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THE

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A JOURNAL OF ART, CIVIL ENGINEERING & BUILDING.

THE WEEK.

THAT H.M. the KING has been so far restored to health as to be able to spend his Christmas as usual at his favourite Norfolk home is not only a matter of pleasurable satisfaction to his loyal subjects, but must redound to the credit of "Dr. Brighton," whose practice of late years has been very markedly declining. Undoubtedly one potent cause, if not the chief one, of the waning popularity has been the hopelessly antiquated character of much of the house property, not only in Brighton proper, but even in its younger neighbour and rival, Hove. Tall-built houses with basements often almost dark, with appalling flights of stairs, no lifts, frequently no bathroom, and with infinitesimal backyards, are enough in these days to deter the public from any seaside town, however salubrious or convenient of access. *En passant*, the convenience of access to Brighton is capable of considerable improvement. For architects who have clients able and willing to invest money in profitable enterprise there are hundreds of opportunities in the modernisation or reconstruction of property, both residential and commercial, in Brighton and Hove.

THE terrible catastrophe that has this week befallen Sicily and Calabria not only demands and receives our sympathy with the loss of human life and the sufferings of those who have escaped with barely more than life, but arouses our fears for the art treasures that, to architects, form the most outstanding characteristic of Sicily and Magna Græcia. Messina, which, so far as news has at present reached us, is the worst sufferer by the present calamity, has so frequently been visited by earthquakes, and notably in 1783, that its store of antiquities cannot compare with those in other parts of the island. So severe a shock can, however, scarcely be confined to a very limited area, and we wait with feelings of apprehension for news of lesser but still serious injury elsewhere.

A MOVEMENT has been set in motion by the local JOHN EVELYN Club for the acquisition of an area of 220 acres as an addition to the Wimbledon and Putney Commons. The fields are between these commons, and at one end is Richmond Park, and Coombe Wood at the other. A large part of the area, which belongs to the family of the Duke of CAMBRIDGE, is now to be let for building purposes. The price has still to be settled by negotiation. The committee have explained that they will not agree to any terms higher than those which a prudent and substantial bidder, concerned exclusively to make a profit for his own private advantage, would offer. If the land is now comparatively cheap, it is because a very large outlay would be necessary in road-making and drainage to develop it as a building estate; because no railway station lies near, and, as yet, no tramway provides communication; and, lastly, because it is not close to any industrial or trading quarter. If the chance of buying is let slip by, the roads will be made and the tramways pushed as part and parcel of a great building enterprise. A private resident has provisionally accepted responsibility for the purchase of a strip of thirteen acres at 280*l.* an acre. The organising committee wisely point out that local enthusiasm must show itself before an appeal for help can be made to outside sympathy. The movement has received the necessary approval of the Conservators of the Wimbledon and Putney Commons. It is suggested that if the subscriptions are insufficient to purchase the area outright, there remain various expedients to avert any serious disfigurement. These include the erection of residences on certain special sites, such as those fronting the Kingston Road, whereby the cost of purchase should be materially decreased. But the JOHN EVELYN Club see no reason why public and private contributions should not be sufficiently generous to enable the area to become an absolutely free public open space. Hampstead Heath has been extended for the third time at a cost of 43,000*l.*

ROME has already, by the developments that have followed the abolition of the temporal power of the Papacy, lost so much of its interest for the artist and the antiquarian that the latest schemes of the municipal authority, involving the destruction of many of the historical monuments of the city, both Mediæval and Renaissance, have caused alarm not only to all those who value the antiquities of Rome for their own sake, but to those who are shrewd enough to understand that these constitute a very potent attraction to the many foreign visitors, whose gold is the mainspring of a large proportion of Rome's business activity. Amongst the monuments threatened is the church of Santo Spirito, which, on account of the records in its priceless frescoes of the Greek notables driven out by the Turkish conquests, has enlisted the sympathy of the Greek Historical Society of Athens and drawn from that body a petition to the Italian Government for its intervention. Of still more general interest is the passage connecting the Vatican and the castle of St. Angelo, whose existence is also threatened. Even the remains of the old walls of Rome are in jeopardy. The excuse for the proposed vandalism is the housing of the working classes, but one of the most striking peculiarities of Rome to visitors is the proximity of the open country to the city's boundaries. We almost said outskirts, but Rome has no outskirts. It would surely be better for the working classes to live in "garden cities" or suburbs outside the gates than to be cooped up in flat-dwellings within the city. True that the Romans of the Republic and the Empire lived in "insulæ," but Italians of the twentieth century have surely imbibed sufficient modernity to respect the works rather than the practices of antiquity.

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THE ABUSE OF COMPETITIONS ON THE CONTINENT.

By LAWRENCE HARVEY, of Geneva.

SOME fifteen years ago the Institute of British Architects took measures to prevent the victimising of their profession by competition-mongers. Apart from the suspicious circumstances which were often met with in the organisation of architectural competitions, it was shown that under the best arrangements then prevailing architectural competitions were very detrimental to the interests of the profession. In one case the money spent by the competitors was more than the cost of the building to be erected. A really monstrous abuse! Usually the secret motive of putting to competition the designing of a public building was that several influential members of the committee had each some person to whom they would like to entrust the job. As they could not openly get him appointed they asked for a public competition in the hope that they would be able to influence their friends of the committee to give the prize to their *protégé*. As committees have neither soul to be saved nor back to be kicked, the trick often succeeded. We speak in the past tense, for we hope that England is become since then so moral that those things could not occur now.

According to the regulations of the Institute, those who set up competitions are obliged to submit to certain conditions which secure as much as possible a fair treatment of the competitors. In our opinion the most important of those conditions is that the judging of the competition should be entrusted to one paid arbitrator. All shuffling of responsibilities is thereby rendered impossible. Left alone to face public opinion, a man of even no heroic virtue feels intensely his responsibility and will take every pains to judge rightly according to his lights. He will probably be most willing to give the reasons of his award, even if they be not asked. This does not mean that the arbitrator's award will please everybody or even most of the interested parties. We remember the late lamented CHARLES BARRY, when President of the Institute, having to act as arbitrator in the competition of designs for the Edinburgh Town Hall. In order to do his work conscientiously he had made a list of the points which decided the relative value of the designs. For each design he gave marks from one to ten for each point: so much for general circulation, so much for convenience, so much for impressiveness of outside or inside, &c., &c. According to the relative importance of the points he multiplied his figures by a co-efficient, one might be five, the other two, the other only one. Then for each design he added all the marks together, and gave his award to the design which obtained the highest total. The result of all this painstaking labour was that everyone was displeased with the award. At all events, however, no one could entertain the slightest suspicion of dishonesty or even slovenliness in the arbitrator's decision.

This is far from being the case at the present time on the Continent, where the system of juries or committees still prevails for awarding the prizes in architectural competitions. One of my Paris confrères, now a well-known architect, competed many years ago for the designing of a group of schools near Paris. Some time afterwards he met one of his school chums who had been appointed a member of the jury, and he told him he had competed and failed. His friend, the eminent member of the jury, said, "It serves you right; you should have shown me your design before you submitted it for competition, and I would have seen that proper notice was taken of it." My Paris confrère added, "In France it is no use competing unless you have friends on the committee or the jury." Even for the scholastic competition of the Grand Prix de Rome the competitors manage to make their designs known to their friends on the jury. A candidate is not considered a serious competitor if he does not. Thanks to the Royal Institute of British Architects we have done with this shameful state of things in England.

With juries to judge architectural competitions irregularities occur which, though not so morally base as what we are told exists in France, are equally unfair and disastrous to the majority of competitors. Some twenty years ago the Swiss Confederation opened a competition for the designing of a central post-office in Geneva. More than a hundred designs were sent in. Yet the jury, without a moment's hesitation, selected unanimously two designs which they considered far above all others. When the names of the authors were disclosed it was discovered that both designs, although entirely different from one another in every particular, were the work of the same firm of architects. This appears very strange, but when explained is simple enough. Up to that time the Swiss Government had shown itself exceedingly economical in its public buildings. The conditions published for the competition underscored this necessity for economy, for it was said that flats should be comprised in the building above the part reserved to the post-office, which flats would be let to private individuals. Now, the winning competitors were intimate friends of the chief of the Federal Board of Works, and in a private interview they heard from him that the Federal Government was enormously rich, and wished to give Geneva the most magnificent post-office possible irrespective of cost, as an acknowledgment for the generous way in which Geneva had received the Federal shouting match.

Now, acting on this information, the firm prepared the two monumental designs to which the jury awarded the palm. In the design selected the flats are represented by one room in the roof. The result is that Geneva possesses in its post-office a monument more impressive than anything of its size to be seen in either London or Paris; but the hundred other competitors have been tricked for all that, and we do not think that any arbitrator would have taken the responsibility of such unfair treatment.

Committees who get up competitions have no more feeling for the professionals who compete than children have for worms they tread under foot. It matters not to them what trouble they give or to what expense they put competitors. The recent international competition for the Monument of the Reformation at Geneva is a most painful example of this kind of victimising competing artists. The architects and sculptors of all countries were invited to send designs for placing a monument somewhere in a large park, so that the game of chance was this, "Your design is splendid, but we do not approve the site you select, and therefore your work is null and void." There was nothing to enable a competitor to know which would be the best site. The design selected by the jury is on a site which offers many drawbacks both practical and æsthetic. As a proof we may observe that nearly the whole population of Geneva, with the exception of the committee and a few friends, is hostile to the successful design. If the committee had required of competitors mere sketches needing very little manual labour, as a preliminary to a final competition in which only a limited number of artists, paid for their work, would have been invited to compete, nobody could complain. But this was not the case; plans involving much labour were demanded, even sculptural details had to be forwarded. For any man who has some fellow-feeling for those who work, the sight of the exhibition of designs for the Geneva Reformation Monument was most painful. Seventy-one designs had been sent from all parts of the world, several from England. Most involved enormous labour, and models, the making of which must have cost from four hundred to eight hundred pounds sterling, exhibited admirable workmanship. All this in vain, to give as a result the selection of a wall with a few statues against it, which will cost, perhaps, five thousand pounds sterling to carry out. If there be any backsliders in England who regret the good old times when competitions were not regulated by the Institute, let them consider the facts which are to be seen on the Continent, and be wise.

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FAIR WAGES.

THE report has been issued of the Fair Wages Committee appointed in August 1907 to consider how best effect might be given by Government departments to the resolution passed by the House of Commons on February 13, 1891, the object of which was "to secure the payment of such wages as are generally accepted as current in each trade for competent workmen."

It cannot fairly be contended that such an object is a pandering to Socialism or a submission to the tenets of trades unionism. The Government, as the largest individual employer of labour in this country, naturally desires that its work shall be carried out by "competent workmen," and rightly recognises that this cannot be achieved except by the payment of fair wages. In many departments of Government work the very assurance of our national existence depends upon the integrity of the labour of competent workmen. The rivetting of a battleship, the accuracy of the sights of a 12-inch gun are matters of which no amount of supervision can insure the perfection without the exercise of the skill and thoroughness of competent workmen. The results of the lack of such skill and thoroughness have been seen quite recently in the construction of foreign battleships.

Even if it were possible to obtain satisfactory work without the payment of fair wages, it is obvious that in Government work such a consummation would imply a clever manipulation of unfair taxation. When a competent workman in Government employ is paid a fair wage for his skill and thoroughness the cost is divided amongst the community, with whatever degree of fair division is represented by the Budget proposals of the Chancellor of the Exchequer. If, on the other hand, he were inadequately paid for good work, he would be taxed to that extent in favour of the remainder of his fellow countrymen. In Germany the cash expended by the Government on the maintenance of each individual soldier is considerably less than in our own country. Why? Because the soldier personally bears the super-tax of the cost of his keep. Such a method of indirect taxation is not yet—and, we hope, never will be—part of our fiscal system. Every Englishman desires that his Government shall be served by competent workmen, and that these shall receive fair wages for their services.

The line taken by the Government must necessarily influence the policy of other governing bodies, municipal and public authorities; and fair wages for competent workmen must become the general rule wherever public money is being expended for the public benefit.

Already it has become quite a common custom for our municipal authorities to insert, as a condition in their contracts, the payment of the trade union rate of wages. The Fair Wages Committee, however, in their report discriminate rightly between "trade union conditions" and fair wages. Frequently, no doubt, the trade union rate of wages is "generally accepted as current for competent workmen," but not necessarily always, and therefore the Committee recommend proposals to insure, without dependence on trade unions, the payment of fair wages.

We cannot but think that it would be advisable for architects in their own interest, as well as in that of their clients, to adopt one in particular of the proposals of the Committee—"that the contractor should be required, when tendering, to furnish a schedule of the rates of wages and hours of labour which he proposes to pay and observe in the execution of the contract."

It has now become so universal that contracts are given to the lowest tenderer, that it is important for architects to be able to put all contractors submitting tenders on the same basis. The quality of materials can be adequately defined by a well-drawn specification; the form of the work is explicitly determined by the drawings; but the precise degree of excellence of the workmanship is practically impossible of definition in a specification.

How often it happens that an architect, saddled with the supervision of the work of the lowest tenderer, finds his labour, his anxiety, and his responsibility increased to a heart-breaking extent because the contractor is bent upon making his profit on the lowest tender by the employment of an undue number of so-called "apprentices," or, in plain English, incompetent workmen ready to accept unfair wages. As it is usually the client most keen on getting his work done at the lowest possible figure who is most exigent of the ability of his architect to obtain for him a higher quality of workmanship than that for which he is willing to pay, the result is dissatisfaction, recrimination, and possibly a law suit, in which the architect may be cast in damages under the somewhat severe view which the Courts now seem inclined to take of the responsibility of the architect and the meaning of "negligence."

It would surely be a strong defence to any charge of negligence if it could be shown that a client willingly accepted the tender of a contractor who proposed to pay 6*d.* an hour to his workmen, when his competitors were prepared to give 9*d.* On the other hand, it is but just to the client who is willing to pay a fair price for a good article that he should be assured that he will receive the work of competent workmen fairly paid.

Nor is it only in respect of "labour" that the principle of fair wages for competent workmen holds good. It applies with equal force to the professional man or artist as to the artisan or craftsman. It is an unfortunate result of the wording of the schedule of charges of the Royal Institute that the public has come to understand by the statement that the "usual remuneration" of an architect is a commission of 5 per cent. that this is the universal remuneration—except when he is content to take less.

For some classes of buildings, as workhouses, large asylums, or hospitals, 5 per cent. is no doubt too high a remuneration, and even our leading specialists would be receiving fair wages at a lower figure. But, taking the general bulk of architects' work, is it conceivable that the services of a newly-elected Associate are of equal value to those of the architect who is a member of the Royal Academy, or President or Vice-President of the Royal Institute? If 5 per cent. is a fair wage for the fledgling, surely the services of the tried and proved artist, of the experienced practitioner, are of greater value, and should receive higher remuneration to constitute fair wages. In no other art or profession does such a state of things exist as in architecture. In painting, sculpture, law, medicine, in every sphere, the men at the top of the tree receive higher fees than those at the foot. Even in architecture we do not find that the trade-union idea of an universal wage for every man obtains generally out of England.

If 5 per cent. is fair wages for the Royal Academician or an Institute President, it is unreasonable to expect that the public should be willing to pay or that the youthful practitioner should require the same rate of payment for inexperience and less ability.

The insistence on one universal rate for all architects is a suicidal policy. The public is apt to appraise a man at his own valuation. It loves to pay high prices for the services or the productions of the best men, and would be delighted to pay the architect who is a Royal Academician in the same ratio to the fair wages of his juniors that it does in the case of painters.

When the Royal Institute receives its new charter, the schedule of charges is one matter that requires amendment, and it should be made clear to which end of the architectural profession the 5 per cent. applies, so that all grades of architects may, according to their ability and position, receive their "fair wages."

Mr. George Banks Rennie, of Denford, Hungerford, Berks, and of Lowndes Street, Belgrave Square, engineer and shipbuilder, of G. Rennie & Co., of Greenwich, a member of the Institution of Civil Engineers, who died on November 15, aged seventy-six years, left estate of the gross value of 96,771*l.* 15*s.* 7*d.*, of which the net personalty has been sworn at 85,775*l.* 14*s.* 7*d.*

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AN ANCIENT IRISH FORT.

THE Grianan of Aileach, which is scheduled in the Ancient Monuments Protection Act of 1882, was vested in the Board on November 9, 1904, by Lord Templemore, and initial repairs have been undertaken by the Commissioners of Public Works, Ireland. A large portion of the walling had fallen down to within 5 or 6 feet of the ground on the south-eastern face. The wall here was 16 to 17 feet in height, and it has been carefully rebuilt with the fallen stones in dry masonry to its original height, preserving the widths of the steps formed in the thickness of the walling and following exactly the original lines as indicated in the adjoining work.

The parapet wall at the top had been greatly injured and almost entirely thrown down by persons visiting the place. During the years 1870-5 a local resident, Dr. Bernard, had at his own expense rebuilt a great portion of this ancient stone fort, the walls of which at that time had become greatly dilapidated. He took the precaution of marking in black colour the walls at the level at which he commenced the rebuilding. The galleries or passages in the thickness of the walls were undisturbed save in a few places where the covering stones were displaced. The lintel covering the entrance, which had fallen, was re-erected. The work done by Dr. Bernard was in keeping with the untouched work then remaining, and is of the character of similar work to be seen here and elsewhere in Ireland.

The principal dimensions of the cashel or stone fort are as follows:—Diameter internally, 77 feet 3 inches east to west, and 76 feet 6 inches north to south; walls 13 to 14 feet wide at base, averaging 16 feet in height. The entrance faces due east, and is 4 feet 1½ inches wide at bottom, and 3 feet 1½ inches at top, and 6 feet 1 inch in height.

There was no spring, but a small well, which collects surface water only. It was 20 inches in depth, and was probably a cooking pit. Adjoining it is an opening through the wall measuring 18 inches wide and 14 inches high, narrowing to the outside face to a width of 9 inches at the bottom, 7 inches at top, and 1 foot in height. There are no traces of the stone huts which are believed to have occupied a portion of the interior.

According to the seventy-sixth annual report of the Commissioners of Public Works, Ireland, there are several cashels or stone forts of like character vested in the Board such as those on the Aran Islands, county Galway, viz.:—The Great Fort on Inisheer, the Forts of Conor and Mothar Dun on Inishmaan, and the Forts of Dun Ængus (a cliff fort), Dun Eochla, and Dubh Cathair on Inishmór, also at Inishmurray, county Sligo, where the structure was afterwards devoted to ecclesiastical uses; at Kilcolman, in the same county, and Dunbeg Fort (a promontory fort), and Staigue Fort, county Kerry. There are the remains of similar forts and stone-roofed huts at Kilcashel, parish of Kilmovee, county Mayo, which have not been vested. These ruins represent the most ancient type of construction in stone known in Ireland, and are composed of stones laid dry without any cementing material.

Of the original date of the erection of the Grianan there is no record, but there are frequent references to its attempted destruction. The earliest reference to its occupation is in the Tripartite Life of St. Patrick, said to have been written in the sixth century, where Aileach is spoken of as the remotely ancient seat of the Irish kings before St. Patrick's time, and in the Book of Lecan there is a list of its forty-four kings from the fifth to the eleventh century.

In 1101 Murtogh O'Brien, King of Munster, it is said, led a great army into Inishowen and "demolished" Grianan in revenge for Cenncora, which had been razed and demolished twenty years before by Domnal O'Lochlain, and Murtogh commanded his army to carry with them from Aileach to Luimenech (Limerick) a stone for every bag of provisions which they had. In 1599 O'Donnell ravaged Clare, and took Ennis, avenging the sack of Grianan of Aileach five centuries before.

In a volume issued by the Ordnance Survey Office entitled "Memoir of the City and North-Western Liberties of Londonderry, Parish of Templemore," published in 1837 ,the Grianan of Aileach is described as it stood in the year 1835.

The further descriptive and historical notes of the structure which follow are chiefly taken from the publication referred to:—

The Grianan of Aileach is situated in the county of Donegal, about 7 miles from Derry, on the summit of a hill 802 feet high. The ascent on the eastern or Derry side is tolerably gradual, but near the top it assumes a more precipitous character, and it terminates in a circular apex which commands an extensive and beautiful view. Formerly an ancient road between two ledges of natural rock led to the summit. Three concentric ramparts surrounded the cashel or keep of the fortress. These external ramparts, which are all in a state of great dilapidation, appear to have been formed of earth mixed with uncemented stones. They are of an irregular circular outline, consequent upon their adaptation to the form of the hill which they enclose, and ascend above each other in successive steps or terraces. Between the third or innermost rampart and the cashel the road diminished considerably in breadth, and diverged slightly to the right, and this approach was strengthened by a wall on each side, of which the foundation stones alone remained.

The cashel, though in a more perfect state than the external ramparts, was a mere ruin. The circular wall enclosed an area 77 feet 6 inches in diameter, and was about 6 feet in height, varying in breadth from 15 feet to 11 feet 6 inches, or averaging above 13 feet. This wall is not quite perpendicular on its external face, but has a curved slope, or inclination inwards, like Staigue Fort, in Kerry, and most other forts of the kind in Ireland. From the quantity of fallen stones, which form a glacis on either side, it must have been at least twice, and was possibly four times, its present altitude. At the height of about 5 feet from the base on the interior face of the wall, the thickness is diminished about 2 feet 6 inches by a terrace, the ascent of which was by staircases, or flights of steps, increasing in breadth as they ascend and situated at each side of, but at unequal distances from the entrance gateway. There was originally a succession of three or four such terraces, ascending to the top, or platform, of the wall. On each side of the entrance gateway there are galleries within the thickness of the wall, extending in length to one-half of its entire circuit, and terminating at its northern and southern points. These galleries are in places 5 feet high, and have sloping sides, being 2 feet 2 inches wide at bottom, and 1 foot 11 inches at top; they are covered by large stones, laid horizontally.

In the southern gallery, and near its eastern termination, there is a small rectangular recess with a seat about 18 inches high. On each side of the entrance passage there is a recess, probably for the purpose of receiving the leaves of a folding door, as their united measurements are equal to the breadth of the passage.

The circular apex of the hill contains within the outermost enclosure about five and a half acres, within the second about four, within the third about one, and within the cashel about a quarter. The masonry of this great work is exactly similar to that of many other Irish cashels or cahirs. The stones, which are of the common grey schist, are of polygonal forms, adjusted to fit each other and wholly uncemented. They average about 2 feet in length, and it is quite evident that they have been in many parts squared with the hammer, but not chiselled. This, as already stated, is most apparent in the angles, &c., of the entrance passage; but in the exterior face of the building the stones are much more rounded, or worn at the edges, and indicate from their state of decay, as well as from the lichens with which they are overgrown, a very remote antiquity.

In the centre of the area of the cashel there were remains of a small building measuring 16 feet 6 inches by 14 feet 3 inches. The walls, 2 feet thick, and not more than 2 feet high, were constructed with mortar. The antiquity of this building is doubtful, and the probability is that it was erected for a chapel during the severe administration of the penal laws. It was certainly used as a chapel until near the end of the eighteenth century, when a chapel was erected at Burt. There are no other vestiges of habitations either within the cashel or its external ramparts. Between the third and fourth walls there is a spring well, which when discovered was covered with a large stone, and between the second and third walls there is a small mound having around it a circle of ten large stones, laid horizontally and converging towards the centre. When the mound was opened shortly before 1835, nothing was discovered in it that would throw light on the purpose of its erection.

The Grianan of Aileach was one of the most remarkable and important works of its kind ever erected by the ancient Irish, the palace of the Northern Irish kings from the earliest age of historic tradition down to the commencement of the twelfth century, and consequently such careful examination of its vestiges as should help to convey a clear idea of its original form, structure, and extent, would give the best evidence now obtainable of the style of military

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building known to the Irish at the remotest period of their history.

That Grian, or the sun, was an object of worship among the Pagan Irish is not to be denied, but that the word Grianan was ever applied to denote a temple of the sun, or a temple of any kind, no authority has been as yet adduced or found, while there are abundant evidences that it was constantly used in a figurative sense to signify a distinguished residence, or a royal palace. It is thus explained by O'Reilly:—"Grianan, a summer house, a walk arched or covered over on a hill for a commodious prospect (a balcony)—a royal seat."

Numerous examples might be quoted of the application of this term to the palace or royal fortress of the Northern Irish kings. Of this fact two instances may here suffice. Both these occur in the poem of Cormacan Eigeas, the bard of Murtagh of the Leather Coats, written in the year 939:—

O Murtagh, son of noble Niall,
Thou hast taken the hostages of Inis-Fail,
Thou broughtest them all to Aileach,
Into the splendid Grianan of horses.

Connor, son of Teige, the bull-like,
Puissant, arch-king of Connaught,
Came with us without a bright fetter,
Into the green Grianan of Aileach.

In all the Irish histories the place of the Northern Irish kings is designated by the name of Aileach simply, or Grianan-Ailigh, Aileach-Neid or Aileach-Fririn, and its situation is stated to have been on a hill in the vicinity of Derry. The signification of this name, Aileach, independently of its attendant epithets, is obviously "stone house or habitation," and it is so explained by Michael O'Clery, the Chief of the Four Masters, in his glossary of ancient Irish words.

The following historical notices relative to its demolition appear in the various Irish Annals:—

674 Aileach-Fririn was destroyed by Finsneachta, the son of Donchadh (King of Ireland).

937 Aileach-Fririn was demolished (according to the Four Masters plundered) by the Danes.

1101 Murtagh O'Brien, King of Munster, at the head of the forces of Leinster, Ossory, Meath and Connaught, demolished the Grianan of Aileach, and he ordered his army to bring from Aileach to Limerick a stone of the demolished building for every sack of provisions which they had with them.

This is the last notice of Aileach as a royal residence to be found in the Irish Annals, and it appears never after to have been thoroughly rebuilt.

ELECTRICITY AS APPLIED TO HEATING AND COOKING.*

THE application of electricity to heating is by no means a modern invention—that is, as electrical matters are judged. There is a record of experiments of this nature carried out by Sir William Harris in 1827, but it was not until fourteen years later that Joule discovered the law known by his name. Most of the early experiments were with respect to furnaces for the reduction of oxides. In 1885 a book was published by "Hospitalier," entitled "Domestic Electricity," which dealt with the ignition of oil and spirit lamps by means of platinum wire brought to red heat by primary batteries.

Three or four years later the first company for the manufacture of heating apparatus for domestic purposes was formed. Several companies had previously made attempts, but it remained for the "Carpenter Electric Heating Corporation" to place articles of any reliability upon the market. Since this first attempt (one might venture to call it the first attempt without any great deviation from the truth) great strides have been made both in efficiency of operation, reliability, and lessening of cost of production. The essential features of effective and satisfactory cooking and heating apparatus are:—

1. The operation to be carried out as rapid as its limitations will permit. 2. The highest commercial efficiency possible—i.e. with the water standard. 3. There must be no smell or dirt.

A word as to limitations. Most operations, except the boiling of water, form their own limitations, for if the operation is carried out too quickly the articles will burn; after that the chief is the "coefficient of conduction," whereby the heat capable of being generated is limited by the rate at which it can be carried away therefrom and used for useful purposes, otherwise the wire or metal film, according to construction, will be fused.

Another consideration is the current flow required to obtain high rates of heating. Corporations and supply companies generally limit the current set in flow by the closing of any one switch; this necessitates the employment of a rheostat or some other suitable arrangement. In addition to this increased cost there is further capital outlay in heavier mains, switches, &c.

Speaking generally, there are two principles of heat generation, electrolitic and hot wire. The latter may be subdivided into the following:—(*a*) Incandescent lamps; (*b*) hot wire coils; (*c*) hot wire coils in enamel; (*d*) hot films; (*e*) hot iron plate (transformer method). The author gave a detailed account of each.

He next reviewed some important facts in connection with the heating of air.

The thermodynamic inefficiency of prime movers for the generators of electricity greatly reduces the efficiency of electric warming apparatus, though this disadvantage is not quite so great as is generally believed. For example, with a small room of 1,500 cubic feet capacity it should be theoretically possible to raise the temperature of the air in the room from 32 to 60° Fahr. with about 200 watt hours. If the air in such room is changed twice an hour, a radiator consuming 400 watts would be theoretically necessary to maintain a temperature of 60°, the temperature of the outside air being as low as 32° Fahr. Now, if an electric radiator consumes 1 kw., its efficiency for air warming will only be about 40 per cent., and it is quite clear that it must be possible to improve the efficiency of the apparatus to at least, say, 70 or 80 per cent., and this, in fact, can be done. The capacity of an electric radiator for warming air depends principally on the amount of convected heat given out by the apparatus, and this percentage of convected heat is in inverse ratio to the temperature difference between the apparatus and the surroundings. If the electric radiator has a temperature difference above the surroundings of 1,200° Fahr., the percentage of radiant heat emitted by the apparatus will be approximately 95 per cent., so that only 5 per cent. of the heat will be used for direct air warming or convection purposes. The radiant heat emitted by the apparatus will impinge upon the walls of the room, thereby warming these walls, and a great part of the heat will be dissipated on the outside of the walls. The percentage of heat received by the walls and dissipated on the outside depends upon the heat conductivity of the walls, and in the case of very thin walls or windows this may be very great indeed. At a temperature difference of 600 to 700° Fahr. the percentage of radiant heat given out by the apparatus is still about 70 per cent., and only 30 per cent. is used for direct air warming; and at a temperature difference of 100°, however, the percentage of heat used for direct air warming becomes very great, and it can be safely stated that an electric radiator having an outside temperature of only 100° Fahr. above the surrounding air can by judicious design and construction be made to have an efficiency of 70 to 80 per cent. for direct air warming purposes.

The efficiency of the apparatus will be greatly assisted if the covering of the wall is of such a nature as to retain a stagnant layer of air close to the walls, which effectively insulates the wall from the heated layers or currents of air moving along the wall and thereby prevents the heat of the air in the room from being imparted readily to the wall itself.

If the electric radiator produces a great percentage of radiant heat this stagnant layer of air is no insulator, because the radiant heat will pass through it without incurring appreciable loss. Electroyl radiators have an efficiency of 70 to 80 per cent. for direct air warming purposes, and will therefore bring the electric heating within the reach of everybody, provided that the cost of electricity does not exceed 1*d*. per unit.

In some types of electric radiators the working temperature is so high that the greater part of the heat is given off as radiant heat. With such radiators the air can only be heated indirectly—that is, by coming in contact with bodies some certain distance away from the radiators. The intensity of these heat rays, as is also well known, decreases with the square of the distance.

Reference was then made to some comparative tests carried out at the Thomas E. Clarkson Memorial School of Technology, U.S.A., by Miss C. D. Fraser, of cooking by

* Abstract of a paper read before the Liverpool and District Electrical Association, at the Common Hall, Hackins Hey, Liverpool, by Mr. S. R. Gibbon.

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electricity, coal, gas, gasoline and kerosene, which showed that with electricity at 1*d.* per unit there is much in its favour.

The author commented on the pushing policy of the Marylebone Borough Council in respect to electric heating in cooking, and hoped that other supply companies and municipalities would follow their example.

QUARRYING IN BELGIUM.

BELGIUM is rich in various kinds of stone and marble. The quarrying industry employs over 37,000 men, and its annual output exceeds 2,500,000*l.* The most important quarries are in the provinces of Hainaut, Liège and Namur, these furnishing seven-eighths of the total stone quarried in Belgium. The products are freestone, limestone and paving-stone. The American Consul at Liège says that the blue stone is the best known, and is serviceable for building and ornamental sculpture, being probably the most important product of this class of quarries. The quarries of Soignies, Ecaussines and Sprimont are the most noteworthy in this connection. These are provided with powerful modern machinery, and employ a large number of workmen. They have also attached to the quarries apprentice workshops, where young workmen receive practical and theoretical training in stone-cutting and sculpture. The quarries of Belgium furnish a great variety of marbles, which stand rather high in the market. Of black marbles there are three distinct groups, the first furnishing a marble much in demand even outside Belgium, which is used in the manufacture of clock cases and mosaics. The "Noir fin de Golzinnes" is valued on account of its purity, the high polish it is capable of receiving, and its adaptability to the carver's chisel. The second group produces a marble that is soft and easily carved, and the third is a deep black, close-grained stone, serviceable for flooring slabs, plinths, window facings and fireplaces. There are many varieties of red marbles, which are used mainly in large work, such as altars, columns, fireplaces and window sills. Blue marble, so-called, is used generally for decorative work and paving. The "florence lilas" is very much in demand. The marbles most used in Belgium are the Sainte Anne blue, the red mottled, the Belgian black and the "granit." The blocks are often shipped in the rough, but it is more customary to finish them at the quarries, the workmen enjoying a reputation of being especially clever in this class of work. The production of porphyry paving-stone blocks, sandstone and calcareous stone is second in importance in Belgium. The slate quarries of Amblere have been worked from time immemorial as material for razor hones. The stones are cut in parallelopipeds, the under side of which is composed of slate, while the upper surface consists of the sharpening stone. The stone is exported chiefly to Germany, but some goes to the United States. Limestone is found generally distributed throughout the country. Limekilns are plentiful, and are confined to no particular locality, although those of the Provinces of Hainaut, Namur and Liège are those only worthy of being mentioned as industrial enterprises. Potter's clay is found generally throughout the country, that found on the Rupel and in the neighbourhood of Courtrai being used in the manufacture of tiles, drainage pipes, paving blocks and bricks. Chalk is extracted in large quantities at St. Vaast and at Trivieres.

BIRMINGHAM UNIVERSITY.

THE new University buildings at Bournbrook have not escaped severe criticism, both professional and lay. From the Bristol Road they appeared to one critic as "an unintelligible mass of sprawling brick, dominated by an imitation of the Mangia Tower in Siena," and from the University Road as "a long stretch of featureless subsidiary buildings which might very well be mistaken for a factory." Fault is also found, according to the *Birmingham Post*, with the campanile, which, this critic complains, "is dumped down in the middle of the courtyard, so that more than half its height is hidden by the library, and only the excessively tapering top is seen in sheer fore-shortening. The general effect is almost comical, and it is difficult to conceive a worse-planned building. It is fairly obvious that the architect had been impressed by Bentley's Westminster Cathedral. He has taken from him the Byzantine domes and the lofty campanile, but, whereas Bentley adhered to the Byzantine tradition in the planning of his noble edifice and displayed his originality in the invention of beautiful details, the architect of the new Birmingham University abandoned the principle of growth so important in Byzantine architecture and merely borrowed certain disconnected ideas for his sprawling, disjointed plan." Much of this criticism is vitiated by two facts which, apparently, have been either ignored or lost sight of. The first is that the new buildings are mainly utilitarian in design, and the second, that in their present state of incompleteness no sound opinion can be formed as to the ultimate appearance they will present. Not till then will the unity and homogeneity of the design be apparent. In the existing inchoate state of the buildings common fairness dictates that judgment should be reserved until that remote, and it must be confessed somewhat problematical, period, when the designs of Sir Aston Webb and Mr. Ingress Bell have been fully carried out.

In the meantime, the close of another year brings with it the task of again recording the progress made in this great work. Its magnitude makes that task no easy one. The work grows so slowly, almost imperceptibly, that even those engaged upon it confess difficulty in stating precisely what progress has been made in twelve months. But what, as a matter of fact, has been accomplished in that time has been the completion of the exteriors of the Harding Library and the chemistry and physics blocks, the carrying up of the tower to the belfry, the erection of an observatory, and substantial progress in laying out the terrace and the grounds. Of the two blocks named, that to be devoted to chemistry is the lesser advanced, but though the scaffolding has not yet been removed it may be said to be finished so far as the exterior walls are concerned.

The designs, readers may be again reminded, are for a series of buildings arranged in the form of a semi-circle, with University Road, which runs practically parallel with Bristol Road, as the diameter. Radiating from the centre to the circumference of this semi-circle there will be ten blocks, and the size of each will be, roughly speaking, equal to that of the Birmingham town hall—a statement which brings the vastness of the scheme vividly before the mind. Of these ten blocks five are at present erected, and three—Blocks A and B devoted to electrical, mechanical, and civil engineering, and Block C to mining and metallurgy—have been in occupation for a considerable time. The two other blocks are those set apart for physics and chemistry. They stand at right angles to the main entrance. This leaves two blocks to be erected between Block C and the physics block, and one between Block A and the chemistry department.

It is upon the tower (the contract for which is being carried out by Messrs. Waring & White, London) that most progress, at least to the outsider, appears to have been made during the past year. This tower, which is built of Accrington red bricks, with Darley Dale stone dressings, has now been carried up to the stone machicolations upon which will rest the balcony running round the belfry walls. When completed, this tower, if only by virtue of its height from the level of University Road, will be a conspicuous landmark for miles round. It rests on a solid rock foundation 50 feet square, and will rise from the ground level to a height of 325 feet, being surmounted by a graceful spire. The clock, which is to be supplied by Messrs. Joyce, of Whitchurch, will have a face 17 feet 3 inches in diameter, and the belfry will contain five bells, weighing five tons each. The tower will contain ten floors, and they and the balcony will be reached by a lift. This tower stands immediately behind the Harding Memorial Library, erected in arches above the main entrance and in front of the entrance hall, over the door of which are statues representing poets, musicians, scientists, and philosophers. The early months of the year were devoted to giving the finishing touches to this hall, the floor of which is in Dove Pentelikon and Sicilian marble, while the walls are adorned with Breche Violette marble columns with grand antique bases and skirtings and statuary caps. The columns support a circular promenade having gilded railings. Above is the dome with its whispering gallery. The dignity of the entrance hall is in keeping with the general scheme, and forms a fitting introduction to the great hall opening out of it. Stately in outline and impressive in its proportions this hall is unquestionably one of the most striking features of the buildings. It has been in use for over a year for examination purposes, and has since been enriched by a beautiful stained-glass window at the south end, the gift of Sir John Holder. At the present time the organ is being fitted up, a peculiarity of the instrument being that the pipes are divided into two parts, fixed on each side of the hall. The mechanical power necessary for the playing of the organ will be supplied by an electrical motor. On the east and west sides of the hall are emer-

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gency exits leading to the courtyards. Running round three sides of the hall is a recessed gallery constructed to form a kind of colonnade. The Harding Library was practically finished last year, so far as the exterior was concerned, and the work in hand now consists of supplying the internal equipment.

Considerable progress has been made in the laying-out of the grounds, and the site generously presented by Lord Calthorpe is being gradually reclaimed from chaos and confusion to something like ordered design. A terrace 20 feet wide and 1,200 feet long, having centre and side rock-faced bastions of Darley Dale stone, is being constructed parallel with the Bristol Road, and when this is finished will add considerably to the general effect of the buildings on the south side. From the east end of the terrace a winding road will lead down to the Bristol Road, where imposing ornamental gates will be erected at a point opposite Bournbrook Road. At one side of these gates a porter's lodge will be built, the foundations of which are now in hand. From the centre bastion in the terrace a flight of steps will lead to the lower level path, from which more steps will give access to the playing fields, twenty acres in extent, also the gift of Lord Calthorpe. Other work, either completed or in hand, is the erection of the boundary wall along the Bristol Road. On an average 250 men have been and are employed on the buildings, and it is satisfactory to be able to record that during the past year no accident of a serious character has occurred. The whole of the work is being carried out under the supervision of Mr. Henry Gray, as clerk of the works.

Dealing with the work of the University, it may be said that the departments of civil, mechanical, and electrical engineering, and also those of metallurgy and mining, have already been working for three sessions, and as the buildings for these departments were completed, and the initial equipment supplied, little change in these directions has occurred during the past year. In the civil engineering section good progress has been made with the arrangements for the testing of cement, and the new 100-ton vertical tensile testing machine has been brought into regular use. In each section the departmental libraries are properly organised, and are receiving additional volumes, while the metallurgical museum has been enriched by the addition of numerous specimens. But the chief improvements are probably those dealing with the comfort of the students and staff.

THE MAKING OF CITIES.

PROFESSOR PATRICK GEDDES, University College, Dundee, delivered a lecture on "The Making of Cities: Past, Present, and Possible," in Aberdeen Art Gallery last week.

Professor Geddes said they might wonder why he took so vast a subject for his lecture, and said he would introduce himself as being in a way the editor of an encyclopædia of which the name, if it were finished, would be—and for that he could not hope—"The Encyclopædia Civica." It would be a study of cities in their past and present states, and of their people also, and it would try to bring together a splendid literature of cities, to gather in picture and indeed in gallery the presentment of their beauty, and would seek to inspire the citizens of each city to some sense of the possibilities and responsibilities of their future. They all more or less existed in cities, and their holidays were largely spent in visiting them as much as country scenes, but little was known of cities. He could not name a book which would give a discussion of cities as a whole. There was a great deal of history, but it was largely concerned with nations or persons, but the city was still largely overlooked. They must recognise they were not only individuals and not only cities, but great human groups or hives. To know cities was one of the essential steps towards knowing humanity and social science. As in natural science so in civic science, they must begin by going to see examples. Modern American cities, such as Washington, Boston, Buffalo, Yale, and Harvard may be taken as types of city planning, of park improvement and university development. The extension of public parks which was proceeding in America was to be heartily approved, as well as the system of linking up those pleasure grounds with boulevards so as to bring the parks within reach of all the inhabitants of those great cities. Professor Geddes then returned to the modern British city, with its slums and jerry-built houses, while as examples of better things, however, the Glasgow Art Gallery and National Exhibition of 1901 were contrasted favourably with the recent Franco-British Exhibition, which, although on a larger scale, had been visited by fewer people, and had been less successful than that of Glasgow. As an instance of the failure of even the best municipal intentions, without artistic guidance, there was exhibited the triangular bronze pediment recently erected by the Edinburgh Corporation on their magnificent new hospital. The modern question as to town planning was next gone into, with illustrations from German towns and cities, and Professor Geddes showed that town planning was not a new thing, but had been a lost art for a few years. As an example of a garden city, Hampstead was taken as the best up to date. In the scheme the design had followed the natural condition of the ground, making the hills neither too sudden nor too steep. Hampstead, with its famous heath, had enormous possibilities, and with an enterprising mayor there was every indication of the best being made of the town. Professor Geddes described Aberdeen as a regional capital. In his London lectures he had referred to Dundee as the saddest and Aberdeen the finest city in these islands. He urged the community to secure the preservation of Old Aberdeen, with its ancient beauty and attractiveness, and to prevent Rubislaw Den being spoiled; while he also spoke of Aberdeen as the leading municipality in the matter of street tree planting. The practical problem before Aberdeen and other cities was to prepare for the Town Planning Bill, as much yet required to be done to obtain the best from the city. He remarked upon the dangers of some plans, and the possibilities and advantages of others in the matter of health and economy as well as beauty. As the most practical means of preparing for town planning and of avoiding the risks of too hastily prepared plans, a method was outlined by Professor Geddes as convener of the cities committee of the Sociological Society, which had already been arranged at Leicester, Chelsea, Richmond, and other towns. Richmond had for some time been the pleasure-ground of London people, but now the motor-car took them further afield. Chelsea, although more a seat of industry than Richmond, also possessed much beauty. The general idea of the exhibitions which had been held at those places was to bring together the resources of the antiquary, the archæologist and historian of the past with models, plans, and pictures all combined and with views of photographic surveys of the present with its beauties and blemishes. They should also add to those, as far as possible, a survey of the actual social conditions such as had been made by Mr. Booth for London, or on a similar and more convenient scale by Mr. Rowntree for York, Miss Walker for Dundee, or Mr. Arthur Sherwell for Edinburgh. The past and the present being thus represented, the possible improvement of the future had next to be prepared for, and towards that two distinct lines of work were necessary—first, to bring together good examples of town improvements and city design from Germany, America, and other countries as well as our own, so as to educate public opinion and call forth architectural skill and public spirit. Finally, with all that knowledge it should become possible for many architects and others to make useful suggestions towards possible improvements on this or that quarter of the town, and in such ways, by means of those exhibitions, the whole community would be aroused to a clearer sense of its common interests and its possibilities. The advantage, too, to the art gallery, library and museum of such a co-operation with the city authorities and the citizens generally was also pointed out, and the lecturer concluded with a strong plea for the preparation of such an exhibition.

The French Minister of Marine has offered to the Louvre authorities a collection of sculptured works by Puget which were recently at the Franco-British Exhibition.

Mr. William Milner Fawcett, M.A., architect, Cambridge, died at his residence at Cambridge on Sunday at the age of eighty-six. He was born near Leeds. He began practice as an architect at Cambridge in 1859. He obtained his F.R.I.B.A. in 1866, was member of Council from 1871 to 1873 and from 1884 to 1889, and was vice-president from 1896 to 1900. He was a county surveyor for Cambridgeshire 1861, and diocesan surveyor for the diocese of Ely 1871. Among his architectural works are the Cavendish Laboratory, additions and alterations to King's, Queens', Emmanuel, Peterhouse and other colleges, the training college for women at Cambridge, additions to Addenbrooke's Hospital, over seventy county mansions and County Council buildings, and the building and restoration of about fifty churches. Mr. Fawcett was for many years an enthusiastic volunteer.

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NOTES AND COMMENTS.

THE third quarterly issue of the *Architectural and Topographical Record* has now appeared, somewhat belated. The parishes with which the present number deals are Boveney, in Buckinghamshire; Tyneham, Steeple, and Kimmeridge, in Dorsetshire. The historical and archæological data are, as usual, well treated, whilst of architectural interest there are measured drawings of a pleasing little two-light fifteenth-century window and seventeenth-century screen, pulpit and pews in the chapel of St. Mary Magdalene at Boveney; a seventeenth-century pulpit in the parish church of St. Mary at Tyneham; and some late sixteenth and early seventeenth-century details from Tyneham House, which is described as "the finest example extant of the sixteenth-century manor houses of the Isle of Purbeck." One of the most interesting things in this issue is the sketch of a chalice with paten cover, bearing date 1574, in the church of St. Michael at Steeple.

THE suggestion of Mr. J. LANDFEAR LUCAS that Portland Place should be extended across Regent's Park to the foot of Primrose Hill, so as to form a stately processional avenue, if inexpedient when Portland Place was laid out, does not seem to have good grounds for its realisation at the present day. London hardly wants a processional avenue from the Langham Hotel to Primrose Hill, or in the converse direction. The tide of fashionable life has drifted so far west that even the lengthening of the wide roadway would scarcely attract carriage folk to these comparatively unknown regions. The idea of taking away part of the park and turning the land bordering on the new processional avenue into building plots is objectionable not only on account of the injury to one of the "lungs" of London, but because Regent's Park was originally a swamp, and is still one of the surest localities in the metropolis for the study of mist and radiation fogs. Of course, it is a corollary of the suggestion now made that the projected Shakespeare memorial should be put on the top of Primrose Hill, instead of, as at present intended, at the Euston Road end of Portland Place. True though it is that the magnificence of Portland Place is lost in a backwater of London's life, if one were proposing to Haussmannise, it should be southward rather than northward, so as to extend this stately avenue, that at present leads from nowhere to nowhere, until it joined Piccadilly Circus. This would hardly fit in with the improvements that have been determined, and partly commenced, in the Regent Street Quadrant and Piccadilly Circus, so that in the present temper of London's inhabitants and London's governors this suggestion is quite as Utopian as the idea of extending Portland Place to Primrose Hill.

THE Institution of Heating and Ventilating Engineers has opened a competition for its members and for employés of any bona-fide heating and ventilating engineer in the British Isles, and is offering prizes of 25*l.*, 5*l.*, and 2*l.* The subject of the competition is the preparation of a complete scheme for heating and hot-water supply suitable for a general hospital, the plans of which have been prepared by a member of the Council of the Institution. We hope these plans have been prepared merely for this competition and not for execution, as they are anything but admirable as an example of hospital planning. This, of course, does not matter if they are merely a basis for the present competition; indeed, they would give all the more scope for skill in the competitors, particularly if the ventilation of the building were included as part of the problem.

IN the future history of the Crystal Palace the fifty-ninth general meeting will mark an important epoch, for it gave approval to a Bill being promoted by which State assistance is asked to permit of its continued existence. The private Bill, which was lodged last week, states that the company have been unable to issue the 75,000 1*l.* preference shares authorised by Parliament in 1906. The Bill proposes to empower the Public Works Loan Commissioners to lend on mortgage 50,000*l.* for the repair and improvement of the structure and such a further amount "as may be requisite" for the redemption of all or any part of the existing 495,000*l.* debenture stocks. The loans made by the Commissioners are to be repaid within sixty years and to bear interest at a rate not exceeding 3*l.* 15*s.* per cent. Power is sought to enable the company to prepare schemes for "the promotion or extension of the usefulness of the Crystal Palace and the grounds thereto belonging for any purposes beneficial to the public." These schemes are to be subject to the sanction of the Board of Trade. Public opinion showed at the recent Mansion House meeting that it would be unwilling to allow the Crystal Palace to become a mere memory, even if it has to be supported out of the national exchequer. It has been officially stated that a sum of 100,000*l.* would place the company on a firm footing.

THE value of hypochlorite of lime, or "chloros," as a sterilising agent for waters polluted by organic impurity, which was proved at Maidstone and Lincoln in our own country, with the Elbe water at Hamburg and the Seine water at Suresnes, has further proved its utility in the purification of the water of Bubbly Creek, or Stock Yards slip, as it is officially known, of the Chicago River, and a full account of the detail of its application is appearing in our contemporary, the *Engineering Record*.

THE Architects' Technical Bureau has issued to its subscribers the first folio of Standardised Manufacturers' Circulars, but its value to architects is not very apparent, as only a very few manufactures are included, and these neither very important nor, for the most part, very novel. Although the circulars bear the imprimatur of the Bureau and profess to have obtained the approval of the advisory committee, it is difficult to understand to what this extends other than to the form of publication, as it is expressly stated that no tests have been made.

ILLUSTRATIONS.

DESIGN OF PROPOSED NEW MOSQUE FOR LONDON.

THE illustration is from a bold pen-and-ink drawing made by Mr. W. I. CHAMBERS.

HARLEY HOUSE, MARYLEBONE ROAD, N.W.

THIS fine building, consisting of high-class residential flats, occupies a fine open position on the Howard de Warden Estate, and faces Marylebone Road, opposite Harley Street. The main frontage faces south and is set back 50 feet from the roadway, the intervening space being laid out with ornamental gardens. The main elevations are in Hartham Park and Portland stone, and the construction is fireproof throughout, while there are in addition fire-escape stairs to each flat. Each block has a fine entrance hall panelled in mahogany. The main staircases are in stone, handsomely decorated, and fitted with a passenger lift, giving access to the upper floors. Electric light and electric bells are fitted throughout. The construction of the building was carried out by Messrs. J. SIMPSON & SONS, of Paddington Street, under the supervision of the architects, Messrs. BOEHMER & GIBBS, of Spring Gardens, W.C.

THE BRANCH HOTEL, BRIGHTON.

OUR illustration shows a building recently erected for Messrs. KIDD & HOTBLACK, LTD., in the London Road, Brighton. Occupying a prominent corner in this, the principal approach road to London-by-the-Sea, and near Preston Park, the aim has been to convey some suggestion of both town and country. The materials used are red brickwork with rough-cast and artificial stonework, the cost being under 3,000*l.* The architects are Messrs. CLAYTON & BLACK, of Brighton.

NATIONAL TELEPHONE COMPANY'S BUILDING, VICTORIA ENBANKMENT, E.C.

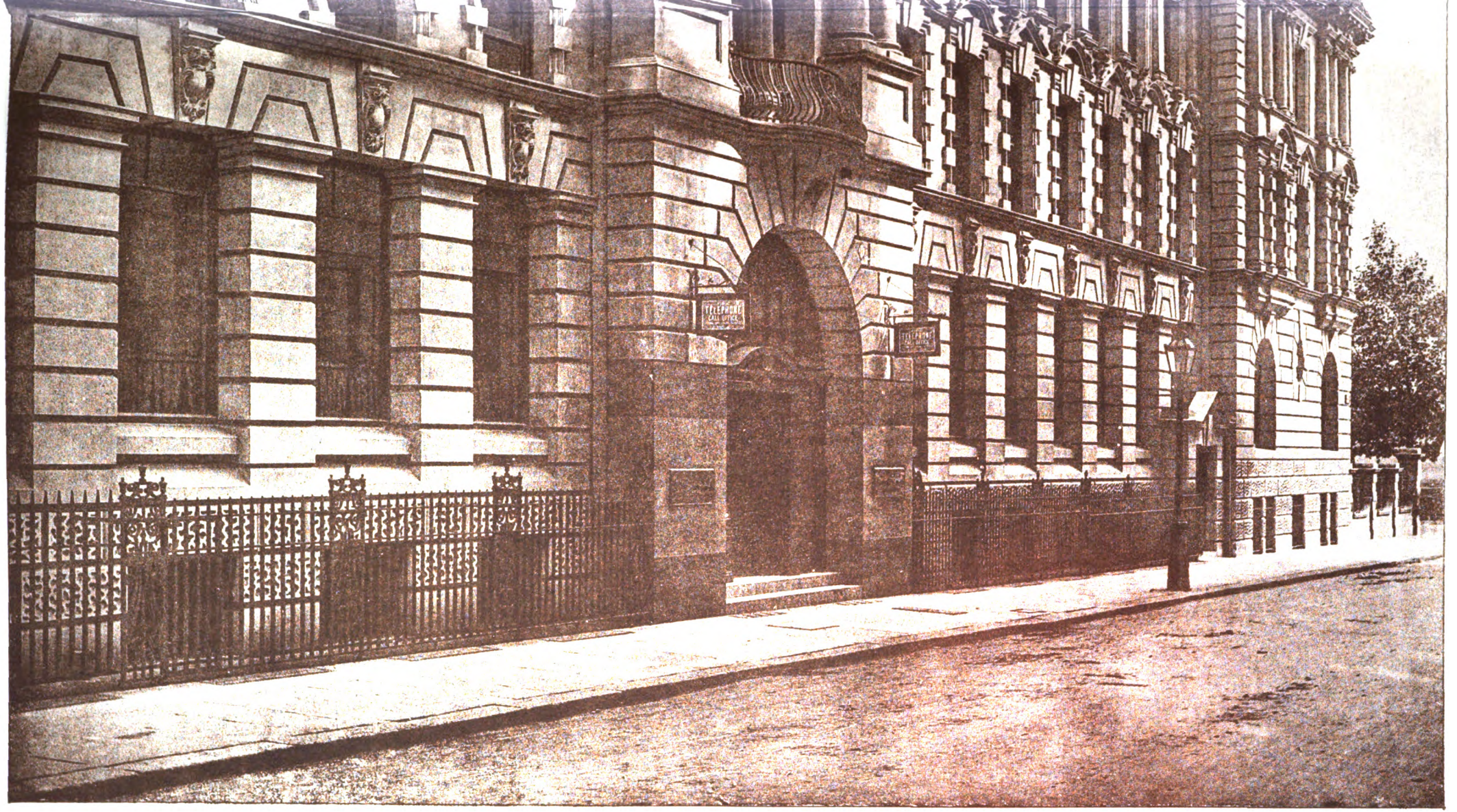
WE give a view of the National Telephone Company's head offices on the Victoria Embankment, for which Mr. A. N. BROMLEY, F.R.I.B.A., of Nottingham, was the architect.

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NATIONAL TELEPHONE BUILDINGS, VICTORIA EMBANKMENT E.C.

A. N. BROMLEY F.R.I.B.A. Architect

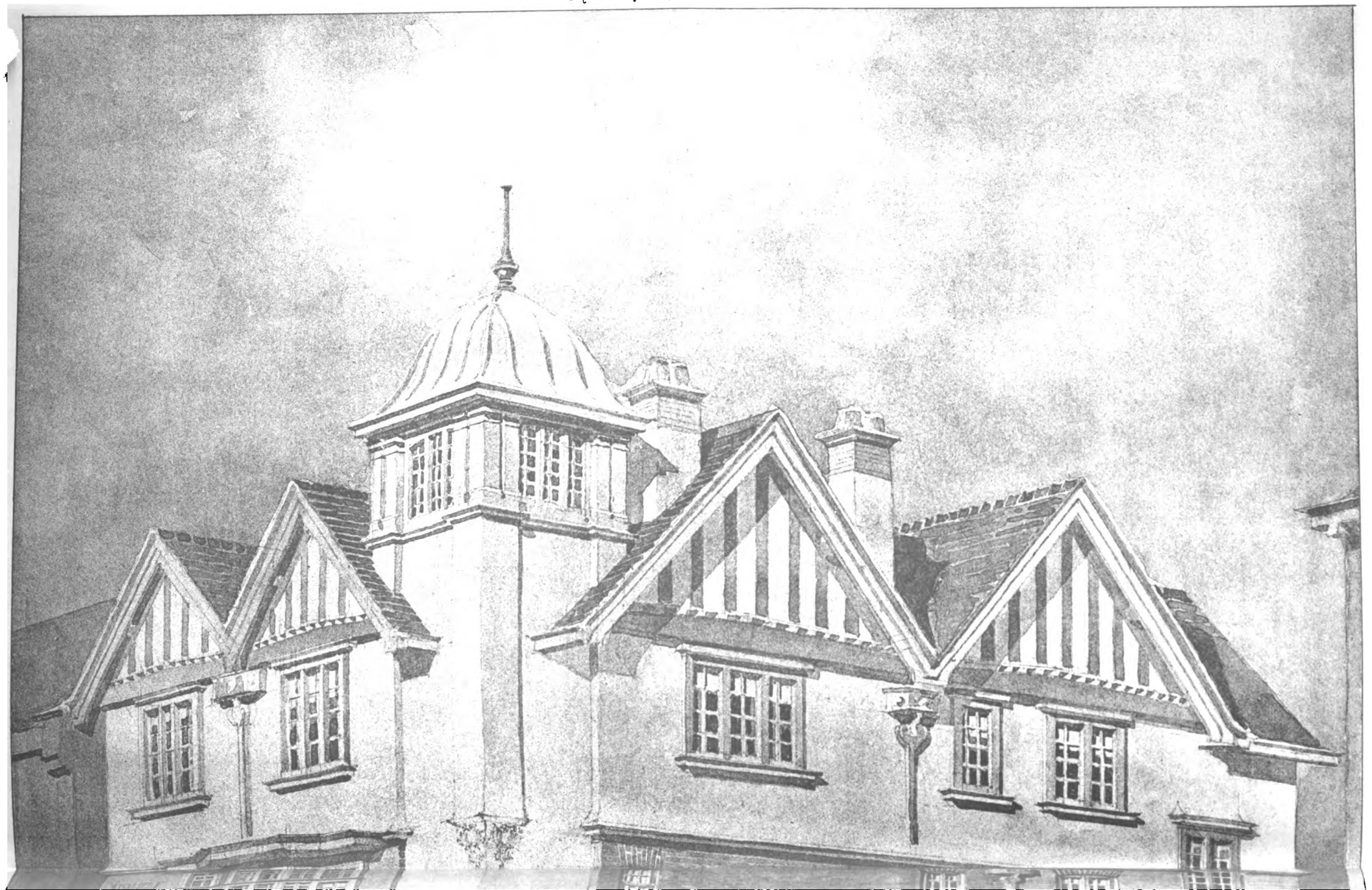
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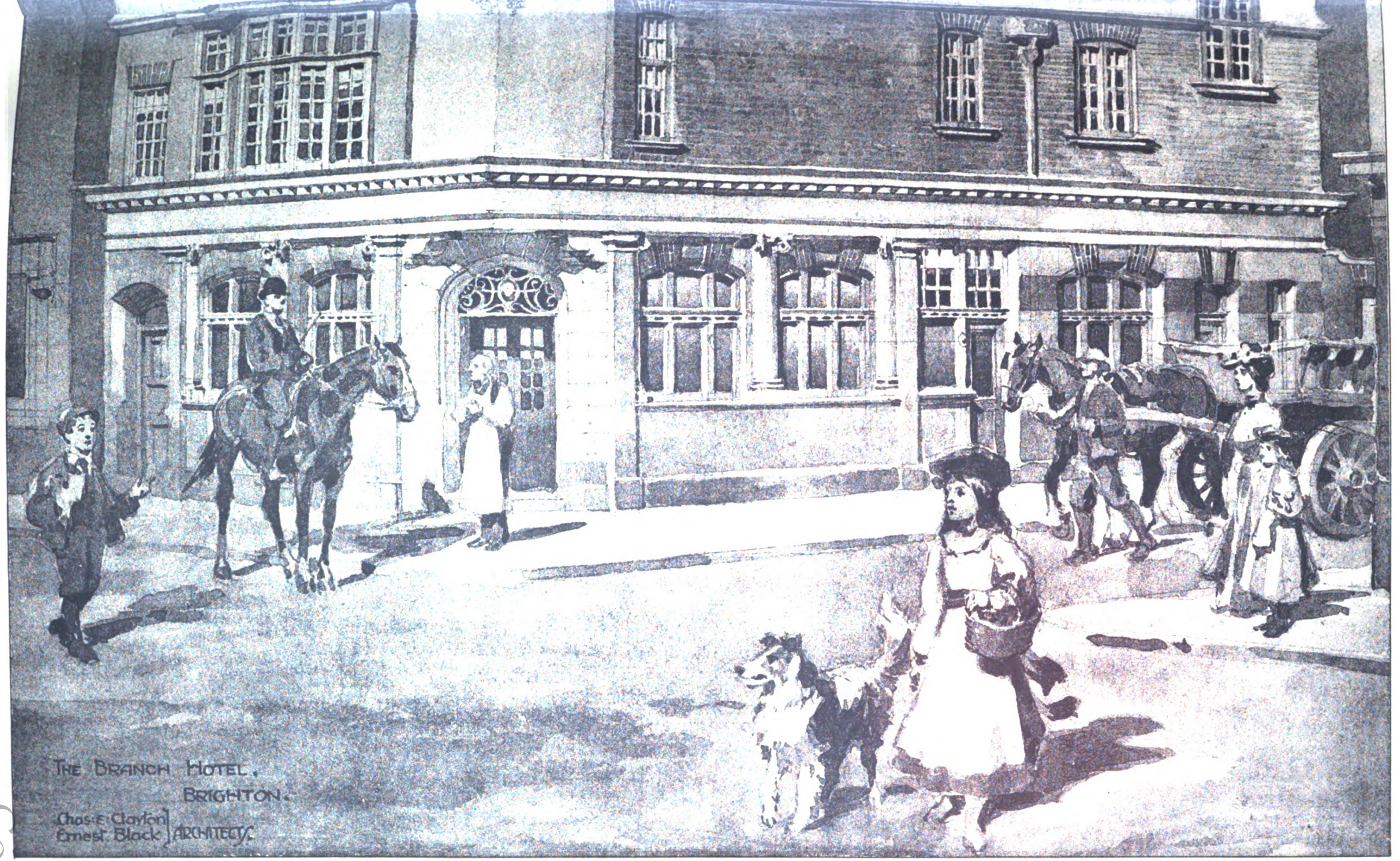
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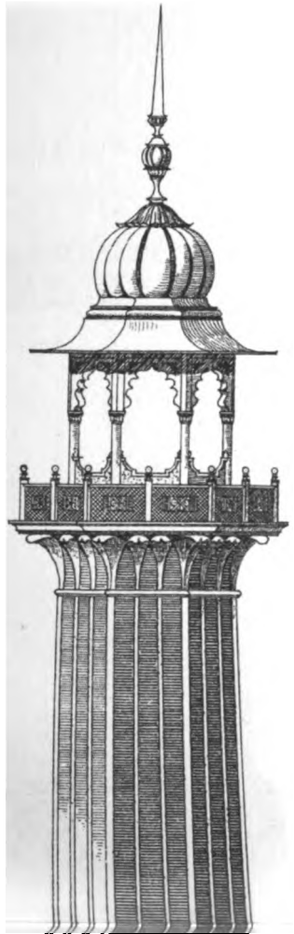
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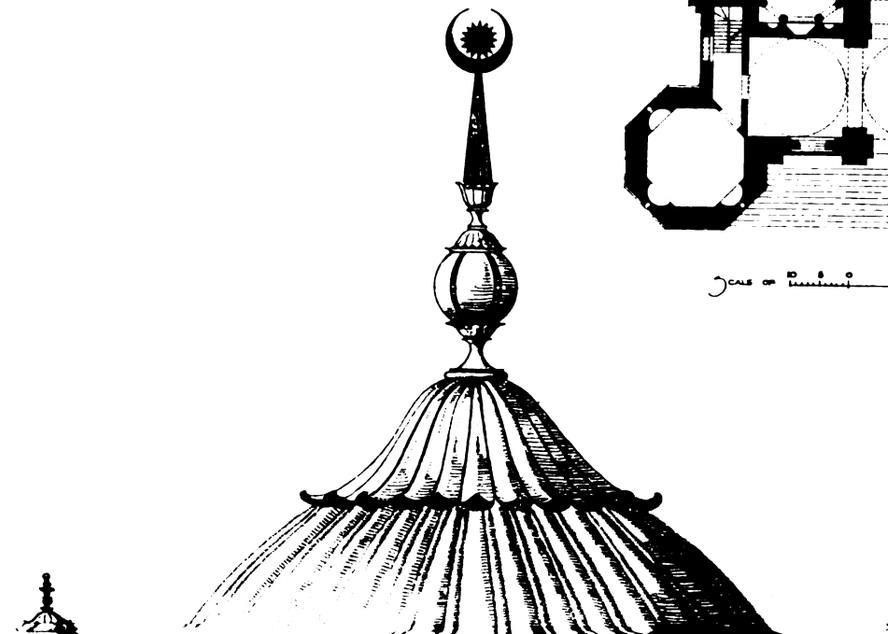


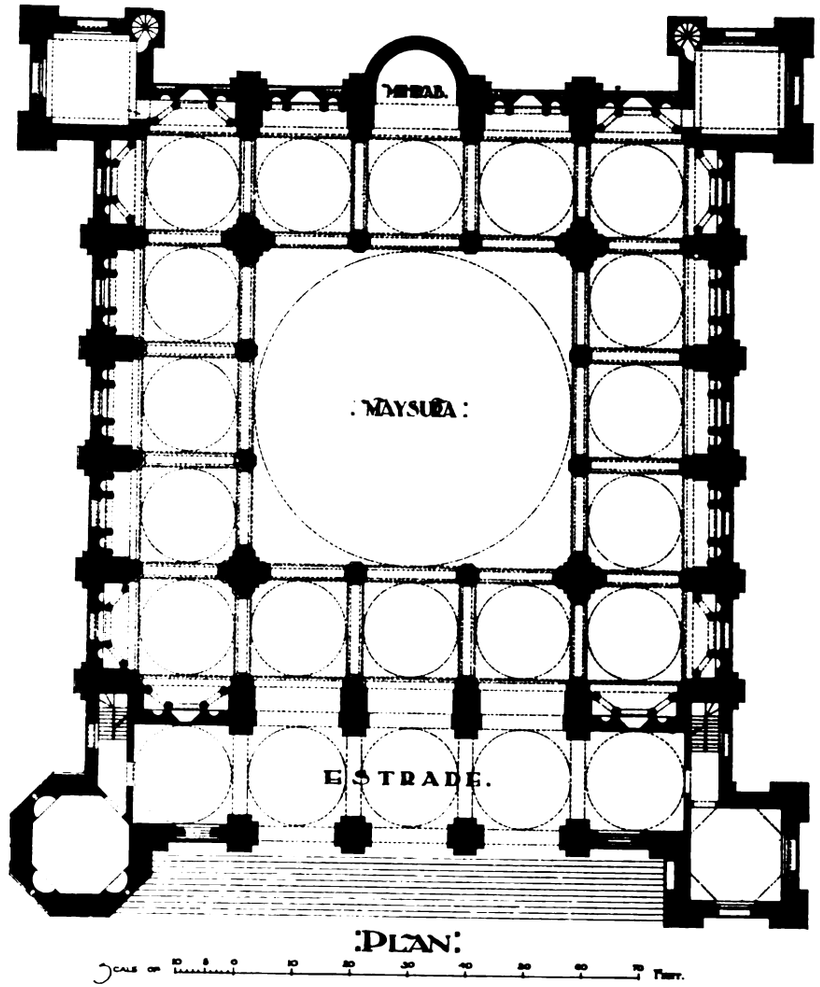
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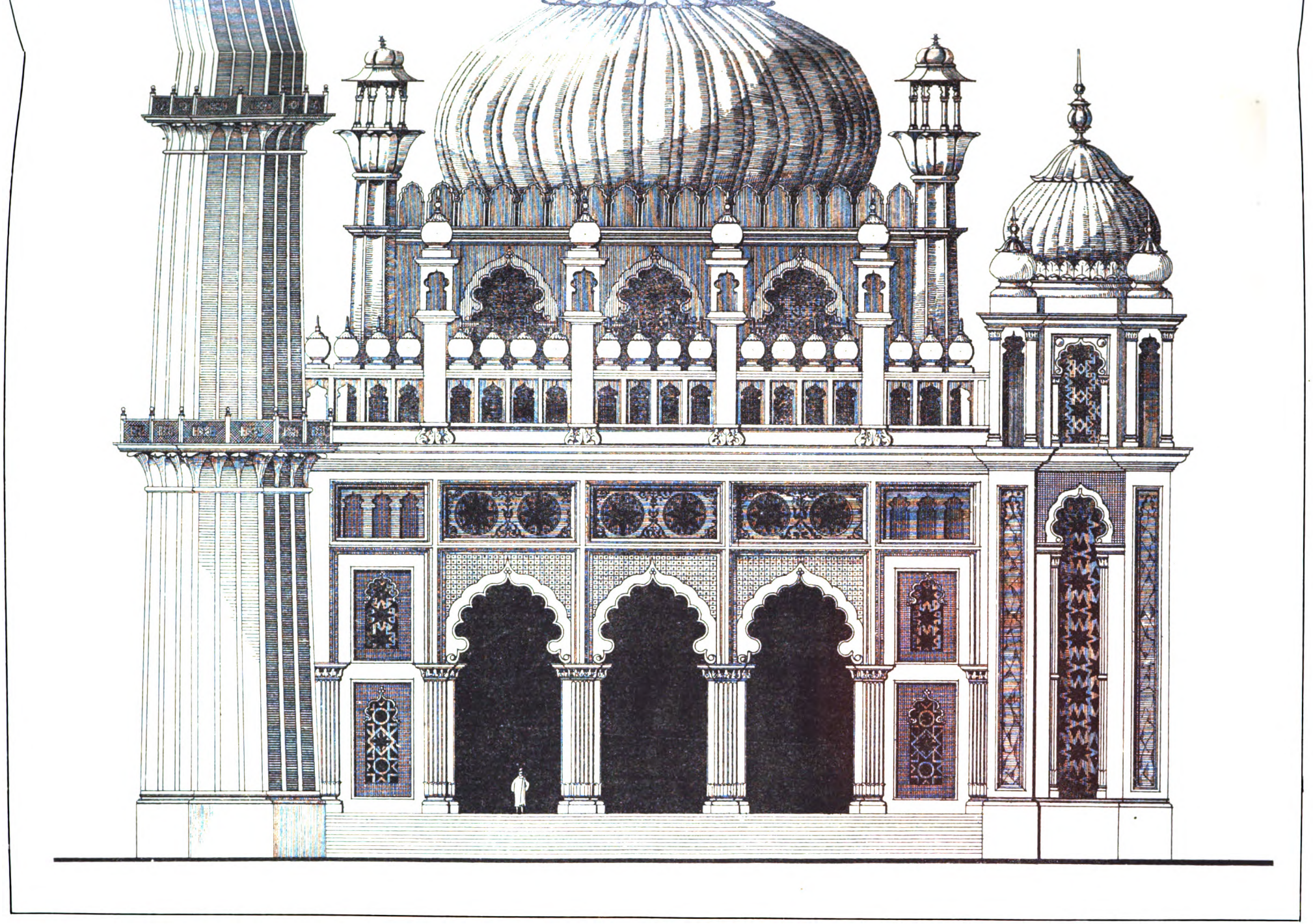






PLAN.

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Design of Proposed New Mosque for London.

By W. I. CHAMBERS.

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PHOTOGRAPHED BY BEDFORD LEMERE & Co 147, STRAND, W.C.

HARLEY HOUSE, MARY

Messrs. BOEHMER &

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OUSE, MAYLEBONE ROAD, N.W.

rs. BOEHMER & GIBBS, Architects.

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EASTERN BUILDINGS.*

IN addressing you this evening, I wish first of all to thank you for the compliment paid me in electing me an honorary member of your Society. The objects you have in view are so closely allied to my own mind and work that I had much pleasure in accepting your invitation.

The selection of pictures I am going to show you are not strictly architectural, but they have a more than architectural interest, because they relate to buildings and to incidents of historical interest.

I consider my work to be the putting into pictorial form the current history of the time, whether at home or abroad, and I shall ask you to believe that you are not only seeing the chief features of Constantinople and places around, but the atmosphere of the life and the history of Constantinople. When I was asked to deliver an address here, it so happened that I was in the midst of arranging my pictures which I had brought home from Turkey, and they struck me as being of some interest and appropriate for an address like this. At the moment they are more than ordinarily interesting, because I was there just on the eve of the change in the old Turkish Government. Practically, I saw the expiring efforts of old Turkey to maintain its ground, and the movement for the reformation which has taken place since.

The mosques are the chief architectural features of the East, and they have a special interest, because travelling, as I have done, all over Egypt, and North Africa, and other Eastern countries, one can compare the evolution of the mosque under different circumstances and see, for instance, the Turkish or Moslem influence brought to bear on the mosques in Constantinople in a very remarkable way. The great mosque of S. Sophia was originally a Christian church in remote times, and there you have the evolution of distinct features of Eastern architecture, of wonderful interest to everyone, whether a student of architecture or not. There is the treatment of the domes, they being a great feature in all mosques, and then the minaret, which was Moslem pure and simple and the influence of ancient temple architecture.

These features are very interesting to follow under different conditions. Thus, the building of S. Sophia goes back to about 500 A.D., and was a Christian church throughout the time of the Byzantine Emperors. The addition of the minarets came after the conquest of Constantinople and the occupation by the Turks. There are few buildings in the old world which have cost as much money as S. Sophia, there being good evidence that several millions of pounds have been spent upon it, until it became one of the finest buildings in the world. It is rather different from the ordinary Mahomedan mosque, which is not usually a glorious place within as is S. Sophia. The interior decoration of S. Sophia really owes its origin to Christian influences. There are 107 columns in the building, two storeys of them of superb marble, which are said to be, although it is a subject of controversy, from Ephesus, and form the most beautiful monuments that any church has ever had. You can see costliness in every part of it; a curious feature is the kibleh, which is a sort of recess indicating the direction of Mecca. Every Moslem on entering the church has a piece of carpet which is for his private use whilst at prayer, and occupies a space about 6 or 8 feet long, and as these run in uneven lines over the floor of the mosque they distort and detract from the architectural beauty of the interior. Another interesting feature is the tribune, a sort of room which the Sultan uses when he goes to the mosque upon great occasions. This is a kind of ornamental pulpit of extreme beauty. The splendid decoration and ornament that follows right round the mosque is also noticeable.

The Mosque of Ahmed is equally important from a Turkish point of view, because it was built by Achmet II., one of the great Sultans, and was not only very costly, but a very ambitious building, and even now on state occasions the Sultan attends service there. One point of interest about this building is the number of minarets. San Sophia has four; usually one or two suffices, but Achmet was ambitious to have the finest display of minarets, and therefore erected six. This produced great internal disturbances among the world of Mahomedans, in the sense that Mecca only had six, and this gave great offence to many people connected with the centre of the Mahomedan world at Mecca, which was only appeased by Achmet contributing a seventh to the mosque at Mecca.

The Mosque of Suleiman the Great exhibits the same characteristic features of the building with minarets outside. The open space in front was in ancient times a great cistern for water. Constantinople is very remarkable in regard to its supply of water. It has no natural supply, the water being brought by conduits from a great distance, and at the present time the great reservoir for Constantinople is underground. In olden times there were a number of these underground cisterns; some of them have since gone into decay and disuse, but are still to be seen, and are very beautiful. They appear to be constructed of pillars brought from other buildings or countries, great monoliths of different sizes. The interiors of these cisterns are lighted through shafts, and are now used by silk weavers, and are as beautiful as some ancient church. One of these cisterns, in the centre of Constantinople, is very large and is called the Hall of the Thousand Columns.

Another beautiful building is in the old Seraglio of Constantinople, now used as part of the museum. It is, I think, the most beautiful I have seen in Constantinople.

It is interesting to note that the history of Constantinople is strangely mingled with our own history of the Crusaders and all kinds of familiar events associated with places out there. The siege of Constantinople alone is one of the most marvellous, the most cruel and tragic episodes the world has ever seen, when the Moslems swept like a wave not only over Constantinople, but over the South of Europe. The conquests of the early Moslem Emperors of the thirteenth and fourteenth centuries have been more or less retained, and have had a remarkable effect on the world.

The picture of the Mosque of Mahommed Ali not only shows the extraordinary beauty of its minarets, but gives me an opportunity of saying a word or two about the Moslem religion, because there is no doubt that the discipline and forms of a religious people have a great influence on the world, and I have always thought that the ritual of the Mahomedans, simple in itself, is one of the most powerful weapons that has moved the world, politically or religiously, at any time. First of all, a Moslem to be a good Mahomedan does not require much to impress him. "Allah is good! Allah is great! and Mahomet is his Prophet," is the simple formula that every Moslem needs to repeat several times every day. Minarets therefore play a considerable part in the influence of this worship. They are made with a staircase inside, and the man who calls them to prayer ascends to one of the galleries, and you hear the call at various hours travelling across the houses in a sing-song note, "Come to prayer! Come to prayer! Come to prayer! Prayer is better than sleep! God is the only God!" and so on. This is very effective, and being done at each mosque everybody is reminded by this call of the human voice to come to prayer. This binds the whole of these people together so strongly that the moment there is any prejudice they have only to appeal to the religious bond which binds them all, and the whole of the Mahomedan world becomes fanatical and extreme. It is very wonderful how so small a service, so easily performed, has become so effective a power.

The cloistered forecourt has a fountain in the centre in which the men wash before they say their prayer, so that at every mosque there is provision in this courtyard for washing. There is a beautiful fountain in the forecourt of the great mosque at Constantinople called after Suleiman the Magnificent, who was in power at a period when the Government was most powerful and brilliant; and there are many things of that period, such as works of art, which illustrate to what a pitch of refinement and skill the people had arrived in the sixteenth century; the Korans, the carved kiblehs, and the inlaid work of pearl make that art period one of very great importance, and in themselves form a very good illustration of the riches of that time.

One of the most remarkable ecclesiastical buildings—if one may call them so—is the Mosque of Amru at Cairo, and it is one of the oldest, being first erected in the seventh century.

The influence of the repeated column in giving architectural effect and beauty is very remarkable, and I defy anybody to go through that building without being struck by the singular beauty of the whole. There are columns after columns of these, most of which had been brought from abroad.

Again, the Mosque at Cordoba, in Spain, shows the beauty of repeated columns with Moorish or Arabic ornament. There is the same repetition of pillars at the Mosque of Amru, which survived from still more ancient times, such as the early Temple of Jerusalem; and other very ancient temples, like Mecca, are in the same way simply a repetition of columns, the same as they would get from

* A paper by Sir J. Benjamin Stone, M.P. (Hon. Member), read at the last meeting of the Society of Architects.

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Egyptian, as exampled in the remains of the clustered columns and spacious courts of the great temples at Luxor, and from Asiatic sources, but in each case the great idea has been to develop the ornamentation, and the manner the pillars are placed gives them a distinctive character in each country.

The Mosque at Mecca.

This picture was obtained under very difficult conditions. The Arab who gave it to me had been appointed sanitary inspector of the pilgrims travelling to Mecca. There is a tremendous difficulty so far as proper sanitary arrangements are concerned. On this occasion and at the risk of his life he took this picture and made me a present of it. But he dare not let anyone know that he had it in his possession, and his only means of conveying it to me was at the moment my train was leaving Cairo, when he put through the window of my compartment a package some 30 inches by 20 inches, with the caution, "Don't look at it till you are out of the country." This picture gives you a real idea of the pilgrims assembling at the great mosque at Mecca. The visit to the "Kaaba" or inner temple covered with the sacred carpet forms another of their great religious expressions. Two or three of these sacred coverings are taken there each year—one from Cairo, one from Constantinople, &c. I was in Cairo when the sacred carpet left for Mecca with the pilgrims. It was a most remarkable sight; the whole of the Mahomedan world seemed to give themselves up to a kind of ecstatic fervour to see this carpet go. They take it to Mecca, and to get there takes quite six weeks. The Khedive and thousands of soldiers see them off at starting. I have a picture of the scene. It is a very important factor in the life of a Mahomedan, because after he has been to Mecca he is permitted to wear a distinct dress, consisting of a green turban, &c., consequently the desire to possess this distinctive dress gives a great impetus to these pilgrimages. A military escort goes right through with them, as it is a very serious undertaking to conduct twenty or thirty thousand pilgrims such a journey, liable to being attacked by warlike tribes. The interest altogether in these pilgrimages has a considerable bearing upon the political history of the country.

The Mosque of Keit Bey, at Cairo, shows the minaret treated with a more ornamental and finer kind of decoration altogether. It is indeed very beautiful, but not only that, the dome is a great feature, its decoration and ornament being of a most elaborate character, purely Arabic; and I think on closer inspection you will agree that the details will bear investigation and are quite characteristic, because they contain words from the Koran, which form part of the ornament.

An interesting mosque at Constantinople is the Mosaic Mosque, which was originally a Byzantine church, the minarets being added afterwards. This is of special interest because it is one of the most famous churches for decoration in mosaic work. The Emperor William of Germany visited Constantinople a year or two ago, and had a desire to see the mosaic work that decorated the inside of this church, but it had all been whitewashed over and not seen for perhaps centuries; however, it was all cleared and the mosaics made visible, but as soon as the Emperor had departed it was all whitewashed over again.

The very famous mosaics of the fifth century at Ravenna, perhaps the best the world can show, are very much of the same character as these.

The interior of the Mosque of Murad II., at Brussa, shows a very simple but interesting form of decoration. Brussa was, before the Turks invaded Europe, the metropolis of the Turkish empire. This mosque has the fountain inside. The ornament, of fifteenth-century work, is very effective.

The walls of Constantinople and other crumbling ruins, once the pride of the Byzantine and Ottoman empires, are most interesting. To look at some of them you would imagine that the great siege could not have been more than a few years ago, although in point of fact it took place in 1452. The prison of Animas, where famous men were imprisoned, possesses a more thrilling interest than perhaps any other building. Great monarchs of Constantinople at different times were imprisoned in this fortress, the dungeons of which are so far down that a lighted newspaper allowed to fall from the top looks like a small star at the bottom.

The Postern Gate is interesting, for it was through here, by a stupid oversight on the part of some soldiers who had left it unfastened, that a rush was made by the advancing Turks in sufficient numbers to prevent it being closed again, and killing the defenders at this spot, took the besieged on the flank at one of the main gates and made way for the whole army to enter. The story of the siege of Constantinople is equal, in romantic episodes, to any historical event in the world.

In olden days, when the Sultans were at the height of their power, they entered the city through the Golden Gate. All people of distinction, conquerors, Roman Emperors, the Roman armies, all entered through this gate, and the story of Constantinople is practically written in it. Around you have the endless cemeteries and monuments marking the events of death through countless ages, and they are still burying and adding to the monuments. The place has a double interest to ourselves, for this was the actual field where the Crusaders pitched their tents when they besieged Constantinople and is still called the Crusaders' field.

The cemetery of Eyoub, where great people of Constantinople, emperors and others have been buried, is a great place of pilgrimage and is one of the most interesting spots, as it overlooks the whole of Constantinople. You see S. Sophia, and further along Sulieman, and so on, and at the top of the Golden Horn war vessels anchored.

What I went to Constantinople especially to see were the famous Sidon tombs. There are seventeen of them in number and were discovered at Sidon, in Syria. They had been the tombs of great potentates of Tyre and Sidon. They may still be considered the most beautiful in the world. They were worked in the age of the Elgin Marbles, and the attitudes of the human figures and the action of the horses are excellent. Their perfect condition is amazing, considering it is about 2,200 years since they were carved. One is called the Tomb of Alexander, because Alexander's figure is on it, but that is only a name for it, as he died and was buried at Alexandria, therefore it could not be his tomb. There is no real record of who were buried in them or who made them; absolutely all trace has been lost. They were hidden in a mountain side of rock and discovered quite by accident. All we know of them is the style and extreme beauty of their ornament. They form some of the greatest treasures of Constantinople; another tomb was brought, not from Sidon, but from North Africa, and illustrates a story from Euripides. Indeed, there was and is now a tradition that it was actually the tomb of Euripides, though there is nothing to confirm it except the story which appears carved on the outside.

To get a more general idea of the country I determined to visit Brussa and Nicea, the latter being the place of the great councils on the ancient creeds.

At Brussa a torrent runs through the town, and the houses on the bridge with the gorge below form a beautiful picture. Brussa is a famous place, for at one time it was the great stronghold of the Turks before invading Europe, and as a place of military operations was famous long before the Crusaders occupied it.

Nicea is nothing but glorious ruins of former greatness, the tombs of some of the great Emperors of Nicea, and the associations of the religious events which occurred there.

If time permitted much more might be said about each of the pictures I have exhibited; indeed, every one might form a text, the story of which could be indefinitely extended.

THE EDINBURGH COLLEGE OF ART.

THE opening of the Edinburgh College of Art, which has been erected on a site at the Cattle Market, Lauriston, has been fixed for January 6. It had been hoped that the College would have been ready for occupation at the beginning of the session in October, but as the building was not finished, the opening ceremony was postponed. The formal opening will be deferred till the whole building is completed, and on account of want of space, invitations for the ceremony on the 6th will be restricted to the Town Council, the College committee, the subscribers, the staff and the students. On the following day the second half of the winter teaching session will commence.

It may shortly be recalled, says the *Scotsman*, that the Edinburgh College of Art has been established by the Town Council at the request of the Scotch Education Department to serve as a central institution for art education in Edinburgh and the south-east of Scotland. It incorporates the work of the Royal Institution School of Art, formerly carried on by the Board of Manufactures, and that of the Art Department of the Heriot-Watt College, and its cur-

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riculum provides for the study and teaching of the Fine Arts and of the Decorative Arts and Crafts. The administration of the working and affairs of the College are by the articles of constitution committed to a Board of nineteen members of which the Lord Provost is ex officio a member and chairman. Nine other members of the Board are elected by the Town Council from their own members, five by the Royal Scottish Academy, one by the School Board of Edinburgh, and there are three co-opted members. The Town Council gave the site in Lauriston gratis; a grant of 30,000*l.* was received from the Scotch Education Department; 10,000*l.* was got from the funds of the Board of Manufactures, and the public subscribed some 15,000*l.*, which included a handsome donation of 10,000*l.* by Mr. Andrew Grant, Pitcorthie, Fifeshire. These sums were available for the building and furnishing of the College. At present the maintenance of the College is by students' fees, a vote by the Town Council from the residue grant and a grant by the Scotch Education Department. Since October the teaching of the College in its various branches has been carried on under Mr. F. Morley Fletcher, the new director and a staff of competent teachers, at the Mound and in the art class rooms of the Heriot-Watt College. So far the new College arrangements have been a great success. The number of students who have entered is 710, which is about 100 more than attended the Mound and Heriot-Watt classes last year. In the circumstances, however, the work has been conducted under considerable disadvantages. The transfer of the College to the new buildings will, of course, greatly tend to the comfort of the students and of the staff and to the efficiency generally of the teaching; but the full effect anticipated will not be realised until the whole of the College buildings are completed. The need of the building scheme being proceeded with as soon as possible is shown by the fact that until the College buildings are completed it will be necessary to restrict the development of the teaching of crafts, which it is intended should become a feature of the College, and that in the meantime the College will be deprived of part of the library accommodation, the lecture hall, and the staff of their common room. It may further be mentioned that the magnificent collection of statuary belonging to the Board of Trustees, which was formerly exhibited at the statue gallery in the Royal Institution, has been handed over for the use of the new College. There is a condition, however, that it should be exhibited under certain conditions to the public. This cannot be implemented until the College buildings are completed. In the meantime these casts will have to be stored in the vaults of the College. The difficulty in finishing the building at present is, of course, due to the delay which has occurred in connection with the removal of the Cattle Market to Gorgie—a work which, in the interests of all concerned, it is hoped may now be pushed on with all despatch.

The part of the College now completed is, roughly speaking, about three-fifths of the whole building as originally designed, its frontage to the south being 206 feet, and that of the completed building 346 feet. The original plan has been carried out almost exactly as designed, excepting for such minor alterations as have been found necessary in order to permit of the temporary occupation of certain class rooms and other apartments by departments of the College, which will eventually be housed in the remaining section of the building.

The building was originally designed with an entire absence of decorative treatment, but it was afterwards decided to add certain architectural features, which have greatly increased its interest and dignity. The south front, from which the College is entered, has now a projecting colonnade, which will form the centre of the completed building. The colonnade has four Roman Doric columns extending from a raised base to the main cornice. The columns are 3 feet 8 inches in diameter and 31 feet high, and are surmounted by a pediment which at some future time may be completed with appropriate sculpture. The remainder of the façade is plainly treated with broad lines of rustication up to its western extremity, where it terminates with a square projecting pavilion treated with Doric columns similar to those of the colonnade flanking its windows. Owing to the large size and necessary irregularity of the windows which light the sculpture and painting rooms, the treatment of the north façade had to be of a simple kind, and it was only possible to relieve its monotony by slightly emphasising the corners and centre and by raising the roofs over these portions to a higher level than those of the general building. Seen from a distance, the enforcement of the angles of the building, and the greater height of the centre roofs are relied on to indicate the size of the building and to mark its important public nature. The west front is flanked by the corner pavilions, and the one-storeyed building between them is surmounted by a balustrade. The masonry is of red Dumfriesshire stone, and the roofs are covered with green slates.

The entrance doorway, which is in the centre of the colonnade, opens into a hall 32 feet square, flanked by the office on the right and the janitor's room on the left. This hall has four Doric columns, which serve to support the walls of the floor above. Directly facing the entrance is the main staircase leading to the upper floors. On each side of it are the stair to the basement and a corridor leading to the north wing. From the north end of the hall wide corridors branch to right and left, from which the rooms on the south front are entered. The rooms in the south wing are ultimately intended to be used as a lecture room, room for elementary modelling, and a workshop. The lecture room, measuring 28 feet by 26 feet, will for the present be used by the Board and by the director, Mr. Morley Fletcher, and the elementary modelling room, which measures 86 feet by 26 feet, will have to serve partly for elementary modelling and partly for elementary drawing. The rooms on the west wing are laid out as a workshop and pointing and carving room, and at the north extremity is placed the clay room, practically equi-distant from all the class rooms in which clay is used. A separate access is provided from the outside to these rooms, so that stone, marble and heavy materials can be conveniently brought to them. The pointing, carving and plaster-casting rooms are provided with an overhead travelling crane for the convenient handling of heavy materials.

The rooms on the north front are ultimately to be used as modelling life class rooms for men and women, modelling and elementary drawing, but for the present there will be one modelling life class room only. The two life class rooms, which are lighted by windows 18 feet high, are 30 feet square and 30 feet by 35 feet respectively, the professor's room being placed between them. The modelling and elementary drawing rooms measure 54 feet by 30 feet and 66 feet by 33 feet respectively, and are so arranged that they can be divided by curtains, so as to neutralise the effect of cross lighting. The corridors, which are lighted from a centre court, are 9 feet 6 inches wide.

It was recently decided that accommodation must be provided for house painters' instruction, and a portion of the centre court has, therefore, been roofed in, affording a space 56 feet by 39 feet for that purpose.

The main staircase has a central flight to the first landing, from which point it branches to right and left. The steps are of stone, and the upper flights have stone balustrades. On the first floor landing, from which corridors branch to right and left, is the hall in which general meetings will be held, and in which students' work can be exhibited. The hall measures 60 feet by 30 feet, and it is provided with lighting from the roof in addition to that from the windows. This room will be used for the present for architecture until the permanent rooms are built. The room next it is the library, 40 feet by 26 feet, and beyond that are rooms ultimately to be used by the librarian for keeping students' proofs, and for professors and assistants' common rooms. Until the necessary accommodation is provided in the new section these rooms will be utilised for teaching design, and as a lecture room. The rooms to the north ultimately intended for post-graduate students and life and composition are temporarily prepared for painting from the life, there being separate rooms for painting from life for men and women. In the basement there is a large cloakroom, and the rooms ultimately to be used for the crafts will at present be occupied as common rooms for the students and staff, the west room only being devoted to the purpose for which it was constructed—instruction in metal work and glass staining.

All the rooms are finished with the greatest simplicity, the walls being lined to a height of about 11 feet with plain match boarding stained to a dark grey colour, and above that plain plaster. The life class windows are double-glazed, with sashes which open to allow of cleaning both window surfaces, and the electric lighting is arranged so as to give each student lighting at any desired height independent of that arranged for the model. The heating is by hot water on a new system, by which circulation is greatly accelerated, thereby permitting the use of small distributing pipes, and affording effective control, so that the temperature can be

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quickly increased or reduced. Exhaust electric fans are provided in central positions, to which large shafts are led from the various rooms. The whole of the class room floors are of wood, carried on reinforced concrete for fire-protection, the corridors are laid with plain red square tiles, and the workshops with asphalte on concrete. The architect of the College is Mr. J. M. Dick Peddie, 8 Albyn Place, who, it may be remembered, took up the work on the special invitation of the Town Council, and has carried it through on the lines of a scheme which was drawn up by Mr. Pittendreigh Macgillivray, R.S.A. The result of his professional skill is a building admirably fitted in all respects to the purposes for which it is designed. At present the entrance to the College will be by Lauriston Street.

THE ROSYTH NAVAL BASE.

ON December 22 all offers made by contractors for the enclosed docks and necessary sea walls and quays at Rosyth Naval Base were due to be lodged with the Admiralty. It may be recalled, says the *Scotsman*, that for this important naval work, of which so much has been lately heard, some twenty large contractors in the United Kingdom were invited by the Admiralty to estimate. Five Scottish firms are included in the number, viz.:—John Best & Sons, Ltd., Edinburgh; Morrison & Mason, Glasgow; Charles Brand, Glasgow; James Young & Sons, Ltd., Glasgow; Robert M'Alpine & Sons, Glasgow. It is generally expected that the name of the successful firm will be made known about the middle of January, and that a beginning will be made with the preliminary operations by the end of that month. This will include the erection of suitable accommodation for the large number of navvies and other workmen who will be first brought upon the scene and a pumping station.

Representatives of the various firms competing for the contract have for a considerable time past either been periodically visiting the district immediately surrounding the base or been in residence near it. This was, of course, for the purpose of securing an intimate knowledge of the nature of the work and sources of supplies. It will be readily understood that the range of subjects on which definite and reliable information was required, for the taking out of quantities, the securing of sufficient suitable material at the nearest possible sources of supply and up to the standard of samples supplied by officials of the Admiralty, the reckoning of the cost of carriage, the consideration of the most efficient means to be adopted for the removal of the enormous quantities of sand, gravel and stones required for the formation of the enclosing breakwaters and piers, and for the removal of rocks, clay and silt lying within the area of the basin to be excavated and dredged, was of necessity a very wide and comprehensive one.

Quite naturally the greatest reticence has been maintained by representatives of competing firms as to their proposals for carrying out the work and as to facts and figures which, if they leaked out, might be used to advantage by rival firms. At the same time, the quantities of raw material which will be incorporated in the concrete work are fairly well known. The nature of the strata to be met with in excavating for foundations and in the deepening of the enclosed area of the base, the possibility or otherwise of utilising the material so removed for the foundations or concrete superstructures, and the necessity for removing to a distance silt, are all factors of the greatest importance in the calculations of the engineers. Reliable information as to these is a sine qua non, and involves trouble and expense in the making up of estimated costs.

A certain kind of accommodation for a limited number of navvies is already provided in the district, but while this may be said to be of the usual kind provided for similar works, it has been indicated that it is hardly of the nature which will satisfy some of the competing firms. The navvy, of course, will be at liberty to choose his abode, but it is under contemplation to provide such accommodation as would offer perhaps more comfort and at least greater privacy than can be commanded in the huts usually run by private enterprise. One of the first constructive works to be undertaken will therefore in all likelihood be the erection of suitable houses or superior kind of huts to provide accommodation for a good 2,000 navvies. These will be placed on ground lying between the naval base works and the burgh of Inverkeithing. Something, however, may be done to provide means of communication between the base works and large centres of population within reasonable distance and where accommodation may be available, such as Dunfermline and Edinburgh and Leith. From a consideration of the comparatively few miles intervening between Rosyth and Dunfermline, it does not appear that much difficulty would be experienced in providing ready access, as they are already connected by very direct roads and might easily be converted or adapted for tram or electric traction. On the other hand, as was done during the years when the Forth Bridge was under construction, it seems quite feasible for the North British Railway Company to arrange a special train service between Rosyth and the capital. Undoubtedly, as on the occasion referred to, many of the better class of tradesmen, engineers, mechanical and civil, and heads of departments, would prefer to reside in Edinburgh. As before, it might also be expected that many of the younger class of employés in various departments would eagerly seize the opportunity which would thus be presented of attending the technical and art classes in the city. Then there comes in the question as to how the facilities thus secured would affect the interests of sub-contractors and their employés. There is every indication of the fact that the former will be largely employed, as usual on such work, but many of these questions will undoubtedly depend for solution on the selection of the successful chief firm of contractors.

The term for the completion of the section of the great work at present contemplated is about seven years, but it is suggested that there is a possibility of a more extensive scheme being thereafter entered upon, if it be not actually put under way at an earlier date, when docks of various kinds would have to be constructed. There is thus some justification for expecting that the work soon to be begun at Rosyth may easily be extended to a period of something approaching twenty years. Owing to the fact that a large bonus is offered for the construction of the works at an earlier date than is specified in the contract, it is certain that the present undertaking will be pushed on with all diligence by the contractors. The firm successful in securing the contract will be called upon to give a security of probably a quarter of a million pounds.

The nature of the material to be excavated has been carefully ascertained as far as possible by an extensive series of borings, the material brought up having been carefully noted and to a large extent preserved for reference. In various other ways, sometimes by the competing firms independently of what has been ascertained by the firm which has been engaged in the sinking of a trial caisson on the spot, and by various recognised methods among experienced engineers, the nature of the bottom and thickness of the underlying strata have been mapped. The measurements, the quantities of material to be excavated from within the enclosed basin by pumping, dredging and blasting, the cost of removal of such material as will not be available for the structure, and of the heavy blasting operations necessary for the removal of the basaltic rocks of Dhu Craig have all been reckoned with in the making up of estimates. Where such huge quantities of material have to be dealt with it is only natural that some discrepancies should be apparent in the relative estimated quantities of the various items making the common grand total. From what can be learned, however, it may not be very far off the mark to say that something over one million tons of sand, which must be equal to samples submitted, and a quarter of a million tons of gravel or crushed stones suitable for the specified concrete work, will be required. To represent these quantities in another though rough and ready fashion, it may be said that the amount required would represent something like a twenty-acre field 30 feet deep all over. Part of this quantity will require to be sharp pit or fresh water sand, and the remaining portion will consist of washed sea sand. The sea sand will be used for the construction of the submerged parts of the walls, and will, according to modern practice, be probably secured by pumping from below high-water mark from the large sand-banks which line both shores in the lower reaches of the Forth. This may be transported by rail or conveyed, which is more probable, directly from the banks to the base by means of barges. The means adopted will depend on the very important consideration of cost of carriage. The Board of Trade has already sanctioned the removal of between three and four hundred thousand tons of sea sand from a part of the foreshore in the vicinity of the base during the next seven years. An enterprising firm has already also secured the rights to most of the extensive sand beds in the Forth, as well as inland in the neighbourhood.

The contracts going in for the consideration of the Admiralty will work out at something between two and three millions sterling.

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HOUSING IN LONDON.

THE housing of the working classes committee have informed the London County Council that they have had under consideration a comprehensive report on the present aspects of the housing question in London. The report, which has been prepared by the statistical officer, deals in the first place with the conditions now prevailing in London and in "Greater London," or the area which comprises the metropolitan and city police districts. The population of the county has steadily increased during the last century from 959,310 in 1801 to 4,536,541 in 1901, and though the rate of increase is now declining, the increase in numbers is still considerable. Since 1861 the population of the extra-London districts has grown rapidly, the increase for the decennium 1891-1901 amounting to no less than 639,372, whereas the increase for the same period in the county of London was only 308,224. In eleven metropolitan boroughs and in the city of London the population is either diminishing or stationary. An interesting comparison is drawn between the cost of accommodation in the central area and in the suburban districts, the latter including the cost of workmen's fares by train or tram. The comparison is mostly in favour of the suburban districts, and it is demonstrated that it is now quite possible for a working man to obtain dwelling accommodation in the suburbs and to pay the cost of travelling to and from his work without incurring any additional expense over the cost of accommodation in the central area. On the subject of overcrowding attention is directed to the fact that in 1901 there were in the county of London 2,449,789 persons living in tenements of one to four rooms, of whom 726,096, or 29.6 per cent., were living under conditions of overcrowding, as judged by the standard of two persons per room. The figures for that year show that the greatest degree of overcrowding existed in the metropolitan boroughs of Stepney, Finsbury, Holborn, Shoreditch, Bethnal Green, St. Marylebone and St. Pancras. A striking feature, which renders a solution of the housing problem more difficult, is the absence of any relation between the number of empty houses and the amount of overcrowding in a particular district. For example, in Stepney, where it appears from the census of 1901 that nearly 100,000 persons were then living under conditions of overcrowding, recent inquiries in various parts of the borough indicate that there is no lack of vacant working-class accommodation. There is little doubt, however, that taking London as a whole, by far the greater proportion of empties occurs in better-class property.

The report next deals with the changes in working-class conditions during recent years. Wages have increased, while the price of food and other necessaries has fallen. On the other hand house rents have risen, but on the whole it may be taken that the position of the labourer from a financial point of view has improved. Another important factor in the housing problem is the prospects of the future demand for labour in London. In the last few years a number of factories have been removed from within the county, but, from an examination of the available statistics bearing upon the subject, there seems to be no reason to anticipate that, apart from local fluctuations, the demand for labour in London will show any departure from the steady growth of past years.

The report further touches upon the methods of dealing with the housing problem. In the first place it is pointed out that the erection of working-class dwellings is a type of enterprise which does not call for the creation of a monopoly in order that it may be economically administered. At the same time the competition of the Council in the past has not been without its good effects in maintaining and improving the standards of construction and accommodation and particularly the standard of sanitary requirements. During the past six years only 7 per cent. of the new accommodation in London and the suburbs was provided by public bodies, and there appears to be little doubt that whatever the policy of the Council may be, the bulk of the accommodation will continue to be provided by private enterprise. It is found, however, that while working-class families requiring four, five and six rooms are being amply provided for in the suburbs, there is not much provision made for families who can only afford to pay for two or three rooms. The committee regard this fact as tending to justify the policy they have suggested to the Council of confining its operations as far as possible to the provision of accommodation at rents ranging from 7*s.* to 10*s.* a week. On the question of where accommodation is most needed, the report states that it is usually desirable, if sufficient opportunities of cheap transit exist, to ease the pressure of competition for house room by building further out, where land is cheap, rather than add to the accommodation in the particular locality, especially as this latter course usually involves a loss. Also it may safely be accepted that building should not be undertaken in suburban districts which already contain a proportion of working-class population largely in excess of the normal. In the county of London the pressure on working-class accommodation is probably greatest in the district north of the Thames and west of St. Pancras, but it does not follow that the need for accommodation can be met to the best advantage by building dwellings in that particular district. It may be that the provision of cottages further out, with the necessary travelling facilities, would be more beneficial to the population concerned. Bearing in mind these various considerations, the Council's estate north of the Thames, at Old Oak Common Lane, Hammersmith, appears to be favourably situated for the purpose of meeting the special difficulties existing at the present time; but the White Hart Lane estate, being in a district where the working-class population already predominates largely, is not so satisfactory. The further provision of working-class accommodation, whether by private or municipal enterprise, might be most advantageous to the proper spreading of the community if undertaken in districts beyond the county in the north and west. South of the Thames the Totterdown Fields and Norbury estates are both well situated for meeting the need for expansion, and the development by private enterprise of land at Wandsworth, Lewisham and Eltham, already progressing so far as four, five and six-roomed cottages are concerned, is calculated to have similar desirable results if smaller cottages are provided and the means of transit cheapened. The importance of locomotion facilities as a factor in the solution of the housing problem cannot be too greatly emphasised. Since the passing of the Cheap Trains Act in 1883 the number of workmen's trains run has increased enormously, and this, combined with the growth of the electric tramway services, has greatly encouraged the very wholesome movement of the working-class population from the overcrowded central districts. With the growth of population the cheapening of the workmen's fares on railways is likely to become a more pressing question in the future. What is required to cope with the problem of properly distributing the population is not exceptionally cheap fares in one direction, but fares such as workmen may reasonably be expected to pay in all directions; and it is a matter for consideration whether railway companies should not be required to run workmen's trains to serve districts which are in process of development, without waiting until a large working-class population is actually in residence. The question of the convenience and sufficiency of the service of workmen's trains and trams will also become more important. The committee endorse the views expressed in the report, which they commend to the earnest consideration of the Council. They have given instructions for a copy to be sent to each member of the Council, and recommend:—"That the report of the statistical officer presented by the housing of the working classes committee, on the present aspects of the housing question in London, be placed on sale at the price of 4*d.* a copy."

INSTITUTION OF CIVIL ENGINEERS.

AT the ordinary meeting on Tuesday, December 22, Mr. James C. Inglis, president, in the chair, the paper read was "An Investigation of the Heat Losses in an Electric Power Station," by F. H. Corson, A.M.I.C.E. The following is an abstract of the paper:—

An inquiry, originating from Blackburn, in 1903, showed that the average coal consumption of thirty-four principal generating stations of the United Kingdom was about 7.7 lbs. per unit generated. The figures ranged from 3.6 lbs. to 15 lbs., Blackburn standing at 10 lbs.

Rough tests on the various sections of the plant resulted in considerable re-arrangement. The steam-pipe system was overhauled and more effectively drained, and steam separators and driers were in consequence dispensed with. Engine stop valves were, where possible, attached directly to the main steam pipes. The steam ring was discarded, and generally the effective heat-radiating surface was greatly diminished. Better fitting boiler dampers were provided, the condition of the brickwork was improved, and the whole process of combustion was more thoroughly controlled by the institution of flue-gas analysis. These and similar alterations occupied three years, and the fuel consumption fell during that time to about 6 lbs. of the same coal per average

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unit generated, a reduction of 40 per cent. Further progress being imperative, it was decided to conduct tests covering the whole operation of the works, viewing the losses peculiar to each part of the plant in their relationship to each other and to the whole; and arrangements were made, and apparatus devised, for their prosecution. After isolated trials of the various types of apparatus had proved their reliability, simultaneous tests were arranged, of a duration long enough to embrace all conditions of operation met with in routine work.

The Blackburn undertaking comprises two adjoining stations of 2,300 kilowatts capacity each, containing twelve mechanically fired Lancashire boilers, six fitted with superheaters; fifteen high-speed engines driving generators from 60 kilowatts to 775 kilowatts in size, controlled from three switchboards; steam piping 3 inches to 14 inches in diameter; ejector and jet-condensers fed from an overhead water-tank above the boiler-house; low-speed steam-driven feed-pumps; four batteries of economisers totalling 1,504 tubes; two chimneys, 150 and 250 feet high respectively. The test has covered during 168 consecutive hours the combustion of about 230 tons of coal, the evaporation of 3.376 million lbs. of water, and the generation of 99.295 electrical units. The net results show a consumption of 5.15 lbs. of coal, and a total evaporation of 33.9 lbs. of water per average unit.

Observations have been taken half-hourly of the rate of evaporation, and of the temperature of the feed-water at the feed-tank, and the economiser inlets and outlets; of the chemical composition and temperature of the gases in boiler and economiser flues; of the temperature and pressure of steam supplied to and discharged from the engines; of the temperature and quantity of the injection and discharge water of the condensers; and of the electrical units generated.

Some of these data have also been obtained by using recording apparatus. The performance is shown on a time basis in curves, and in total in eight balance sheets relating to the operation of the whole plant and of its constituent parts. So far as possible, the results have also been entered on the form prescribed by the Institution committee on steam engine and boiler trials.

The principal sub-divisions into which the trials have fallen are:—(i) fuel selection; (ii) estimation of moisture in coal; (iii) determination of calorific value; (iv) flue-gas analysis and measurement; (v) evaporation of water and distribution of steam; (vi) steam consumption of auxiliaries; (vii) steam consumption of main engines; (viii) measurement of output.

1. *Fuel Selection.*—This has been effected after comprehensive trials, involving calorimetric determination and actual working test of various fuels. The insufficiency of the calorimeter indication alone is shown in Table I., and it has accordingly been used only as a preliminary guide, supplemented by practical trial under working conditions. As a means also of ensuring uniformity of supply of fuel, the employment of the calorimeter has been largely discarded, more reliance being placed on observation of the coal in actual use. To exhibit the results quantitatively, the calorimetric determination of the heat value of the coal has been adopted.

2. *Estimation of Moisture in Coal.*—Every load of coal entering the works is sampled at the weigh-bridge. All samples, roughly 1 lb. in weight each, are mixed at the end of the day, and dried, the loss of weight being approximately a true statement of the moisture contained. Periodical tests have been applied to check the accuracy of the method, and have shown that some water, about 1 per cent. of the weight of the sample, still remains. With this correction, the moisture is estimable by these means with close approximation, and uncertainty as to the efficacy of the process is overshadowed by the greater doubt accompanying any calculation of the qualities of the whole from those of a small part. Tables show the results of the moisture tests for nine months.

3. *Determination of Calorific Value.*—The Thompson calorimeter has been modified for the removal of certain liabilities to inaccuracy existent in its original form. Oxygen supply from a gas cylinder has replaced that from potassium chlorate and nitrate, rendering combustion more controllable, and securing better transference of heat to the water. Electric ignition has ensured thoroughness of combustion, and external silvering of the outer vessel has reduced radiation error. Curves illustrating the diminution of radiation resulting from the external silvering are given. The mean calorific value from seventy-three tests of the dried fuel is 13,180 B.Th.U. per lb., or, allowing for moisture, 12,310 B.Th.U. per lb., of the coal as fired.

4. *Flue-Gases Analysis and Measurement.*—The chemical constitution of the flue-gases has been estimated by a Krell CO_2 recorder, and by the Orsat apparatus. Considerable difficulty has been encountered in the selection of truly average sample gas, and a large number of tests have been made to ensure certainty of its representative character at all times. Numerous test-holes have been drilled in the flues, and samples from one point compared with those derived simultaneously from another. Other difficulties have arisen from the type of analyser. After trial of varied arrangements, all such troubles appear to have been surmounted, and the correctness of results has been proved by confirmation of the Orsat apparatus. Diagrams are given of the arrangements made for the purpose of flue-gas analysis, and also typical CO_2 charts obtained from the flues.

Specific Heat.—Some doubt is suggested of the validity of computing the specific heat of the gases from that of their several constituents, and also of assuming the quantity to be independent of change in temperature and pressure. In the inquiry this course has been followed, any error resulting therefrom being probably exceeded by possible uncertainty of the chemical analysis.

Temperature.—Four certified mercury pyrometers, one of recording type, have been used for this section of observations. Temperature records from boiler and economiser flues are given.

5. *Evaporation of Water and Distribution of Steam.*—The feed-water has been registered by a Siemens water-meter in the pump suction-pipe, the instrument being tested daily on the pumping, at various rates, of a measured quantity of about 2,000 gallons. Errors of the meter, due to the presence of air-vessels, were encountered, but were obviated, and the half-hourly record of the meter, corrected by the error curves, may be accepted with confidence. The water lost by leakage and by blowing down of boilers has been determinable by direct test, and the radiation loss by shutting off all engine valves and applying still tests of ten hours' duration for the measurement of condensation. This may be inaccurate, for in practice the steam is superheated, but it has been preferred to results obtained from attempts to derive the figure from the fall in temperature accompanying the flow of a known weight of superheated steam.

6. *Steam Consumption of Auxiliaries.*—The tests under this head cover the steam used by furnace grate-jets, by feed-pumps, and by apparatus of domestic character. The first of these has been arrived at by feeding all jets from one boiler, and noting the rate of evaporation; the second, by condensation of the exhaust into a known weight of water at various speeds of pumping; and the third by frequent direct tests.

7. *Steam Consumption of Main Engines.*—The steam consumed by the main engines is deduced from the increase in temperature of the condensing water, the quantity of which has been measured. The accuracy of this method rests upon dryness of the exhaust steam, which appears to be indicated by thermometers and mercury gauges fitted to the engine exhausts.

8. *Estimation of Electrical Output.*—All energy used for whatever purpose has passed through meters calibrated to 2 per cent. accuracy. In conclusion, the author discusses the part played by each possible source of loss in the indifferent thermodynamic performance of the works as a whole. While regretting that circumstances have compelled somewhat superficial treatment of some details, he has confidence in the accuracy of the data obtained, within the limitations prescribed by the apparatus available and by the character and conditions of the trial.

ATMOSPHERIC POLLUTION.

A REPORT for the year of the chemical department of Glasgow Town Council has been prepared by Mr. F. W. Harris, corporation chemist and analyst. In the course of it he says that during the year some of the problems connected with aerial sanitation have been investigated, notably the relative efficiency of coal and gas fires. The results are intended to demonstrate scientifically that the general adoption of gas as a fuel would greatly reduce atmospheric pollution. It is doubtful whether the citizens generally realise all that is implied by the term "aerial sanitation." The ordinary individual probably only realises the extent of the contamination of the atmosphere when, owing to sudden changes in temperature, the city is enveloped in fog;

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then the impurities are by condensation of the aqueous vapour rendered visible. But is it generally realised that the atmosphere on a clear day is equally contaminated with impurities? At present we are solely dependent upon climatic conditions whether through fog prevailing the city is enveloped in a black pall loaded with impurities, or whether these are driven to the out-lying districts by favourable winds and warmth. The aims of aerial sanitation are not only to prevent the formation of black fog such as Glasgow is occasionally enshrouded in, but to effect a permanent improvement of the atmosphere. It has been suggested that the dispersion of fog can be attained by high-tension electrical discharges. This method, however, has not developed beyond the laboratory stage, probably on account of the large expenditure necessary to experiment on a practical scale. Considered in the most favourable light, such methods are really only palliative measures, and the only practical and economical means by which our atmosphere can be permanently purified is to eradicate the evil at its source. The eradication of this evil can be attained only by educational and compulsory means. Why are our rivers being gradually purged from the foul contamination of domestic sewage and works' refuse? Simply because local opinion has been stimulated to the realisation of the danger incurred. Educate the citizens by means of lectures and demonstrations to realise that the present method of heating and warming domestic dwellings is wasteful, fully 75 per cent. of the available heat being lost. Make each individual realise that pure air is as essential to health as pure water and pure food, and that by the discharge of smoke he is directly contributing to atmospheric pollution, thereby, from a health point of view, injuring not only himself but his fellow-citizens—in other words, creating a public nuisance. Domestic grates require supervision. The Corporation have already control of drains, gas and electrical fittings, likewise possess similar powers over any discharge into the river. Why not extend such powers to the supervision of fire grates and the control of all emissions into the atmosphere? These are all means to attain the end, namely, the abolition of domestic smoke, the evil of which is far greater than is generally accepted. With the manufacturing offender the solution is simply a question of compulsion. Numerous effective methods of smoke prevention are at hand; it only needs effective compulsory powers to remove the source of pollution.

LONDON BUILDING ACTS.

THE Building Act committee of the London County Council in their annual report state that they held forty meetings; in addition there were thirty-six meetings of sub-committees during the year.

The committee administer the London Building Acts, 1894 and 1898 (decisions with regard to the more important provision being subject to confirmation by the Council), the Factory and Workshop Acts 1901 and 1907, in so far as they relate to the provision of means of escape in case of fire, and the London Building Acts (Amendment) Act, 1905, which deals with the question of the provision of means of escape in case of fire in certain classes of buildings other than factories and workshops in which more than forty persons are employed. The Council has also charged the committee with the preparation of the draft by-laws under section 2 (1) of the Advertisements Regulation Act, 1907.

For the purposes of the administration of the Building Acts, London is divided into fifty-six districts, for each of which a district surveyor is appointed. The power of appointment and dismissal of district surveyors is vested in the Council. During the year 9,820 cases under the Building Acts were dealt with, about half the number relating to dangerous and neglected structures, and 6,922 new buildings were examined by the district surveyors, who received fees amounting to nearly 18,000*l.* in respect thereof. 20,172 old buildings were examined, the fees paid to district surveyors on these amounting to over 26,000*l.* It was necessary to take legal proceedings in a large number of cases, either to obtain authoritative decisions or to enforce compliance with the law. About four miles of new streets were sanctioned during the year. In order to obtain the views of all parties interested in the more important applications under the Building Acts, each local authority concerned is asked to express its views before these applications are considered.

Under the Factory and Workshop Act 1,323 cases have been considered by the committee; in 377 of these cases the provisions of section 14 of the Act did not apply and they were, therefore, removed from the list of cases to be dealt with; sixty-five certificates were issued in respect of new factories and the necessary work was completed in 167 old factories. In carrying out this branch of the committee's work every endeavour is made to avoid unnecessary interference with the trade or manufacture carried on at the premises dealt with.

The London Building Acts (Amendment) Act, 1905, is somewhat drastic and is largely retrospective, but, speaking generally, considerable discretion is allowed to the Council in dealing with buildings coming within the scope of the Act, and there is a right of appeal in the more important cases to the Tribunal provided by the Act of 1894. Every effort, too, is made by the committee to administer the Act in a reasonable manner so as to secure the advantages of compliance with the provisions of the Act with as little hardship as possible to the individual. The work involved in the administration of the Act is very heavy, as will be seen by the fact that during the year under notice no fewer than 10,541 notifications were received from the district surveyors under sections 10 and 12 (projecting shops and access to roofs); of these cases 1,482 have been dealt with. The total number of cases reported under these two sections alone was, on March 31, 30,804. The number of applications under section 7, relating to new high buildings and buildings which may be occupied by more than twenty persons, was 412, of which twenty-seven were refused, and certificates were issued on the completion of the works in 161 cases. Notifications were received in respect of buildings in which inflammable liquid was stored in 369 further cases, and 416 cases were dealt with. 238 applications under section 9 of the Act, which relates to existing high buildings and buildings occupied by more than twenty persons, were dealt with.

The question of the further amendment of the London Building Act, 1894, has been under consideration, and on the committee's recommendation the Council decided to insert in its General Powers Bill of 1908 clauses to amend sections 75, 76 and 77 of the Act of 1894, so as to enable the Council to permit the erection of buildings having a larger cubical extent than was contemplated in that Act.

Correspondence

[The Editor will not be responsible for the opinions expressed by Correspondents.]

The Skyscraper Era.

SIR,—In an article appearing in the current issue of *The Architect*, a remark is made "How many there are whose positivism is only equalled by their ignorance." I think Mr. F. W. Fitzpatrick, of Washington, must take rank amongst the above, when he asserts that we English are going to become the slaves to skyscrapers. Is he unaware that our more recent legislation has been directed towards limiting the heights of our buildings; and is he also unaware that even his beloved Americans are showing signs of weariness and dissatisfaction respecting their Jack-and-the-Beanstalk nightmares, and there is somewhat belated talk of promoting legislation for limiting the height of future erections? It may be true that "business men, not artists, constitute the controlling force in politics and municipal affairs," but the views of artists are becoming increasingly respected over here, and the sign is a very healthy one.

We, I hope, are not afraid of taking valuable lessons from our younger brother, but he must not become cheeky all the same, and imagine that whatever he says is valuable.—Faithfully yours, PERCY L. MARKS.

Albert Buildings, 49 Queen Victoria Street, London:
December 28, 1908.

SIR,—The article in your always interesting journal by Mr. F. W. Fitzpatrick I read on Christmas Day, and I found it very entertaining, but does Mr. Fitzpatrick really think that the day of the skyscraper is at hand, in connection with this country? I say in all reverence, God forbid. In America, the home of this monstrosity, the day is "well spent." Rumours are in the air that Congress is to be asked to place an embargo on it. One of the main reasons, I believe, to be advanced is on sanitary and fire prevention grounds, as it is found impossible to obtain sufficient pressure of water to enable it to be procured on the upper part

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of these outrageous erections. Fancy London or Paris with such buildings. I must not pursue the subject further. I want to finish that interesting paper on "London Taverns in History." Continued success to the dear old *Architect* in 1909.—Yours gratefully, AN ENGLISHMAN.

Architectural and Topographical Society.

SIR,—The recent appointment of a Royal Commission to inquire into the condition and preservation of the ancient monuments of this country is an encouraging sign of an awakened public interest in the magnificent national relics which are thickly scattered about the country.

May I once again claim the courtesy of your columns to call attention to the work of description and recording which this Society has undertaken?

In addition to the minute descriptions of old buildings which we publish (with illustrations) in our quarterly "Record," and the large scale drawings and photographs which we are endeavouring to collect, we have recently decided to issue printed forms for brief notes on buildings which, when filled up, we propose to file in a manner convenient for reference; copies of this form which have just been issued to our members, can be obtained gratis on application at the offices of the Society; and when a number of them have been collected they will make a detailed catalogue of ancient buildings such as, we believe, has not hitherto existed in these islands.

May I appeal to all who have any reliable information concerning any ancient building or buildings to apply for copies, especially to clergymen and others who hold a fiduciary position in connection with such monuments?

May I, at the same time, appeal for the further assistance in the other work of description and investigation which is being done slowly but, we believe, thoroughly; and may I finally call attention to the fact that by increasing the number of our members the progress of this work will be hastened, as the rate of publication is mainly governed by the funds at our disposal?—Yours faithfully,

WILFRID TRAVERS, Hon. Sec.

33 Old Queen Street, Westminster, S.W.:
December 19, 1908.

The appended form is a specimen of those intended for filing amongst the records of the Society, in order that a large amount of information may be accumulated and placed at the disposal of members and others in addition to, and at an earlier date than, the necessarily slow publication of the "Record" will permit. In supplying the details correspondents are requested to take every care to ensure the greatest accuracy, and to include the salient facts rather than unimportant details. It will be noted that all the architectural types are given according to the dates of their erection. Any further details, which will be gratefully received, should be submitted on a separate sheet (or sheets) of paper. Any number of these forms will be issued on application to the Hon. Secretary of the Architectural and Topographical Society.

SPECIMEN FORM.

O.S. No. 269 (1 in.-1 mile).

County of Buckinghamshire. Lat. 51°30′ N.

Parish of Dorney. Long. 0°40′ W.

Name and Use of Building—Parish Church of St. James.

Historical Notes.

Date of Foundation, probably pre-Conquest, is unknown. Tithes and living granted to Burnham Abbey on its foundation c. 1265. A chantry founded by John Scott, temp. Henry VI. A chapel built by Garrard family in sixteenth century.

Features of Building:—Plan.

Chancel and unaisled nave with west tower. Chapel north of chancel. South porch.

Structure.

Chancel contains early work in south wall, much altered in thirteenth century (door and window, now blocked) and fourteenth (low side window on both sides, and chancel arch) east window modern. Nave shows late twelfth century door (blocked) and two thirteenth century doors. Windows—seventeenth or eighteenth century; large, plain, rectangular. Tower—brick with stone dressings, embattled, with hexagonal stair turrets. Two-light belfry windows. West door and three-light windows over; all fifteenth or sixteenth century. North chapel entirely brick, including mullioned square-headed windows; sixteenth century. Porch of brick, partly stuccoed; 1661.

Fittings.

Altar, seventeenth or eighteenth century. Fragments of fifteenth century screen now along east wall. Tub-shaped font, twelfth century, with strap and fleur-de-lys ornament. Gallery dated 1634. Seven old pews, plain, probably of same date. Box pew, with front and outer side cut down, on north side. Two elaborate lead memorial tablets hung on remaining side. In chapel, a large monument to Sir Wm. Garrard (1607) with kneeling effigies. Their children below. Registers from 1538. Plate—Elizabethan.

Armory.

Hatchment over gallery. Sir C. Palmer, or. two bars gu., each charged with three trefoils arg., in chief a greyhound courant sa. impaling az., a lion ramp., reg. arg., crowned ducally or. on tomb. Garrard. Arg. on a fesse sa., a lion pass., of the first. Kedermister. Az., two chevrons or. between three bezants. Nethermille. Arg., a chevron between three crescents az. Rowe. Arg. on a chevron az. between three trefoils slept per pale gu., and vert as many bezants.

Books of Reference.

"History and Antiquities of the County of Buckingham," G. Lipscombe, M.D., 1847; Crown Folio, J. & W. Robins, London.

"The Ecclesiastical and Architectural Topography of England," Vol. II. Pub. under the sanction of the Central Committee of the Archæological Inst., London.

"Victoria History of the County of Buckingham." Constable & Co., 1907, Large Imp. 8vo.

Other Buildings of Architectural Interest in this Parish are:—

Dorney Court.

GENERAL.

Sir Thomas Drew on Saturday gave his annual historical and descriptive lecture on Christ Church Cathedral, Dublin, in the nave of that building. Allusion was made to the satisfactory installation of electric light.

The Sheffield City Council is to be advised to erect a sanatorium for consumptives near Tuxford, in North Nottinghamshire. The grounds which are recommended for purchase are about 34 acres in extent.

The Directors of the City and County of Perth Royal Infirmary have unanimously resolved to proceed with the erection of a new infirmary, to consist of 100 beds, at an estimated cost of 40*0l.* per bed, at Tullylumb.

An Exhibition of French Art is to be very shortly opened in Montreal under the patronage of Lord Strathcona and the French Consul-General. Among the artists represented will be Rodin, Bartholomé, Camille Lefèvre, Abel Marque, Fix-Masseau, Bernard, Voulot.

M. Charles Albert Waltner has been elected a titular member of the Académie des Beaux-Arts, Paris, in the engraving section. M. Waltner is vice-president of the National Society of Fine Arts.

Messrs. Butterworth & Duncan, of Rochdale, have been awarded first prize in a competition for a school at Disley for 350 children, which will cost over 5,000*l.*

M. Pons, pupil of M. Renon, has been awarded the prize and first medal in the Concours Godebœuf (architecture) at the Ecole Nationale des Beaux-Arts. Three pupils of M. Laloux were awarded the three first-class medals.

The Committee appointed to consider the erection of a memorial of the late Canon Fleming in York Minster have decided that it shall take the form of a statue in stone of King Edwin, one of the martyred Saxon kings, to be placed in the beautiful niche on the left or north side of the altar in the choir, at a spot where Canon Fleming frequently stood. King Edwin was baptized very near the actual place, and his head is buried in the Minster.

Mr. E. A. Gruning, of 25 Gresham House, Old Broad Street, and 3 Holland Park, W., died on Tuesday after a short illness. Mr. Gruning practised as an architect and surveyor in the City for over forty years. He designed many buildings of importance, chiefly for bankers, insurance companies, and large mercantile firms. Mr. Gruning, the son of Mr. John Frederick Gruning, was born on June 26, 1837, and married, in 1874, Miss A. A. Cappel. He leaves two daughters and a son. Mr. Gruning was a Fellow and past vice-president of the R.I.B.A., a Fellow of the Surveyors' Institution, and a member of the Tribunal of Appeal under the London Building Acts. He was also a lieutenant of the City.

The Jury in the recent competition for a naval ordnance college to be erected on the Champ-de-Mars have unanimously awarded M. Patouillart-Demoriane the premier place among the twenty-four competing architects. The design of MM. Duval & Gonse secures the second prize, and M. Chaussemiche is placed third. MM. Briasson, Duquesne, Guidetti & Grisolia, Leprince-Ringuet, Sortais, receive awards of honourable mention. The building is to contain sections for a naval gunnery, artificers' school, marine engineering, laboratories, treasury and pensioners' bureau.

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MINERVA VISITING THE MUSES.—Frieze by J. B. CIPRIANI, R.A.

THE WEEK.

THE event of the week in architectural circles has been the announcement made by Mr. E. T. HALL, Vice-president and Chairman at the business meeting of the members of the Royal Institute on Monday last, that H.M. the KING had been pleased to grant the petition of the Royal Institute of British Architects for a Supplementary Charter. As the letter conveying this information to the Council was dated on December 31 last, this announcement came as a surprise and a pleasant New Year's gift to the members.

THE chief business before the meeting, according to the notices issued to members, was the consideration of two resolutions to be proposed by private members, each of which was, in effect, a vote of censure on the Council. The first of these, standing in the name of Mr. G. E. NIELD, was as follows:—"The Fellows and Associates of the Royal Institute of British Architects demand, as due to them, a full and satisfactory explanation from the Council, or its responsible officers, of the circumstances leading up to the proposed suspension of part of By-law 9, and direct that in future no such motion shall be moved. They condemn such proceedings as that attempted, and consider it unworthy of the governing body of the Royal Institute." As the object of the Council in abrogating By-law 9, and the objection of many members to their doing so, were alike rendered futile by the announcement of the grant of the new Charter, Mr. NIELD wisely refrained from pressing the merely recriminatory part of his resolution, and withdrew it.

THE second resolution was that of Mr. K. GAMMELL, who moved:—"That the Council of the Royal British Architects shall forthwith give effect to the will of its members, as expressed by the resolution passed in open meeting on January 7, 1907, whereby this Institute showed its disapproval of the principle of limited competitions for public buildings erected with public moneys, by forwarding a copy thereof to the Council of every county, county borough, and borough in England and Wales, before April 10, 1909."

IT transpired that the Council had shelved the resolution of a year ago, and had taken no steps to give effect to it, and it was clearly recognised that Mr. GAMMELL'S motion was a vote of censure on the Council. It was pleaded on behalf of the Council that they considered it unwise to give effect to the resolution of January 1907, and the Chairman, as the spokesman of the Council, practically told the meeting that the Council knew better than the general body of members what was expedient, and that, as their trustees, the Council were not going to let the Institute do a foolish thing. This is surely an illogical and unconstitutional position for any governing body of a society to assume, and is a most unfortunate attitude for the Council to maintain. It was a very general opinion in the room, even amongst those who had come to the meeting with the intention of saving the Council from the ignominy of a vote of censure, that the Council had not acted wisely, either in the matter to which Mr. NIELD'S resolution referred or in that dealt with by Mr. GAMMELL; and it was probably only the presence of some who were opposed to the original resolution of January 1907 that saved the Council from a vote of censure. In the result Mr. GAMMELL'S resolution was amended by the omission of the word "forthwith" and of the words after "1907," and in this amended form was carried by a small majority. The Council may take the view of this result that they have escaped the vote of censure, but must feel that they have had their knuckles rapped.

OUR curiosity was aroused by the laudatory notices in the non-technical press of Messrs. LYONS'S latest London café, designated "The Corner House," and situated at the corner of Coventry Street and Rupert Street. We read that it was built of Carrara marble and that the main saloon was in the Georgian style with Greek columns and pilasters, whilst the pastrycook's shop was in LOUIS XIII. style. We half wondered whether Professor BERESFORD PITE, in his Euston Square building, which we illustrate to-day, had initiated another Greek revival. We were scarcely disappointed and not at all surprised to find that the Carrara marble was that variety of terra-cotta which Messrs. DOULTON have so successfully introduced under the name of "Carrara," whilst the Greek columns were piers of Greek marble encasing stanchions, and with very distinctive Renaissance Ionic capitals. The whole building is in one style, which can be best described as Restaurant Renaissance, the detail of which is collected from all periods and all countries, some refined and admirable, some the reverse, the most striking idiosyncrasy being the lack of scale in contiguous decorative features. The Mirror Hall in the basement is a fine big room, all lined with marble, save for the mirrors, which are not too obtrusive, and the mosaic in the frieze, which is, and by its garish and bizarre assertiveness quite mars the general satisfactory colour tonality. Despite the lavish use of costly material, the artistic qualities of Messrs. LYONS'S latest establishment are, in our opinion, very much below those of some of their smaller and earlier tea-shops.

THE dangers of petrol have been emphasised during the past week in the daily press, and notably by Mr. WILLIAM HAYDON, the present chairman of the public control committee of the London County Council. It is unfortunate that petrol should be so dangerous, because the new type of petrol lamps would otherwise be of great utility for domestic purposes. It is useless for the manufacturers to put on the market lamps which in themselves are perfectly safe if their employment necessitates the storage of petrol in however small quantities but accessible to domestic servants. Mr. HAYDON neatly says of the ineffectiveness of advice as to the use of petrol in the house, "It is only a shade less mischievous than teaching a child how it may safely play with fire."

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VULCAN AND VENUS.—Frieze by J. B. CIPRIANI, R.A.

ARCHITECTURE IN 1908.

A YEAR ago we spoke of the hope existing in the minds of those connected with building that things must soon improve as they could scarcely be worse. That hope has been falsified during the past year and the improvement has not yet commenced. Unemployment in the ranks of both skilled and unskilled workmen during the past year has persistently, month after month, been reported as greater than a year ago. We are told that during the first eleven months of the year the foreign trade, the imports and exports, of this country has diminished by 99,000,000*l*. The credit of the country has scarcely improved, as Consols hover between 84 and 83, although money is undoubtedly cheaper with the Bank rate at 2½ instead of 7.

The most important event of the year in the world of architecture has been the selection of Mr. RALPH KNOTT'S design for the

NEW COUNTY HALL FOR LONDON.

The merits of this design and its most prominent competitors have been fully discussed in the columns of *The Architect*, and it is unnecessary now to reiterate them. The selected design, very slightly modified, has been adopted by the London County Council, and the first steps have been taken towards its realisation. It will be, however, several years before the building as designed will be finished, as a portion of the site is to remain in the occupation of Messrs. HOLLOWAY BROS., whose riverside premises will have to be acquired and absorbed in the complete scheme. The cause of the present limitation of expenditure is, of course, the careful consideration for the financial possibilities of the county of London, that is a prominent feature in the policy of the Moderate party now in power in

THE LONDON COUNTY COUNCIL,

a consideration which has led to the abandonment not only of the ill-starred steamboat enterprise of their predecessors, but also during the past year of the Works Department, that was one of the most cherished fads of the Progressives.

The plausible theory of the existence of an organised ring of contractors, conspiring to keep up the prices of municipal work beyond the limits of fair profit, was not based upon facts, and even had such a ring been a reality, there are more effective ways of fighting the conspiracy than the establishment of a municipal works department, which by the very nature of building business cannot compete successfully with private enterprise. Even supposing, what is extremely rare in municipal employment, that a fair day's work is obtained for a fair day's wage, the municipal department is not in a position to take advantage of the business opportunities that come in the way of an enterprising contractor, and by virtue of which he can always beat a municipal department in the question of expense.

Another branch of municipal trading which has added to its bad repute during the past year is the

HOUSING OF THE WORKING CLASSES.

It may be right that the community at large should provide, in default of private enterprise, healthy homes for the working classes at rents they can afford to pay, but what are we to think of the results shown at West Ham and not unknown elsewhere, that the working classes either will not live in the houses municipally provided, or if they do will not pay their rent? The West Ham Borough Council in this way lost 3,000*l*. in the last year for which the accounts were rendered, and nearly 18,000*l*. since 1901.

The London County Council is to be congratulated and the thanks of the public are due to them for the successful completion of the

ROTHERHITHE TUNNEL,

which should be a valuable addition to the traffic facilities of London, particularly between the eastern and southern districts. It is in the initiation and financing of such public improvements that the activity and energy of municipal bodies is best displayed rather than in the incompetent and costly attempts at municipal trading.

The so-called

MARBLE ARCH IMPROVEMENT

does not redound to the credit of the London County Council from an artistic point of view, and is a muddle which one would carefully avoid showing a visitor from the Continent as an example of what London can do in the way of town planning.

The past year has been the occasion of the biennial

INTERNATIONAL CONGRESS OF ARCHITECTS,

which was held at Vienna in the month of May and was attended by some 1,400 members from all parts of the world. As usual, the papers read were varied in subject, in utility, and in interest, but remarkable for their excellence and avoidance of dulness as well as for their high tone. The social side of the congress appears to have been particularly successful, as might be expected in Vienna, where the cult of the pleasant life is so generally pursued.

In London we have had the

INTERNATIONAL ART CONGRESS

for the Development of Drawing and Art Teaching and their Application to Industries, which besides the ordinary congressional programme of papers and discussions was remarkable for the exhibited collection of the productions of pupils and students of all grades, from that of the Kindergarten and infants' schools to the level of the French Ecole des Beaux-Arts. Wisely the term "drawing" was not supposed to be confined to draughtsmanship on the flat, or, as Professor BERESFORD PITE well expressed it, "lead-pencil and indiarubber." Drawing in the solid in the form of metalwork, wood-carving, and the like was included, and its value recognised as a means of educating hand and eye as well as thought and comprehension. The universal teaching of drawing as a training in thought for and comprehension of the beautiful would be the most potent agent that could be imagined for the advancement of the Mistress Art—Architecture.

Education in architecture having been successfully taken up by such youthful universities as Manchester and Liverpool, it is not surprising that

CAMBRIDGE UNIVERSITY

should think that her position demands that she too should recognise architecture in her curriculum. As it

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does not appear that design is to form any part of the intended examinations, which are to be confined to technical science and history, the recognition does not go very far and will not make architects, even if it results in adding an intelligent comprehension of architecture to the benefits of university education.

A remarkable wave of thought has been manifest during the past year amongst those who are real educationalists in architecture, and perhaps we should not go far wrong in crediting the inception of this movement to Mr. REGINALD BLOMFIELD. Certainly within one week both Professor BLOMFIELD and Professor REILLY lectured on the same theme of

THE GRAND MANNER IN ARCHITECTURE.

Although Professor REILLY'S lecture was delivered some few days before the first of Professor BLOMFIELD'S, it may have been that the announcement of the latter's course at the Royal Academy suggested a subject to his *confrère*. Whether or not the coincident treatments of this subject were causally connected is, however, unimportant. What is notable is that such a theme should be considered worthy of consideration by two of our leading Professors. And still more, that this should be followed later in the year by the announcement that the Royal Institute has decided to substitute the Principles of Architecture for the detail of the Styles of Architecture, as one of the subjects of its examination.

There can be no doubt that in spite of the protests, both polemical and practical, of some of the more thoughtful minds, the tendency alike of students and exponents of the art of architecture in this country has been during the last half-century towards the exaltation of detail and the disregard of the higher qualities of expression in mass. The era of revivalism both Classical and Mediæval, and its consequent attachment to archæological correctness, has inevitably led to the undue prominence accorded to detail. Revolt against this has been partly the motive force impelling the "new art" movement; but although some of the best spirits in this movement have rightly been led to the proper subordination of detail, too many have fancied the path of freedom to lie in the subversion of the work of the past, and have thereby been led into the vagaries that we have most of us deplored. They are still the thralls of detail, having merely exchanged the chains of correctness for those of eccentricity. That we are now riding on a higher wave of thought in respect to the essentials of architecture is further evidenced by the appreciation expressed of the philosophical paper read by Mr. FELIX CLAY at the Architectural Association on "The Origin of the Sense of Taste in Art." It is surely remarkable that such a paper should be well received in any assembly of architectural students, for in days not so very far back it would scarcely have been tolerated.

Besides the modification of its examination, to which we have above referred,

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS

has during the past year made its application to the Privy Council for the revised charter which represents the effect of the compromise between the educationalists and the registrationists in the ranks of the Royal Institute. During the period of waiting for the new charter several architects have been elected as Fellows under the old system, but this has now practically been stopped by the action of the Associates, who, on a ballot being demanded, promptly black-balled every candidate who had not passed the examination. An attempt was made by the Council to evade the ballot on a subsequent occasion, but was unsuccessful, and the list of candidates for the Fellowship was withdrawn. The new charter has been so long in arriving that it is scarcely surprising that a large number of members of the Royal Institute, Fellows as well as Associates, have firmly resolved that delay, accidental or otherwise, shall not be allowed to nullify the terms agreed upon by all sections as the basis of the new charter. A worthy successor to Mr. LOCKE has been found in the new secretary, Mr. G. IAN MACALISTER, B.A.

THE LIVERPOOL ARCHITECTURAL SOCIETY,

which is the oldest Society outside London connected with the architectural profession, has celebrated the sixtieth anniversary of its foundation. Originally established as an architectural and archæological society, including in its membership those who took merely a *dilettante* interest in architecture, new or old, it gradually became a purely professional body, and such it is now. Professional societies are highly desirable, and one might even say necessary, and the more numerous they become and the more active they are, the better for the art of architecture. But it is not to the benefit either of the art or the profession that associations in which the layman and the amateur can meet with and learn from the actual practitioner of any art should drop out of existence. It is far better for the art that there should be a large body of amateurs and laymen who understand what is good and what is mediocre or bad in architecture, and who can, with an intelligent interest, rightly appreciate the art of the present.

We have plenty of societies for the instruction and benefit of amateurs in archæology, antiquarianism, and even ecclesiology. We need more for amateurs of art in general and architecture in particular.

The science of archæology has cause to mark *cum creta alba* the past year, for this has seen the commencement of the systematic

EXCAVATION OF MEMPHIS

by Professor FLINDERS PETRIE as the representative of the British School of Archæology in Egypt. Many and valuable as have been the results of exploration in buried Egypt, there is good cause to hope that the investigation of the remains of the capital of the ancient empire may be rewarded with even greater treasures and additions to our knowledge not only of the oldest dynasties but of bygone civilisation of comparatively more recent date.

Of both archæological and architectural importance has been the appointment of a Royal Commission to prepare an

INVENTORY OF ANCIENT HISTORICAL MONUMENTS,

for it can scarcely be supposed that when the list is prepared it will simply be pigeon-holed without steps being taken to preserve the value of the list by conserving the monuments that it records.

Failing retention on its original site the fate of the ancient historical monument,

CROSBY HALL,

is perhaps as happy as could be desired. The directors of the Chartered Bank of India, Australia and China offered the fabric to the London County Council, and this body at its meeting on July 14 resolved to accept the gift and to hand it over to the University and City Association of London, who are to re-erect it at Chelsea, convey the freehold of the site and building to the Council, and maintain it for the public benefit, subject to a right of user for the academic purposes of the University Hall of Residence, More House, Chelsea. This solution has superior merit in several respects to the alternative suggestions put forward for its re-erection in the churchyard of St. Botolph's or the garden of Leighton House, not that these latter schemes were without plausibility and adherents.

In the history of our

CATHEDRALS,

the past year has seen the completion of the restoration of the central, or Bell Harry, tower at Canterbury, which has been carried out under the direction of Mr. W. D. CAROE, at a cost of about 15,000*l*. This, however, does not complete the whole of the repair necessary to the cathedral, for during the past year it has been "discovered" that the upper parts of the two western towers are in a dangerous condition and operations have been commenced at a carefully estimated cost of 17,250*l*. for this work. It has also been "discovered" that the piers

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of the central tower are unsound, cracks, fissures, and crushed stones being evident. These and other urgent repairs bring up the estimated cost to 24,000*l*. It is the same old story once more: the chapters, who are the custodians of our cathedrals, neglect the sustentation of the fabrics under their charge till, as they would have us believe, a sudden and alarming "discovery" is made that a famous and ancient historical monument is on the verge of collapse. It is high time that some public and competent body was formed *ad hoc*, to take over the care of the fabric of our cathedrals and other ancient historical documents.

The guardians of Chichester, having collected and spent 117,000*l*., have appealed during the past year for another 5,000*l*. to "complete" the repair of the fabric, the particular items now urgent being the stonework of the campanile and the lead roof, which is said to be dangerously thin. Completion of the repair is exactly what ought never to be attempted in a cathedral. The fabric should be continually repaired or sustained and never allowed to fall into such a state as to be dangerous.

At Chester they have asked for 6,000*l*. to restore the south-west door and buttress of the south transept and to rebuild the organ. The latter job demands 4,000*l*., but the former work has been put in hand.

The "restoration" of Peterborough Cathedral has been completed and the fund closed after an expenditure of 53,614*l*. exclusive of special gifts. The Dean has started a Fabric Repair Fund. This is as it should be; sustentation and not restoration should be the policy pursued in respect of the fabric of our cathedrals.

At York Minster, too, the restoration of the exterior has been for the present completed, and such repairs as are now necessary will, it appears, be paid for out of ordinary income.

With the north and south turrets and the portal the new west front of Hereford Cathedral has been completed after six years' work under the direction of Mr. J. OLDRID SCOTT.

The choir of Dunkeld Cathedral has been opened for public worship after restoration under Messrs. DUNN & WATSON, at the expense of Sir DONALD CURRIE.

Truro is proceeding towards completion, a contract at 15,369*l*. having been signed for the erection of the western towers and spires.

At Winchester they are still making "discoveries." Having underpinned the two corners of the north transept it has been found that the wall between them must be underpinned also. Another "discovery" is that the buttresses on the wall of the north aisle do not support but hang on to the wall. As this was known to be the case with buttresses at the east end of the church several years ago the recent "discovery" is somewhat belated. A bagatelle of 7,000*l*. has been added this year to the estimated cost of restoration. There is little doubt that, save for sentiment, the proper course to be adopted with Winchester Cathedral would have been to have pulled down the whole building and re-erected it on sound foundations, and by the time the "discoveries" and the repairs are completed it will probably be found that this drastic method would have been the most economical. We only hope that the present faith in the grouting machine is not misplaced, and that it will not be "discovered" that the cement which is supposed to be binding together the fractured walling has found its way into the peat. The grouting machine is used in the construction of tube railways, and the engineers say that by its means the space by which the excavation exceeds the periphery of the tube is filled completely by a waterproof mass of cement so that no subsidence can occur nor water travel along or enter the tube. It is disquieting therefore to know that in the past year the North Lambeth Library has had to be partly rebuilt in consequence of subsidences attributed to the construction of the Baker Street and Waterloo Railway. As we travel on the tubes we see evidences of damp penetrating which lead us to fear that the grouting machine is not so perfect as its sponsors claim.

IMPORTANT BUILDINGS COMPLETED

include the new Government Offices in Parliament Street, designed by the late Mr. J. M. BRYDON; the new Town Hall, Stockport, by Sir A. BRUMWELL THOMAS; the Law Courts, forming part of the new municipal buildings of Hull, and of which Messrs. RUSSELL & COOPER are the architects; the Municipal College, Portsmouth, costing 110,000*l*., and designed by Mr. G. E. SMITH; the extension of Leeds University, designed by Mr. PAUL WATERHOUSE, and opened by H.M. the KING on July 7; the offices of the Royal Pension Fund for Nurses, opened on July 4 by H.M. the QUEEN, and of which also Mr. PAUL WATERHOUSE was the architect. Although not yet opened to the public, Sir ASTON WEBB's important additions to the Victoria and Albert Museum are practically completed. Another large hotel, the Waldorf, in Aldwych, has been added to those of London, the architects being Messrs. A. MARSHALL MACKENZIE & SONS. Mr. J. BELCHER, A.R.A., has added the office building of the Royal Insurance Co., and MAPPIN & WEBB's new premises in Oxford Street to the list of his works in London. A notable piece of design is Professor BERESFORD PITE's new office building for the London, Edinburgh and Glasgow Assurance Co. The new St. James's Hall, Great Portland Street, has been completed at a cost of 100,000*l*., Messrs. JOSEPH & SMITHEM being the architects, and associated with them for the interior Mr. A. BLOMFIELD JACKSON. Mr. LEONARD STOKES has completed the additions to the offices of the Chelsea Borough Council, costing 21,000*l*. A building which has attracted the attention of the general public not for its architecture but for its sculpture is that for the British Medical Association by Messrs. H. PERCY ADAMS & HOLDEN. Amongst the most important hospital buildings completed have been the Royal Infirmary, Manchester, at a cost of 500,000*l*., of which Messrs. E. T. HALL & J. BROOKE were the joint architects; the Booth Hall Infirmary of the Prestwich Poor Law Union, by Messrs. T. WORTHINGTON & SON; the Greenock Hospital by Mr. ALEX CULLEN; the Cardiff City Mental Hospital, costing 349,000*l*., by Messrs. OATLEY & SKINNER; the Glasgow Maternity and Women's Hospital, by Messrs. (the late R.A.) BRYDEN & ROBERTSON; the Infirmary Extension and Nurses' Home at Selly Oak, Birmingham, by Messrs. C. WHITWELL & SON. Churches worthy of note are the first part of St. Wilfrid's Church, Harrogate, by Mr. TEMPLE MOORE, and St. Alban's, Bournemouth, by Mr. G. H. FELLOWES PRYNNE.

IMPORTANT BUILDINGS COMMENCED

during the past year include a new asylum for the county of Essex, the first portion of which, estimated to cost 289,276*l*. and to accommodate 1,376 out of a future total of 2,000 patients, has been begun from the drawings of Mr. F. WHITMORE, the county architect. Another asylum work is the additions to Napsbury Asylum, Middlesex, for which Mr. ROWLAND PLUMBE is the architect, and which is estimated at 91,469*l*. The extension of the Birmingham Municipal Buildings at a cost of 150,000*l*. has been commenced from the designs of Messrs. H. V. ASHLEY & WINTON NEWMAN, selected in open competition. Another successful competition design, that of Messrs. LANCHESTER & RICKARDS for the new home of the Wesleyan Methodist Connexion at Westminster, is now in progress of realisation.

OBITUARY.

The list of architects who have passed away during the year includes the names of Mr. J. S. QUILTER, Mr. F. E. MORRIS, Mr. J. B. COLSON, Mr. E. W. MOUNTFORD, Sir JAMES KNOWLES, Mr. D. R. DALE, Mr. G. A. MANSFIELD, Mr. F. G. JOHNSON, Mr. S. P. REES, Mr. J. LESLIE, Mr. C. F. REEKS, Mr. R. F. VALLANCE, Mr. J. J. STEVENSON, Mr. H. POSTON, Mr. R. C. DAVY, Mr. W. PERKINS, Mr. A. DARBYSHIRE, Mr. H. H. STANNUS, Mr. L. W. GREEN, Mr. T. WINN, Mr. L. H. ISAACS, Mr. F. H. OLDHAM, Mr. A. E. GOUGH, Mr. D. GOSTLING, Mr. F. A. SPRULES, Mr. I. STEANE, Mr. E. TAYLOR, Mr. W. M. FAWCETT, Mr. E. A. GRUNING.

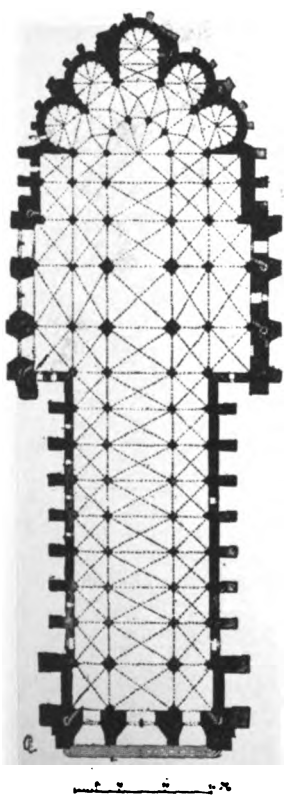
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RHEIMS CATHEDRAL—THE CORONATION CHURCH OF FRANCE.

By Professor CHARLES GOURLAY, B.Sc., A.R.I.B.A.

IN no single cathedral in France may one find all the beauties of the French Gothic style which are to be seen in the many ecclesiastical buildings still remaining throughout the country, belonging to the glorious epoch of the thirteenth century. Nevertheless, it is the object of this article to bring before the readers of *The Architect* the claims of Rheims Cathedral to being considered as having approached as near as, and probably nearer than, any other French cathedral, to being truly representative of the work of this great period in France, for it possesses many of the beauties of the style in the highest degree.

The cathedrals of Amiens and Rheims are almost universally considered to be the finest of the great French Gothic structures, and whether Amiens or Rheims is the finer depends on the special feature under consideration. For instance, the interior of Amiens is much higher than that of Rheims and has a lit triforium which Rheims has not, two features which give it a great advantage over that of Rheims, but, on the other hand, the west front of Rheims far surpasses that of Amiens. At Amiens the towers are dwarfed by the enormously high nave, which, being lower at Rheims, enabled the towers to be built in much better proportion with the other features of the façade; therefore the west front of Rheims is undoubtedly the finer one from the strictly architectural point of view, that is, independent of its sculpture, in which it far surpasses that of Amiens. And this superiority extends to the interior of the western façade of Rheims, for there we have a lit triforium below the great rose window, and beneath, on each side of the doorway, the wall face is richly treated with sculpture, set in rows of trefoil-headed niches having intermediate carved panels of the greatest beauty, while the traceried tympanum of the doorway is glazed with old glass; thus the internal treatment is immensely preferable to the blank walling of the interior of Amiens. Hence, although the cathedral of Amiens is often, but not always, preferred as a whole to that of Rheims, yet we may, after these introductory remarks, proceed to the study of the cathedral of Notre-Dame at Rheims—the Coronation Church of France—with the understanding that it holds the proud position of being one of the two finest works of the Gothic period in France or on the Continent of Europe.



RHEIMS CATHEDRAL. PLAN

PLAN.

In plan the cathedral of Rheims is singularly beautiful, being very complete though simple. The nave is long, having ten bays, and it has an aisle on each side but no chapels. The transepts are short, consisting of only two bays, and have one aisle on each side, both of which are wider than the aisles of the nave. Therefore the end bays of the nave and choir arcading at the crossing are wider than the others, thus giving a feeling of lightness and openness at the crossing which is most appropriate. The transepts are placed nearer the east end than is commonly the case in French cathedrals, with the result that the choir fills the crossing and extends westwards into the nave to the distance of three bays. Eastwards of the crossing the choir has three bays, then the apse with its ambulatory and chapels forming a perfect chevet. The chapels are large, being of considerable depth, and the central one is deeper than the others. As to dimensions, this cathedral is exceeded in length externally in France by that of Le Mans only, which has an exceptionally long eastern chapel, the lengths being, Rheims, fully 489 feet, and Le Mans, 492. The length of Rheims internally is 455 feet, and the width of its nave 46 feet.

ARCHITECTS.

Many legendary statements have been made about the name of the original architect and his successors, also about the dates of their work, but M. DEMAISON, the Municipal Archiviste of Rheims, has by careful research conclusively established the following facts.

The cathedral of Rheims was begun on May 6, 1211. JEAN D'ORBAIS furnished the plans for the whole building, carrying out the choir and probably the greater part of the transept. His successor was JEAN LE LOUP, who directed the works for sixteen years. He undertook part of the nave, and also the great western front, which was continued by GAUCHER DE RHEIMS from 1250 to about 1260. Following him was BERNARD DE SOISSONS, who constructed the nave from the fifth to the ninth bay inclusive, and the great circular western window. It is known that BERNARD continued to carry on the work till 1287, and that it was, without doubt, very soon after this date that ROBERT DE COUCY became Master of Notre-Dame. ROBERT DE COUCY died in 1311, and therefore he could not, as had at one time been believed, have been the original architect of the cathedral or of its porches. The following parts are attributed to him. The four first western bays of the nave, which, although they harmonise with the other bays, yet show distinct differences in style and in the method of construction. The differences of style may be traced in the profiles of the mouldings and in the carving of the capitals. It is very probable that he was author of the side portions and upper parts of the western front, of which he may have modified the design; also of the towers. At the time of his death the great gallery of the front had not yet received its statues.

WESTERN FRONT.

Referring to the western front, FERGUSSON says, "The superb west façade is perhaps the most beautiful structure produced in the Middle Ages." Including the towers there are four storeys in this front. The lowest storey contains the three deeply-recessed porches, with gables above each; that over the central porch rises to the height of the centre of the rose window above it. A central pillar divides the great portal into two doors which lead into the nave, while the side porches have single doorways opening into the aisles.

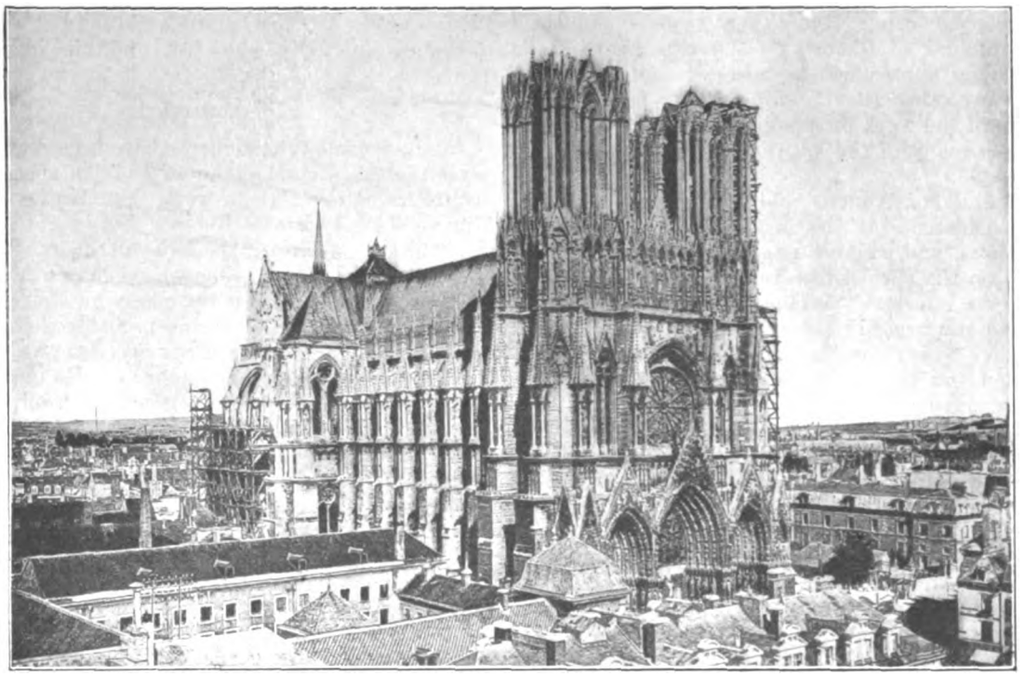
The second storey contains the richly traceried rose window, which is directly above the central doorway and is set in a pointed arched opening. The circle is about 40 feet in diameter, and its bold mouldings make it stand out clearly beyond the plane of the tracery within it. The part into which the circle fits, being square below and pointed above, makes three irregular spaces which have to be filled up somehow. This was commonly done, as in this instance, with tracery, and it is very instructive to observe the many different ways in which it was attempted to satisfactorily solve this problem. On each side of the great rose window are two tall double-light windows, with rich tracery in their heads and gables over.

The third storey contains a fine and effective feature in the gallery containing the row of statues of kings, each statue being placed in a niche with canopy above, which terminates in a small gable, the whole forming a magnificent arcade. The gable marking the centre of the front indicates the roof of the nave but is not directly connected with it, for the roof stops at another gable,

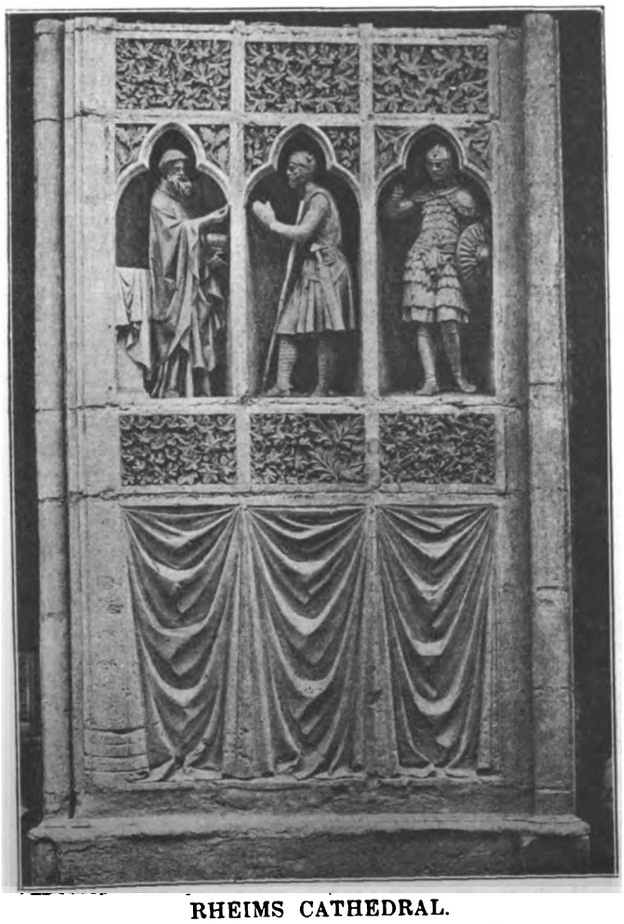
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which is nearly in line with the eastern faces of the towers, and there is a broad flat space between.

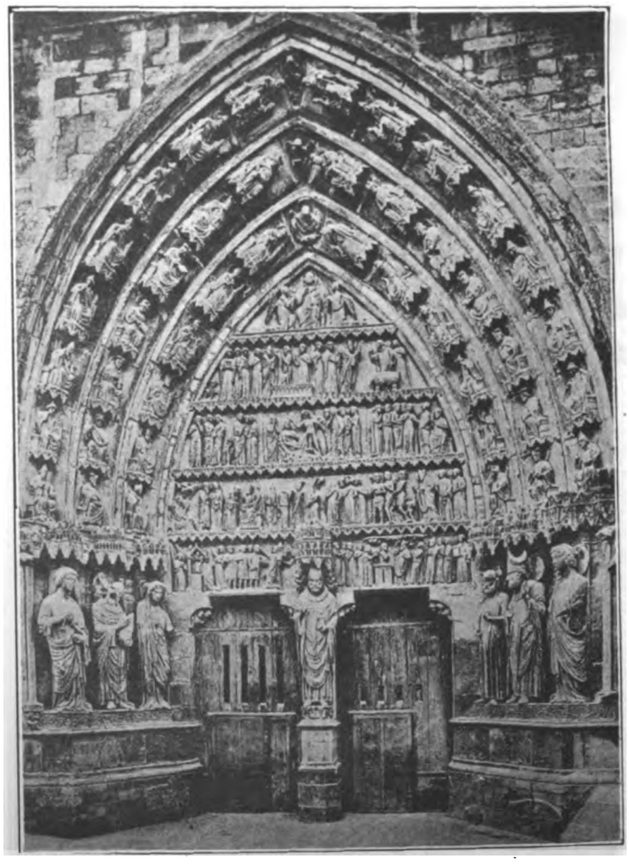
The boldly projecting buttresses divide the façade into three great vertical compartments. The end buttresses are at their bases somewhat similarly treated to the great doorways, having arched panelling with tracery and gables over. The intermediate buttresses rise from between the central and side porches. In the second storey there is a niche containing a statue, with spirelet above, all very richly treated. These buttresses appear to terminate in the arcaded gallery forming the third storey, but their vertical lines are carried upwards into



CATHEDRAL OF RHEIMS FROM THE NORTH-WEST.



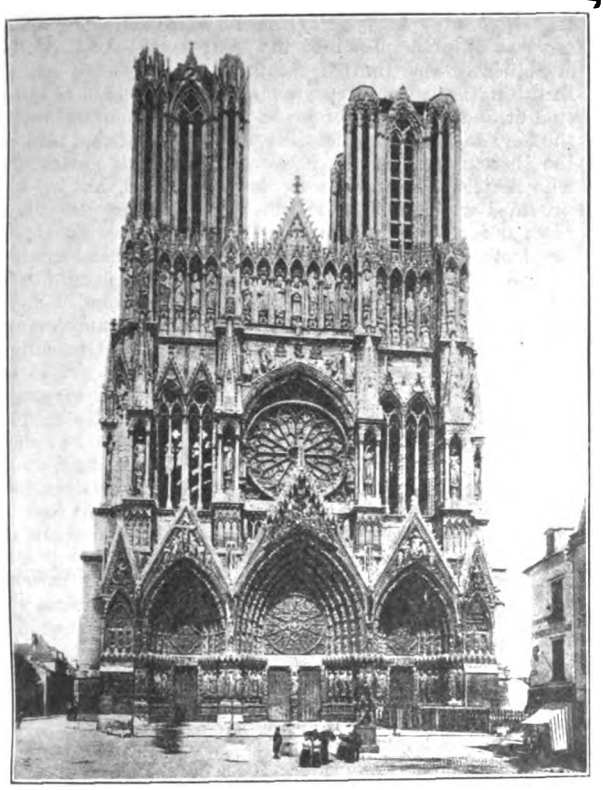
RHEIMS CATHEDRAL.
DETAIL OF INTERIOR OF WEST CENTRAL PORCH.



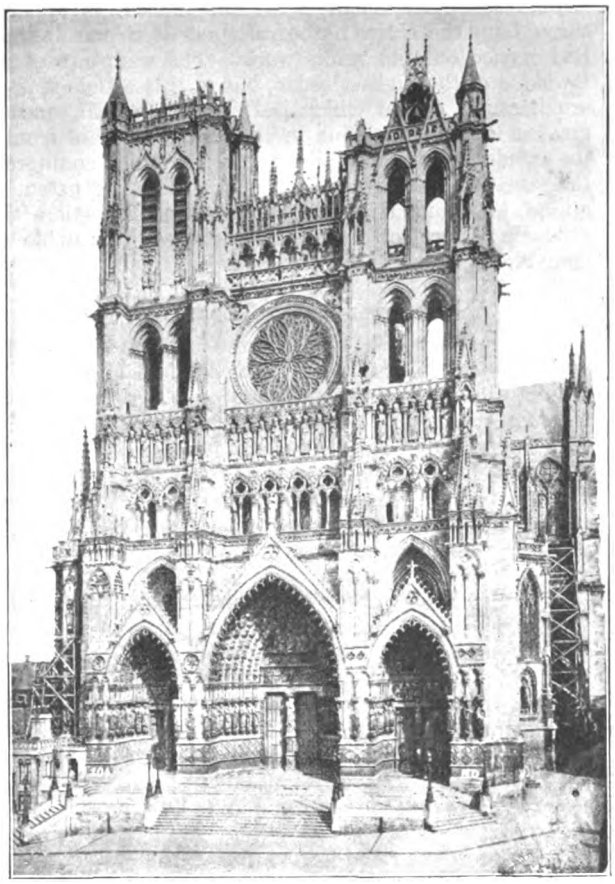
RHEIMS CATHEDRAL.
CENTRAL PORCH TO NORTH TRANSEPT.

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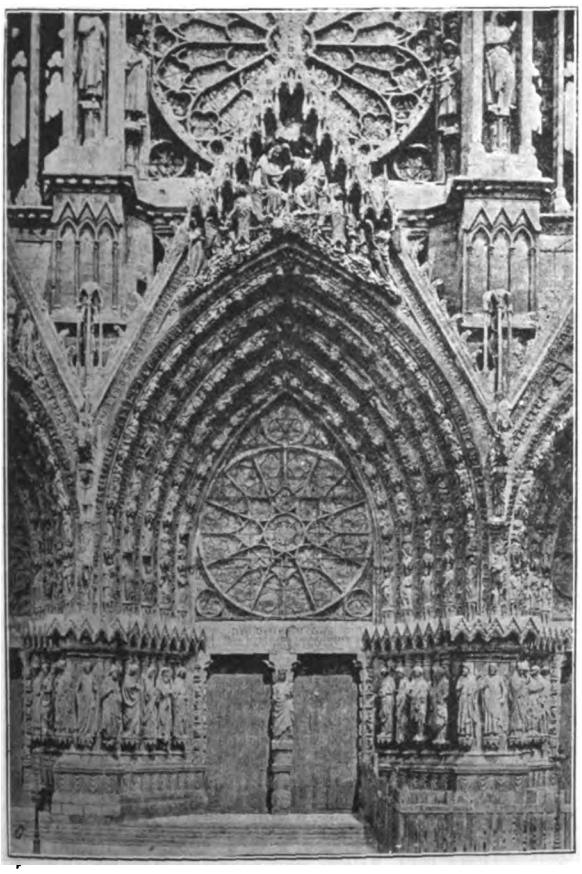
the towers. The towers themselves form the fourth storey. They are octagonal on plan, having a very tall double-light window on each cardinal face forming the lantern, while projecting from the other sides of the octagon there are polygonal turrets terminating in small pinnacles. These western towers are 267 feet in height and were not completed till nearly 1430; their spires, however, were never executed. It appears as if the spires were not necessary to complete the design of the front, which seems perfect without them. This may be



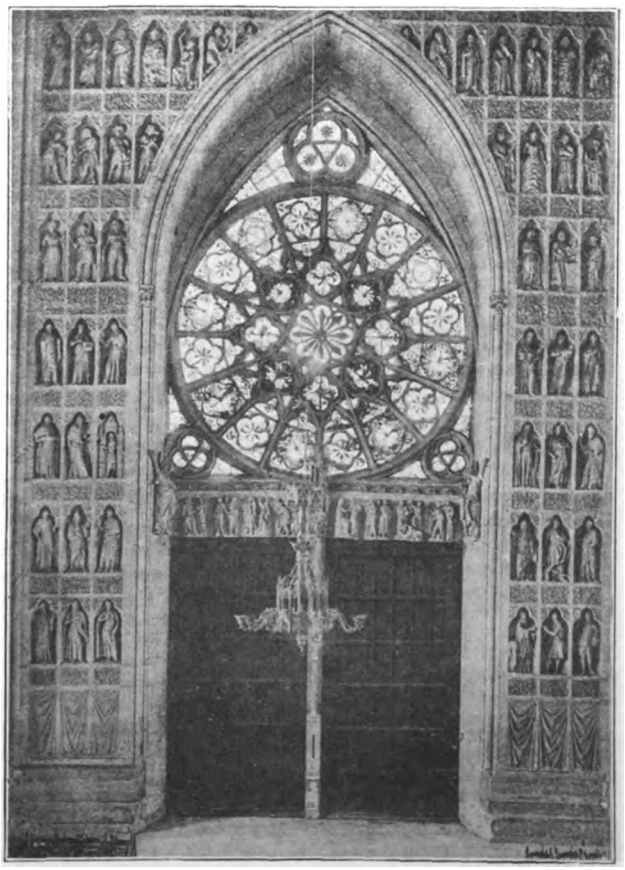
RHEIMS CATHEDRAL.—WEST FRONT.



AMIENS CATHEDRAL.—WEST FRONT.



RHEIMS CATHEDRAL.—CENTRAL PORCH.



RHEIMS CATHEDRAL.—INTERIOR OF WEST CENTRAL PORCH.

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owing to the irregular outline at the top of the towers, especially the northern one, which is thus in harmony with the rich decoration of the whole front.

This front is undoubtedly a masterpiece; the whole of the architecture is in perfect proportion, and there is a remarkable unity about it which, indeed, is apparent throughout the entire cathedral, just as if one architect had carried out the whole work. The sculpture of this façade is of the highest order, but in this article it is the architectural design which is being dealt with, and the greatest stroke of genius in the design of this front is the arcade forming the gallery of kings, which counteracts the vertical tendency of the buttresses to the extent required, and binds the towers to the central portion, thus producing a perfect composition—indeed, this noble and magnificent façade is unsurpassed.

CENTRAL PORCH, EXTERIOR.

The magnificent central porch is 52 feet high and 20 feet wide, the doorways being 20 feet high. At the base of the façade there is a band of carved drapery with mouldings, above this are statues set on corbels and crowned by canopies, which form a continuous row along the entire front, except on the lintels of the doorways. The lintel of the central doorway was sculptured as those of the north and south doorways still are, though the sculptures on them are greatly mutilated, but that of the central doorway was hewn off in 1793, and in 1802 a commonplace inscription was inserted. The cathedral is dedicated to the Virgin, and the sculpture of this porch all relates to her, while on the central pillar there is a beautiful statue of the Virgin and Child. The tympana of such doorways are generally richly sculptured, but in this example we find the whole of these spaces filled with tracery, that of the central doorway taking the form of a large rose window, which contains beautiful glass. The arch mould is richly carved and its hollows are filled with sculptured figures. Above all, in the gable, there is a group representing the Coronation of the Virgin, capped by a series of niches which follow the slope of the skews. Since mediæval times this porch has been worthily considered one of the four wonders of the Middle Ages in France.

CENTRAL PORCH, INTERIOR.

The interior of this central porch has already been referred to in the introduction. The actual doors are of wood, and the central pillar appears more slender internally than externally, in order to form recessed surfaces, against which the doors may close; the lintel retains its sculpture. The entire tympanum of the doorway, including its circular window and adjoining parts, is filled with beautiful stained glass belonging to the fourteenth century. Perhaps the tympana of the western doorways were glazed in order to admit light for the efficient lighting of the sculpture of the inner face of the wall in which the doors are placed. This sculpture is placed in a series of niches, row above row, and the foliage in the intermediate panels is treated in a very natural manner. In the lowest panels carved drapery is exceedingly well represented. There are in all 120 statues decorating the interior face of this western wall, and there appears to be no other wall interior so richly treated with carving and sculpture. The subject of the statuary on the north side of the central doorway is the Life of JOHN THE BAPTIST, while that on the southern side is the prophecy and fulfilment of the Coming of the MESSIAH.

CENTRAL DOORWAY OF SOUTH TRANSEPT.

The fine central doorway to the north transept is a double one, the opening being divided by a stone pillar with sculpture. This porch is of earlier date than the western ones, yet it is very richly treated with sculpture, that on the jambs relating chiefly to the Bishops of RHEIMS. The tympanum is, here, of solid stone, and it is sculptured in the manner generally followed in similar doorways of this period; the subject is the history of St. NICAISE and St. REMI.

(To be concluded.)

THE WORKMEN'S COMPENSATION ACT (1906) IN OPERATION.—I.

By W. S. HOLDSWORTH, D.C.L.

THE Workmen's Compensation Act (1906) came into operation on July 1, 1907. It has therefore been in force for eighteen months. In some respects it was a new departure, but in most respects it was simply a development of the principles contained in the Acts of 1897 and 1900. In this country Acts of Parliament which introduce a wholly new set of principles into the legal world—Acts like those establishing the limited liability company—are generally in the nature of very rough plans as to the kind of institution or as to the kind of principle which commends itself to the Legislature. The detailed working out of that plan, and the introduction of the necessary safeguards against those who desire to pervert it to their own ends, are left to be provided when cases arise which call for some more specific rules or for some safeguard against hardship or fraud. The problems entailed by the application of a general scheme or principle to the almost infinite variety of the facts of human life are worked out by the Courts in the form of decided cases. This process, like many other experimental processes, is both slow and expensive, but it is sure. Gradually by means of these decided cases and by amending Acts there is evolved what would be called in continental countries a "jurisprudence" of the subject; and finally the results of this "jurisprudence" can be codified into an Act which can lay claim to some finality, because it is no longer a rough sketch or plan of the aspirations of the Legislature, but a considered code based upon the experience derived from concrete cases arising in the world of facts. We have said that the Workmen's Compensation Act, 1906, is not quite a new departure. Though it undoubtedly contains new principles and new ideas, it reproduces in many of its clauses the wording of its direct lineal ancestor, the Act of 1897; and in the ten years which had elapsed between the passing of those two Acts much had been done by the Courts to make the Act of 1897 a workable Act—to give definite meanings to its words and sections and sub-sections, and to determine the extent of the rights and liabilities outlined in it. The Act of 1897 has been repealed, but the judicial labour expended upon it has not been thrown away. Where the wording of the Acts of 1897 and 1906 are identical the old cases still have authority, and therefore the Act of 1906 has worked far more smoothly than it could have worked if it had not had such an ancestor in 1897. Heredity is a force in spheres other than that of biology. But some new principles were introduced by the Act, and all the problems set to the Courts by the passing of the earlier Act had not been fully worked out. It is therefore of some interest to inquire what progress has been made during the years 1907 and 1908 towards the evolution of a definite body of rules upon the subject of workmen's compensation.

The cases decided turn upon many different sections, so that an inquiry of this nature must by the nature of the case be a little disconnected. We shall deal with the subject under the following headings:—The workman's remedies at common law and under the Act; the meaning of the term "accident"; the meaning of the phrase "course of employment"; the meaning of the phrase "serious and wilful misconduct"; questions relating to the amount of compensation payable; questions relating to the rights of dependents; liability for certain diseases; cases turning upon the definition of certain terms.

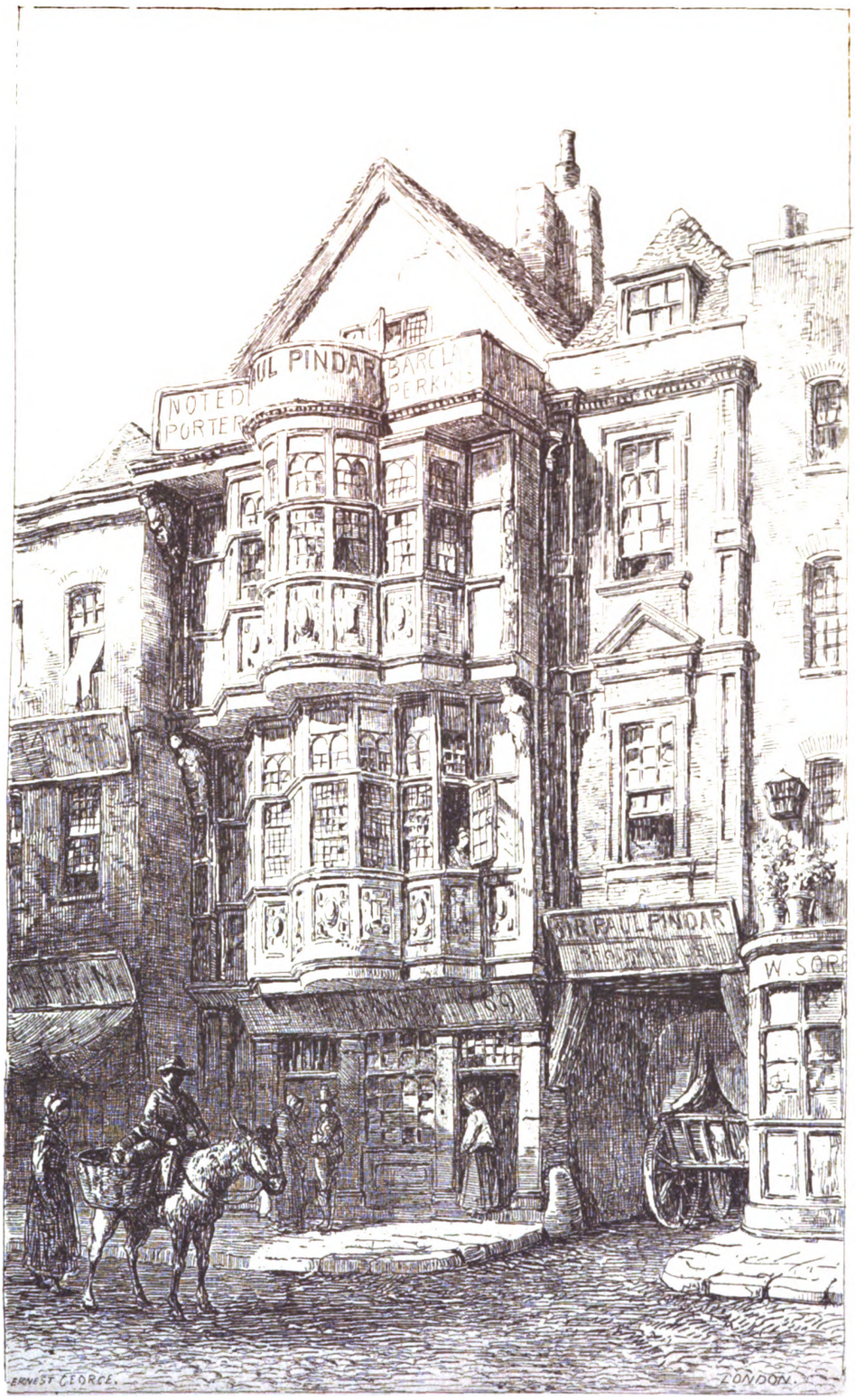
The Workman's Remedies at Common Law and under the Act.

It is well known that the workman's remedies at common law against his employer for injuries sustained by him in the course of his employment were very inadequate, and that their inadequacy was the main cause for the passing of the Act of 1897. In all cases to which the Employers' Liability Act of 1880 did not apply the workman could be met by the defence of common employment; and in all cases the employer could use ordinary common law defences, such as contributory negligence. The Acts of 1897 and 1906, on the other hand, placed the employer under a statutory liability to compensate for all accidental injuries sustained by the workman in the course of his employment. The mere negligence of the workman is no bar to his claim for compensation. It must be shown that the injury was caused by his own serious and wilful misconduct. But the new rights thus given to the workman did not take away such rights as he had at common law. They were additional, not sub-

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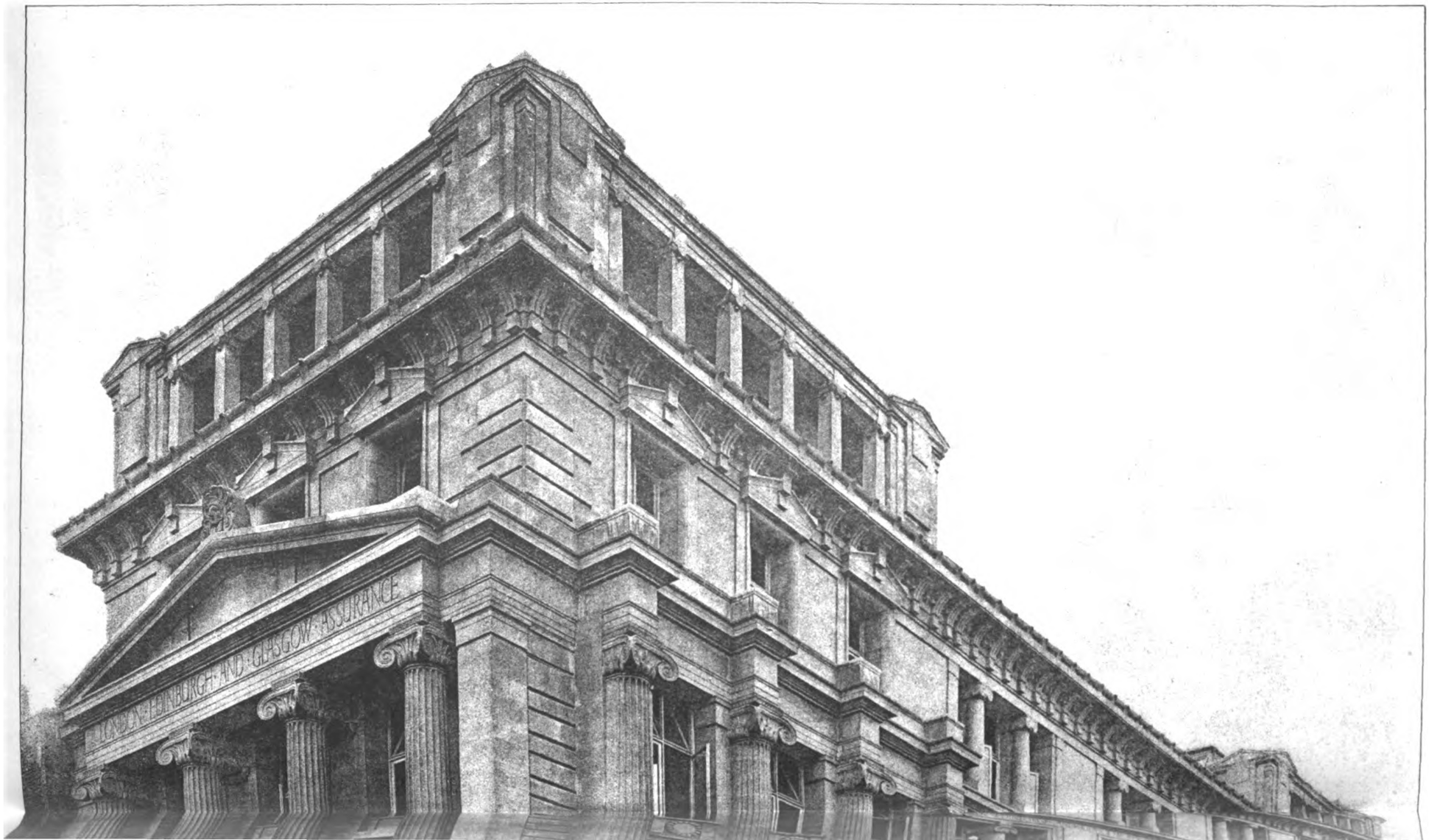
House of Sir Paul Pindar, London.

From early Etchin

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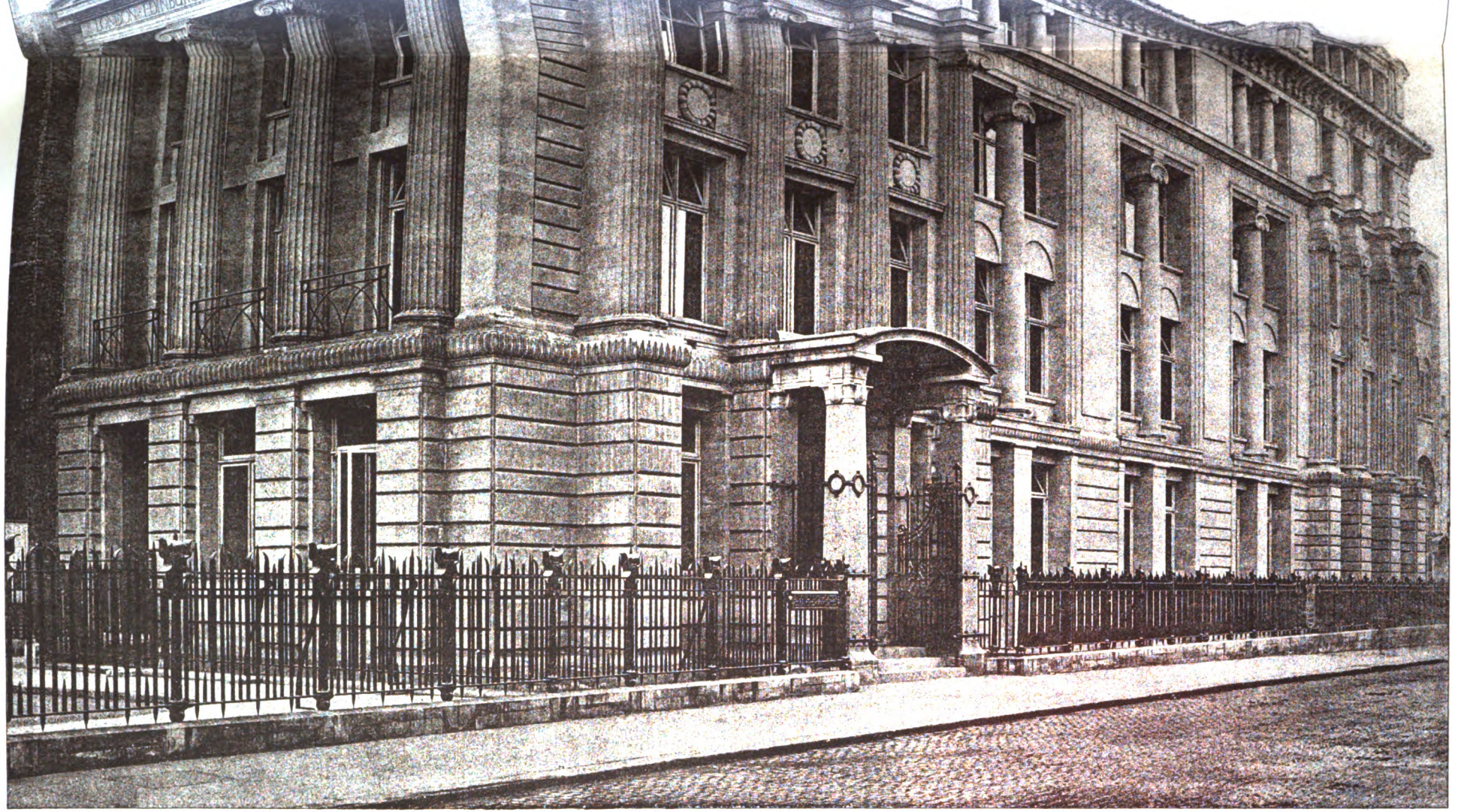


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Professor BERESFORD PITE, F.R.I.B.A., Architect.

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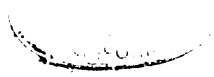


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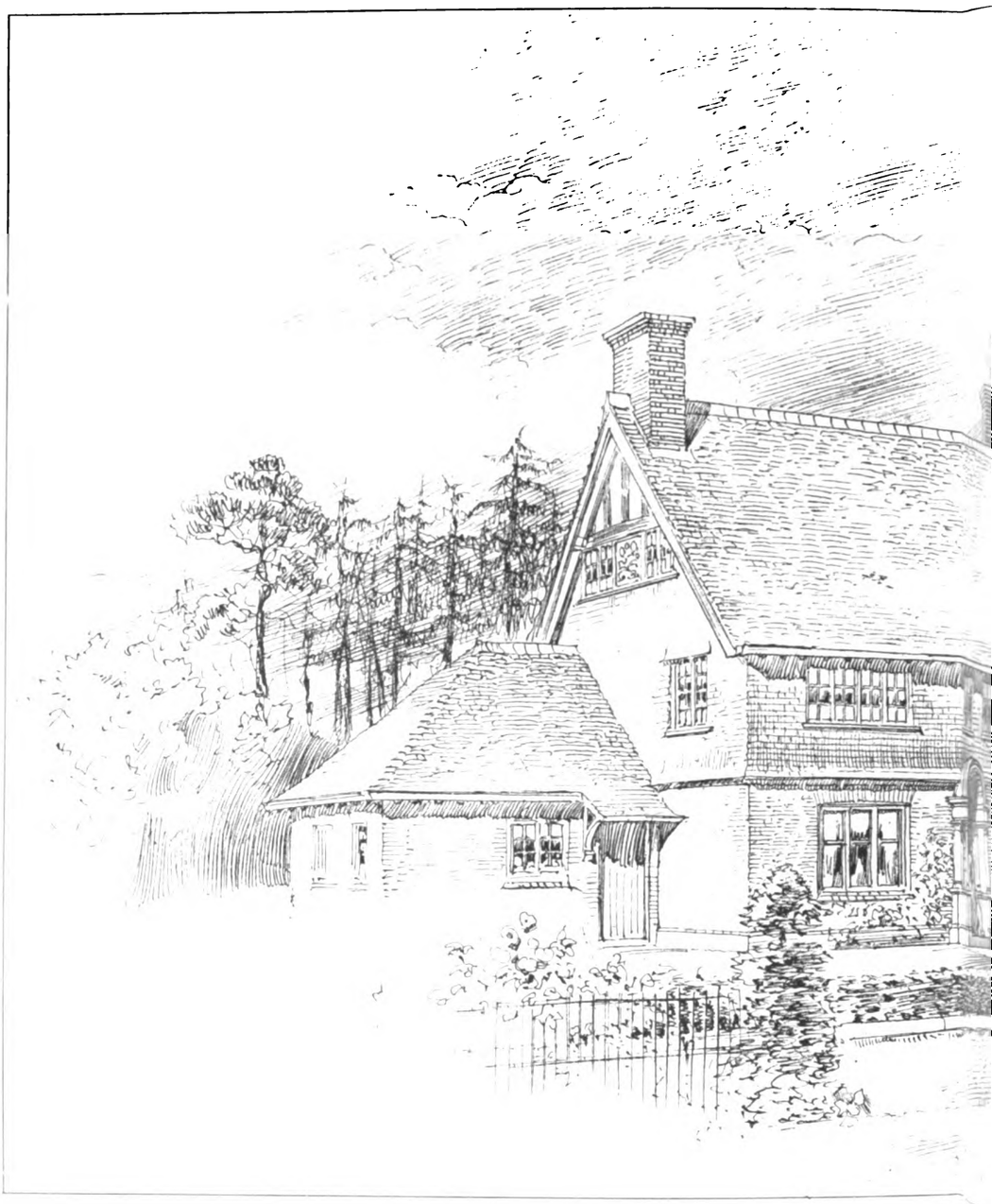
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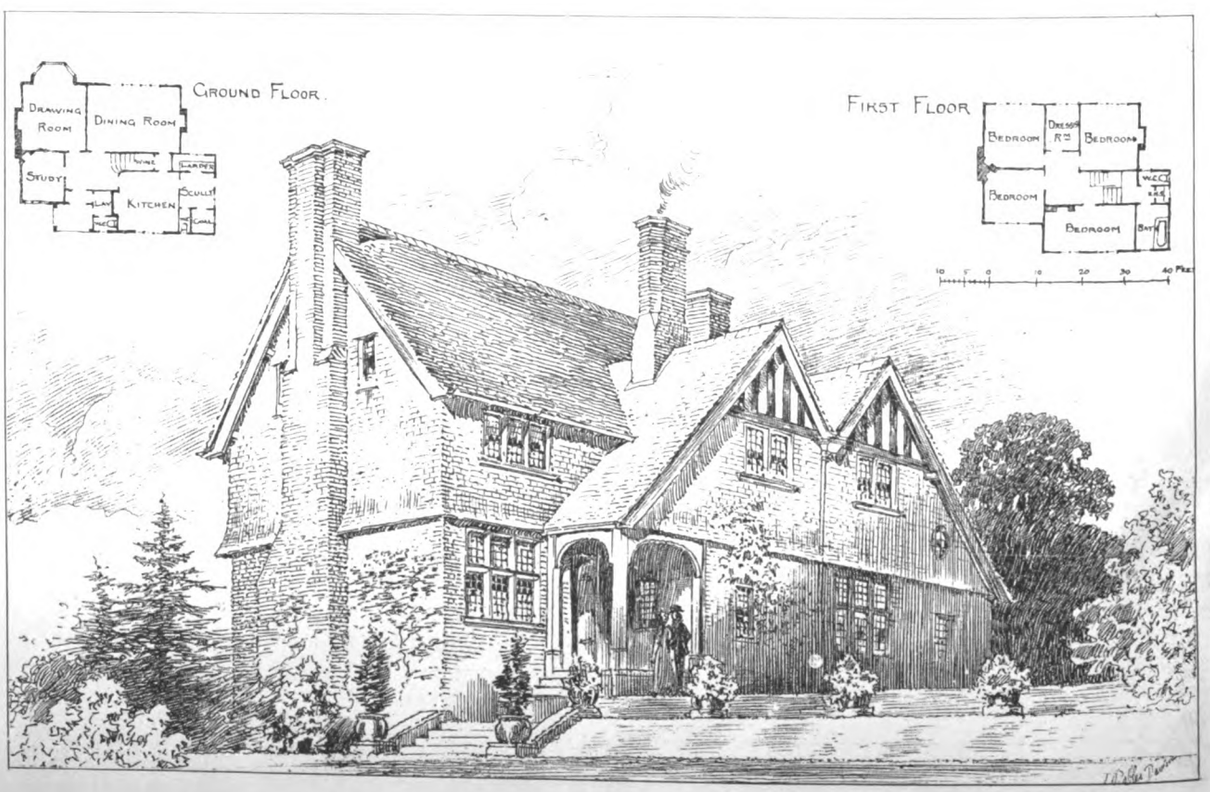
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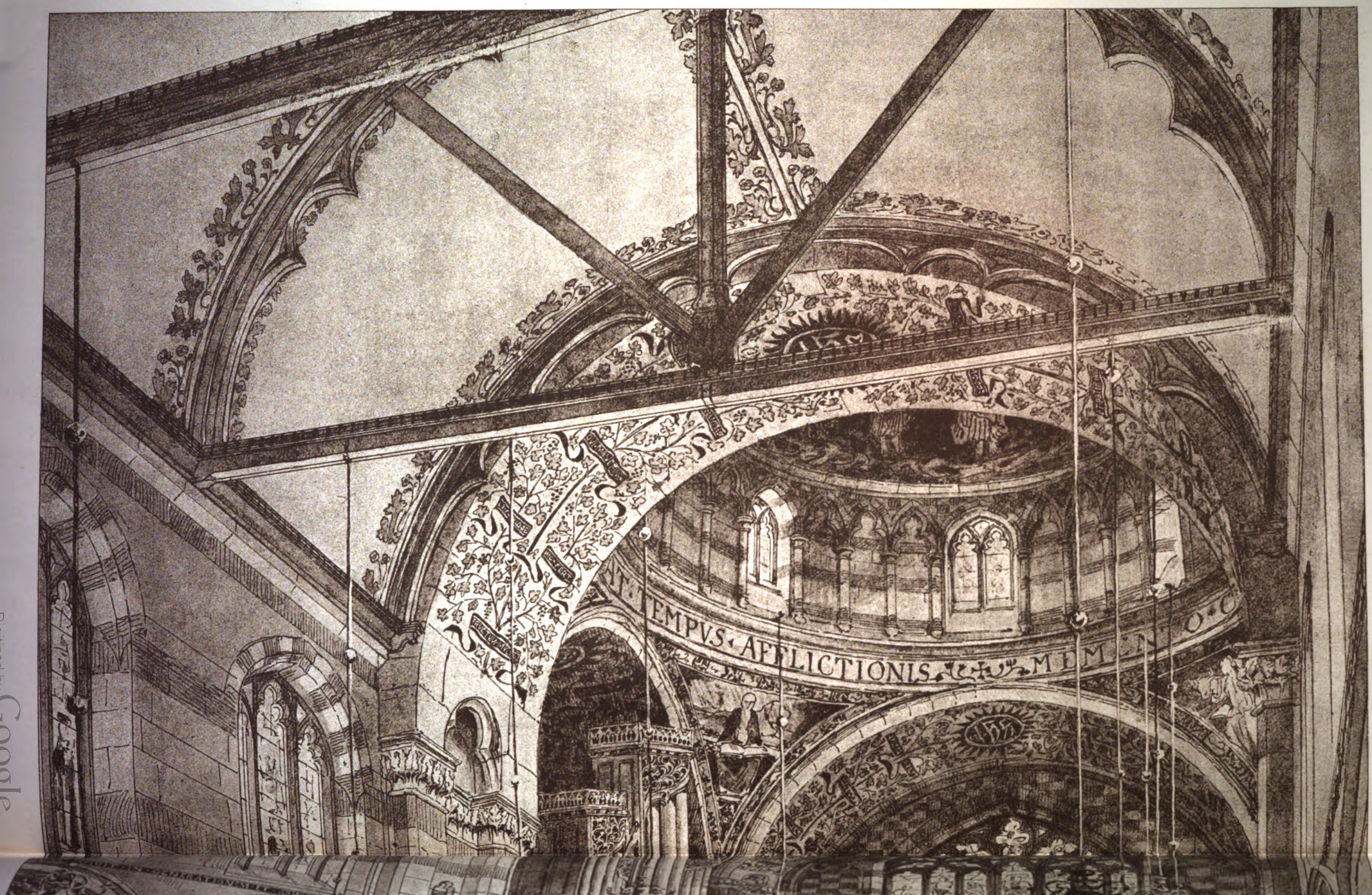
F.R.I.B.A., Architect.

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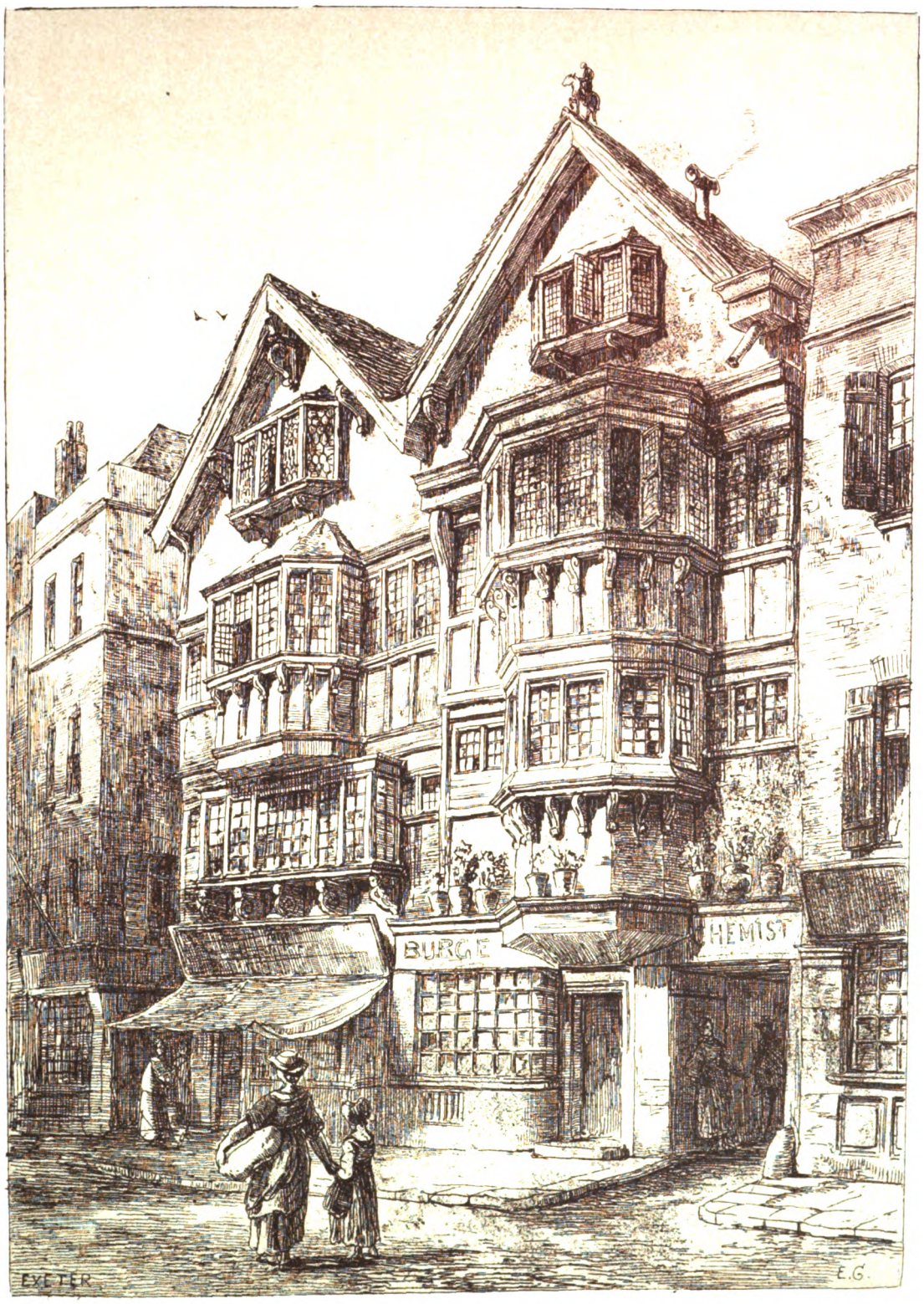


INTERIOR OF CHAPEL FOR GIGGLESWICK SCHOOL.

T. G. JACKSON, R.A., Architect.

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Old Houses. Exeter.

Ernest George.

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stitutional; and occasionally a workman has found it advisable to pursue his common law remedy instead of that provided by the Act. Thus it is provided by the Act of 1906, section 2, sub-section 1, that, in order to support a claim for compensation under the Act, notice must be given as soon as practicable, before the workman has voluntarily left the employment in which he was injured, and within six months of the happening of the accident causing the injury. Therefore if the six months have expired the workman is thrown back on his common law remedies. The Act provides (section 1, sub-section 4) that if a common law action is begun within the six months and decided in favour of the employer, and if it appears that the injury is one for which the employer would have been liable to pay damages under the Act, the Court may, on the application of the plaintiff, assess the compensation due, deducting all costs occasioned by the fact that the plaintiff has proceeded at common law and not under the Act. In the case of Cribb *v.* Kynochs, Ltd.,* a woman gave notice of a claim under the Act. She did not pursue the claim, but sued at common law more than a year after the happening of the accident. This action failed, and she then applied for an award of compensation under the Act. The Court of Appeal held that the claim failed. The Master of the Rolls pointed out that the Act (section 1, sub-section 2*b*) prevented a workman who had failed in his application under the Act from suing at common law, and that, subject to the exception contained in section 1, sub-section 4, it also prevented one who had failed at common law from proceeding under the Act. It was no doubt true that in this case the notice had been given within the six months, but that notice had not been followed up. If a workman could give his notice and then wait for any time he pleased, within the period allowed by the Statute of Limitations, before he made his claim, employers might lose the benefit of the six months' period of limitation. It is only if the period of six months has not expired that the workman who has failed in an action at common law may claim under the Act in respect of the same injury, and then subject to the liability that the costs of the previous action must be deducted from the compensation due to him. Last December, in the case of Cohen *v.* Seabrook Bros.,† where this condition was satisfied, Darling, J., made an award of compensation.

The Meaning of the Term "Accident."

For an authoritative definition of the term "accident" we must look to the case of Fenton *v.* Thorley & Co.,‡ decided under the 1897 Act. This definition was taken as authoritative in the case of Ismay, Imrie & Co. *v.* Williamson,§ which was the first appeal to the House of Lords under the Act of 1906. In the former case the term was defined as meaning "an unlooked for mishap, or an untoward event which is not expected or designed"; but, as the latter case shows, the application of this definition to the concrete facts of particular cases may even divide the House of Lords. In this case a workman who was in a very weak state of health was engaged as a trimmer on board the steamship *Majestic*. While engaged in his work he had a heat stroke, from the effects of which he died. The majority of the House of Lords held that he died from the effects of an accident arising in the course of his employment, and that his widow was therefore entitled to recover. It is true that a heat stroke is a disease, but it was a disease directly caused in this case by the employment on which the man was engaged. It was very similar to the case where a wool sorter, who had got anthrax in the course of his employment, was held entitled to recover. Lord Macnaghten on the other hand considered that, though the injury of which the man died arose out of and in the course of his employment, it did not arise from "accident." The man was in a weak state of health. He was not a trimmer by trade. He did not know what steps to take to ward off the attack. He considered therefore that the injury was the result of the man's own weakness and ignorance, and not of accident. In the case of Broderick *v.* London County Council,‖ the Court of Appeal have reaffirmed the principle that a workman who is working at a dangerous trade, and who is injured by reason of one of the diseases or dangers necessarily attendant on the trade, cannot be said to be injured by an accident. In such a case the injury is not an unlooked for mishap, or an untoward event. Therefore it was decided that where a workman employed in the sewers by the London County Council contracted enteritis by inhaling sewer gas he had not suffered an injury by accident. The distinction between this and the last cited case is somewhat fine, especially if it is true, as some of the witnesses stated, that heat stroke is very common among engineers and trimmers, but can easily be dealt with if proper precautions are taken. It would almost appear that heat stroke is a disease or a danger necessarily attendant on the trade of these persons. But this point does not seem to have been taken in the arguments or in the judgments.

The Meaning of the Phrase "Course of Employment."

It is only if the injury arises from an accident in the course of the injured man's employment that the employer is liable. It is therefore important to know what the Courts consider to be the meaning of this phrase, and on whom the onus of proof rests in a doubtful case of showing that the injury arose in the course of employment. The important case of McDonald *v.* Owners of the Steamship *Banana** clearly decides that the onus of proof is on the workman. In this case a person employed as donkeyman, while returning to the ship, fell off the gangway and was killed. The only evidence as to how the accident occurred was the entry made at the time in the ship's log-book to the effect that Thomas Macdonald, while returning on board ship more or less the worse for drink, refused the aid of the night watchman to assist him up the gangway, and on reaching the top step, over-balanced, fell between ship and quay, and, striking an iron girder, was killed. The County Court Judge thought that the evidence was consistent either with the theory that the deceased had met with the accident in the course of his employment, or otherwise. He thought, therefore, that he could infer that the accident happened in the course of the deceased's employment, and he therefore made an award in favour of his widow. But the Court of Appeal clearly laid it down that the onus of proof is on the applicant, and that if the evidence he produces is equally consistent with the view that the accident did not occur in the course of his employment he fails. As the Master of the Rolls put it† :—"It does not appear (1) whether he had gone ashore on ship's business, or (2) whether he went ashore on a spree without leave, or (3) whether he had leave to go ashore. . . . If he was sent ashore on a ship's errand he would be within the Act. If he went ashore without leave, he would plainly not be within the Act. If he went ashore, not on a ship's errand, but with leave and for his own pleasure, I think he would equally not be within the Act. To give an illustration which possibly appeals to most of us:—If I send my domestic servant in the evening with a letter to a friend, and he is knocked down by a motor omnibus on his way to or from my friend's house, I should be liable. If, however, he, having a night off, goes—as he is at full liberty to go—to the Franco-British Exhibition for his own amusement, and meets with an accident at the same spot, I take it that I should not be liable."

There have been many cases decided upon this subject, and we will shortly state the facts of one or two to illustrate the manner in which they are dealt with by the Courts. In the case of Cremins *v.* Guest, Keen & Nettlefold,‡ the employers of certain colliers, as part of their contract of employment, conveyed them by train from their home to a certain platform reserved for their exclusive use at the colliery six miles off. While waiting for the train one of the colliers was knocked down and killed by the train. It was held that the injury arose in the course of their employment. A workman who is injured while going to the employer's pay-office to receive his pay along a path constructed by the employers for the use of their employés; § a stable employé, who without provocation was bitten by the stable cat while having his lunch; ‖ and an employé of a menagerie, who tried to deal with a lion who had escaped from its cage, and was injured ¶—were likewise considered to have suffered in the course of their employment. On the other hand, an engine-driver, who for his own purposes got off his engine, crossed a siding to get a book from a friend, and was knocked down, was unable to recover.** The Lord Chancellor said :—"I agree that labour is often intermittent.

* 1908 2 K B. 551; 24 T. L. R. 736.
† 25 T. L. R. 176.
‡ 1903 A. C. 443.
§ 1908 A. C. 437; 24 T. L. R. 881.
‖ 1908 2 K.B. 807; 24 T. L. R. 822.

* 1908 2 K.B. 926; 24 L. T. R. 887.
† 1908 2 K.B. at pp. 928, 929.
‡ 1908 1 K.B. 469; 24 T. L. R. 189.
§ Lowry *v.* Sheffield Company, Ltd., 24 T. L. R. 142.
‖ Rowland *v.* Wright, 24 T. L. P. 852.
¶ Hapelman *v.* Poole, 25 T. L. R 155.
** Reed *v.* G.W.R., 25 T. L. R. 36.

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If a man is in the place of his employment, and during its hours uses such intervals otherwise than in working, and while doing so is injured by one of the dangers to which the employment exposes him, that may be an accident within the statute. He may be in such case required to be in attendance, and in that respect engaged on his duty, though not actually doing work. But here this man was where he was not entitled to be, and was not working, but pleasing himself. . . . The accident did not arise out of, or take place in, the course of employment at all."

The Meaning of the Phrase "Serious and Wilful Misconduct."

Practically the only defence open to the employer based upon the conduct of the workman is the defence that the injury is attributable to the serious and wilful misconduct of the workman himself; and, under the present Act, even the proof of this fact is no defence if the injury has resulted in death or serious and permanent disablement; a workman who wishes both to seriously misconduct himself and to recover compensation must take care that the consequences are sufficiently serious. The onus of proving serious and wilful misconduct is on the employer. The Court must decide as a question of law whether any evidence has been produced from which a reasonable man could find the existence of serious and wilful misconduct. The arbitrator or other tribunal actually trying the case must decide as a question of fact whether the presence of serious and wilful misconduct is to be inferred from that evidence; and, as the House of Lords has pointed out last year in the case of George *v.* Glasgow Coal Company,* such finding of fact cannot be reviewed. All that can be reviewed is the question of law—the question, that is, whether the evidence is of such a kind that a reasonable man could draw from it the inference which has been drawn. We pointed out in *The Architect* of November 23, 1906, that the Courts were inclined to put such an interpretation upon the words "serious and wilful misconduct" that it was in practice very difficult for an employer to avail himself of this defence. Two recent cases, however, would seem to show that a more reasonable interpretation is being given to these words. In the case of Bist *v.* London and South Western Railway,† an engine-driver who, in breach of a rule well known to him, left the footplate while the engine was in motion, got on to the tender and was killed by colliding with a bridge, was held to be guilty of serious and wilful misconduct; and in the case of George *v.* Glasgow Coal Company,‡ already referred to, a man working in a coal mine who, in defiance of a rule, opened the gate fencing the shaft without ascertaining whether the cage had stopped opposite to the gate, though he had been warned against the practice, also failed in his claim for compensation for injury resulting from falling down the shaft. As Lord Atkinson pointed out, the Court must consider misconduct not in a moral but in a business sense. Any breach of a rule is misconduct; the more difficult question is whether it is serious and wilful. "Here the appellant not only broke a rule, but the rule had been brought home to him; he had been warned a few days before of this very matter;" and this, the Court thought, was quite sufficient to justify the inference that the misconduct was serious and wilful. We pointed out in *The Architect*, March 1, 1907, that the permission given to the workman guilty of serious and wilful misconduct to recover if the injury results in death or serious and permanent disablement will be a little difficult to reconcile with the clause which gives the workman the right of recovery if injured by accident, for it is a little difficult to say that the workman has in such a case been injured by accident at all. But this point has not yet come up for decision by the Court.

(*To be continued.*)

[*This series of articles will appear for the next three or four weeks, and will be a concise record of the important cases under the Act.*]

The Glasgow Institute of Fine Arts have appointed the following as hangers for the forthcoming exhibition:—For oils: Messrs. George Houston (painter), John M. Crawford (architect) and Michael Simons (lay member); for water-colours: Messrs. David Gauld and James Kay (painters).

* 25 T. L. R. 57. † 1907 A. C. 209. ‡ 25 T. L. R. 57.



BLAKENEY, NORFOLK. By Harold Oakley.

ROYAL ACADEMY LECTURES—PAINTING.

THE subjects selected by Sir Hubert von Herkomer, C.V.O., R.A., Professor of Painting at the Royal Academy, for his course of four lectures to the students are (1) "Ambition"; (2) "Portraiture," January 7; (3) "The Philistine," January 11; and (4) "Some Personal Experiences," January 14. The first of the series was delivered on Monday afternoon before a crowded audience. Sir H. von Herkomer commenced by warning the students that they would hear many things that might be unpleasant to them, for his lectures were nothing if not admonitory. He had taken as his first subject "Ambition." A journalist who had been very helpful to young men once issued a pamphlet which contained the following dictum:—"Get on, or get off." This certainly did not err on the side of verbosity. It seemed to imply that to get off after a failure was an easy matter. But to an artist, at any rate, that was not true. An artist who fails soon finds that it is far easier to get in than to get out; a love for his art has become engendered in him which not even failure can quench; art has become as essential to his existence as air and breath. He would be content with so little; but even that little is denied him.

Ambition scorns content, its principal characteristic being the right sort of discontent. Without ambition a man sinks into a morass of purposeless effort. Ambition might take many forms, from the acquisition of riches in this world to winning happiness in the next. Ambition needed a stimulus, and no stimulus was so powerful as opposition and rivalry. The artist was fortunate who had to fight in his early years. If success had dropped at his feet ready made it would not have been worth picking up. The artistic life was quest goaded on by ambition; and quest was never still, for no true artist could contentedly rest on the laurels he had won. Ambition remains active longer in the artistic temperament than in any other. Success was something elusive, that seemed to recede as the pursuer advanced to grasp it, and he could never be sure if he had caught it. The artist has no competitor; his goal is never that of another; he lacks the assistance of a pacemaker. In this he is unlike those desirous of achieving fame in physical exercises, where each can exactly measure himself against his neighbour. Yet an athlete has the humiliating knowledge that he cannot run so fast as the ostrich, or jump so far in proportion to his size as the common flea. The artist, however, is fortunate in having no competitor in the animal world. Though there is a handicap on him which is spared to many other callings, if he is not in full possession of his faculties he cannot express his message to mankind. Unless his eye and hand can all faithfully serve him, his art is non-existing. A blind poet can dictate his thoughts; a deaf musician can still compose his immortal harmonies.

Probably nine-tenths of those who enter schools of art are convinced they will become great painters or great sculptors. What a calamity it would be if all those blessed hopes were realised! How cheap would the greatest art become if all succeeded! The first ambition of an aspiring student to be gratified was entering the schools; the second, gaining a medal; the third—the answer must be left to the gods. Ambition has extraordinary vagaries. In a certain Italian campo santo there is a life-size figure of a chestnut-seller carrying a child. The woman whom it represents had scraped together enough money before she died to have a marble monument. Being anxious to see what it would look like, she gave sittings to the sculptor in her last illness. Thanks to her indomitable will she lasted until it was com-

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pleted, and then as there was nothing more to live for (her life's ambition being realised), and there was no more quest, she died in a few weeks. That was a craving for a kind of posthumous fame. No true artist could say he was indifferent to posthumous fame. It was a tremendous thought, this living on of a man's work, for his worth remained and would represent the essence of his personality. In reading a book by a dead writer you are as deeply impressed as though he were still living in Kensington or Chelsea. It is a wonderful thing to produce a work that is indelible, a work which will be a living factor so long as a fragment of it remains.

Ambition in art being one of the noblest forms of ambition must be also the most beneficial to mankind. There were other kinds which were less exalted. The quest of wealth when normal was healthy, but it was too often made sordid. The miser commits a crime against himself when he denies himself necessaries; the wealthy pauper of whom one often hears commits a crime against the State by living at the public expense. Misers were extraordinary beings. Sir Hubert said he had been told by some friends of his that on one occasion, when staying at a West End hotel, they went for the sake of excitement to a neighbouring fire. As they approached the scene they were met by the usual bustle and disorder of the main thoroughfare. Anxious to avoid the crush, they turned into a side lane, and then seeing a likely-looking door they pushed it open and entered down a dark passage. Their curiosity was undeterred by the smell and filth, and they slowly groped their way along. The sight at the end of the passage sent them quickly back to the street. In a cellar-like room was a dirty old shrunken man sitting at a table before a pile of gold pieces into which he was constantly delving and letting the money trickle through his fingers. The old man was too miserly to put a lock on the outer door, though he was thereby running enormous risks. Turner would not pay for mending a skylight in his studio, though rain was falling on the incomparable works which he meant to bequeath to the nation. He, too, was old and dirty and of a bony frame. Symbolism in art received justification here, for misers were always represented as gnarled old people living in dirt.

Ambition was to be sharply differentiated from notoriety which was begotten by vanity and nourished by approbation. Notoriety could not exist away from the lime-light. A generation ago two brothers sought notoriety and wealth. It was arranged that one should travel the country delivering well-advertised lectures on "The Beautiful in Art," while the other was to use all his influence as a journalist to draw attention on the new prophet. The curiously-attired lecturer was scoffed at and made the subject of public ridicule, but he thereby gained his point, for he was still further advertised and he soon drew a following. Their heaven was reached when the stage took them up. The two brothers had the gratification of finding themselves considerably the richer. In its way the movement did some good in spreading abroad a certain desire for beautiful things.

Every artist knew there were moments in his youth when ambition urged him to efforts to which he had not yet grown, to attempt something beyond him, something which with greater practice and experience he would not dream of touching. That period is far from hurtful. Ambition once started was never likely to be quiescent. The hasty cock-sure phase of a young artist's life when he found fault with all about him is followed by another period when, the scales having fallen from his eyes, he knows not where to turn or what to do. It is then that the student shows what grit he has in him and ambition comes to the rescue by shaking him roughly out of his stupor. Ambition was something far more than a mere desire to supersede another artist, being rather a desire to supersede oneself; and such a craving could never be appeased and certainly never satisfied by the hollow formulæ of complementary stock phrases. All this, said Sir Hubert, might sound like a philosophical dissertation; but it should be remembered that it is impossible to dispense with philosophy and more especially at the present time when the situation requires all a student's thoughtfulness. The rank and file of young artists are born to hard times when things looked most alarming. But they held the balance of the country's art.

One of the chief reasons for this deplorable quandary was that wealth has been turned into the wrong channels, for now it was absorbed in a gamble for Old Masters. Among the present-day rich patronage of art had degenerated from a love of art to pride of price, which now constituted the chief boast of art buyers. The paying of enormous prices for Old Masters had become a duel between two, three or more rich men. Antiquarian value was not art value. This was proved by the variation in prices paid for the same picture—than which nothing could be more illogical. As an instance he quoted the history of Millet's *Angelus*. For this the artist received 40*l*. It was next sold for 72*l*., then for 480*l*., 1,520*l*., 6,400*l*., 22,120*l*., and finally 32,000*l*., at which price it was acquired by an American duellist. A friend of his who purchased pictures of the same school had refused to give 500*l*. for it. The artistic value of a picture is fixed when it leaves the studio, and it was monstrous that art should be utilised for the speculations of the auction room. This pride of price has become a disease. If these enormous prices must be paid then let the descendants of the artist derive some profit; or if there are no descendants the State might devote a percentage of the money to the purchase of works by living artists.

This neglect of contemporary artists was harmful to the community as well as to the individual. It has an enormous moral effect, for nothing is so disastrous to the artist as loafing; it taints his character and his work. Yet the public care as little for the rank and file of the profession as for the unemployed labourer at the dockyard. Rather less, for the labourer can always retire to the workhouse and issue forth again for a day's work without losing caste, whereas nothing so prejudices an artist in the eyes of the world as being out of work. The chance of an artist having a picture hung is very uncertain, and still more uncertain is his chance of getting it sold. There are certainly institutions for enabling them to bridge over bad times, but these doles are immediately swallowed up by pressing bills. Many people had dreams of a remedy for such poverty which would leave no smart of charity behind it.

There were two causes for the existing financial depression in art. One was, as already stated, the pride of price among the rich. The second was a failing interest in art among the English people. Those enormous sums paid for Old Masters did not engender a love of fine art without which no art can live. That love or interest was palpably on the wane. Ask the illustrator, the wood engraver, and the painter of subject pictures, and one and all will tell you that they are more or less out of work. The newspaper proprietors observed the waning interest in art, and followed the movement. The sketcher who knocked off fifty sketches in the time it took a subject painter to produce a single picture had just come into favour. The wonderful and pre-eminent wood engraving of this country was now disappearing before mechanical production, to England's lasting shame. The sketcher was now being supplanted by the camera. Perhaps in one case in a thousand the person appearing in a snapshot might be represented as passably interesting and presentable. In the other nine hundred and ninety-nine cases it was little less than a personal libel against which there was no redress. In accepting snapshots the public were getting a very inferior article in place of the artist's handiwork. He was told on good authority that in America a reaction had set in against this pitiable state of things. All honour to that country.

Another cause of general neglect was the absorbing love of sport. Such a passion will not keep Great Britain in its place in the vanguard of the world. How can a race be improved by twenty, thirty, or seventy thousand men watching a football match, where twenty-two men are doing the work for which they have been trained? Rather they ran serious risks of undermining their health by thus spending their only leisured afternoon in standing about in bad weather. An object lesson was recently afforded by Munich, with its 500,000 inhabitants. There they organised an exhibition of the same size as the Franco-British, which was solely devoted to the arts and industries carried on within its walls. This achievement was in harmony with the general life in Germany. It strikes a note on a modern instrument, though with all the past for inspiration. That inheritance is only abused when we find the house of a millionaire equipped with Louis XV. furniture. The home must be false which is furnished with objects whose proper place is a museum.

The students had certainly fallen on hard times, but for all his gloomy prognostications he did not despair of a reaction before they were fatally hurt. In the halcyon days of his youth artists were few and art lovers many. They must set their teeth and sit tight. They had the gifts of youth, hope, and ambition, and there was need of all. But they must be sure of their strength and innate ability, and that there was something behind those gifts. They must seek first to get on from within, and then afterwards from without. If they failed in both, then get out.

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NEPTUNE AND AMPHITRITE.—Frieze by J. B. CIPRIANI, R.A.

NOTES AND THE WEEK.

ANENT the question of "sky-scrapers," it appears that the Building Code Revision Committee of New York City has recommended that in ordinary streets the height of buildings shall be limited to 300 feet, and in streets 45 feet wide to 135 feet, and that even when buildings face open squares and parks the height shall not exceed 350 feet. It is evidently beginning to dawn on New Yorkers that if everyone built to the height of the Metropolitan Life Building life in the streets and lower storeys would be impossible, whilst it is manifestly absurd to allow those who first jump the claim by putting up flatirons to prevent their neighbours from doing the same. In London Mr. HANKEY'S flats sounded the knell of tall buildings, but in America the characteristic admiration of smartness and bigness has till now obstructed the recognition of the inevitable result of unrestrained liberty to the enterprising copyists of the tower of Babel.

THE influence of chinks on the problems of heating and ventilation has been recognised in a general way for a long period by those who have to deal with these problems, but it has scarcely been grasped, as some recent careful investigations show, that these may and do amount to some 10 to 15 per cent. of the window area, so that a window, say 4 feet by 8 feet, may allow a free opening for air of some 4 feet superficial area. Special care in fitting and the use of draught excluders may reduce this amount considerably, but it must not be forgotten that additional provision must then be made for the necessary fresh air in an apartment if one is bent on excluding the draught at this season of the year.

IN the United States they seem to have found, like ourselves, that the system of entrusting the erection of a building to the contractor who submits the lowest lump sum tender for the whole work is not altogether satisfactory, and Mr. FRANK MILES DAY, one of the leading architects of the country, outside of New York, in an address to the members of the Master Builders' Exchange of Philadelphia, advocated six plans for mitigating the evils of the usual system. It must be premised that in the States it occurs that, far more frequently than with us, the general contractor is not himself a real builder, but a financier and smart business man who sub-lets the whole of the work to sub-contractors. Mr. DAY'S first suggestion is that the contractor should be selected for any particular building on the grounds of his high character and experience, not because he happens to send in the lowest tender. Over here many architects have experienced the advantage of this system, and by first choosing their builder and then arranging with him a contract price have found that both their client's interests and their own peace of mind have been thereby benefited. An even better method where a client is willing to pay a fair price for good work is to select the builder and let him carry out the work on the basis of a fixed profit on the prime cost, prime cost in this case meaning the actual cash expended in labour and material *plus* a percentage for establishment charges. The essentials of satisfaction in this latter method are integrity and ability in the builder, and these qualities are in England not difficult to find.

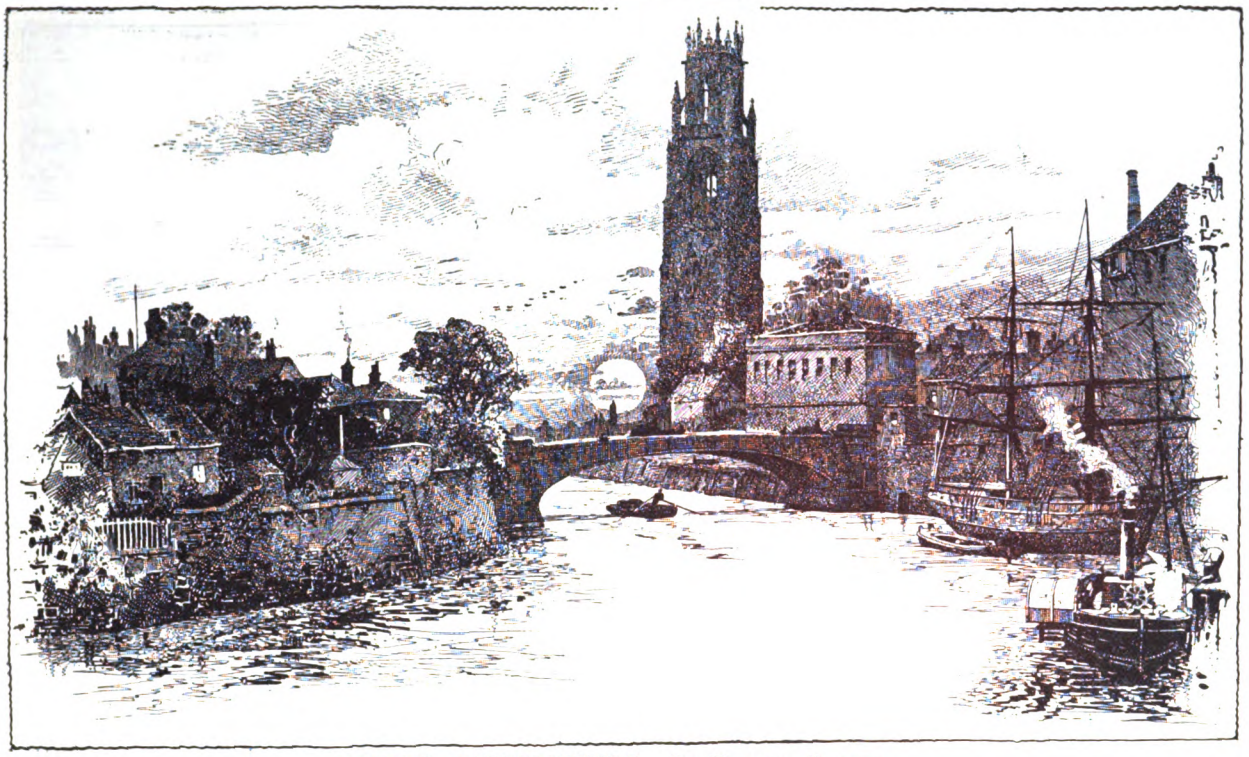
MR. DAY'S second plan is to obtain some control of the sub-contractors by obliging the general contractor to submit, for approval and as an essential part of his tender, the names of his intended sub-contractors. To our insular ideas it seems unthinkable that anything less should be possible, as no British architect would dream of abandoning his own judgment in the selection of sub-contractors or his power of excluding from the work either sub-contractors or actual workmen of whom he did not approve.

THE third suggestion made by Mr. DAY is that the architect should specify the sub-contractors to be employed by the general contractor, or bidder, as he is called in the States. This suggestion, however, Mr. DAY regards as hopeless, for, as he says, "bidders kick against it and will not have it." Naturally, for such a type of business man as the American general contractor or bidder would thus speedily be wiped out of existence. It is an essential part of the system that the bidder should be free to go to the cheapest market both for material and labour, and the only reason for employing him at all is to get the advantage of his ability in this direction. But the system does not make for excellence in building. The fourth plan is but a variant of the third—that instead of the architect specifying the sub-contractors, he should fix the sum to be paid for each section of the work. Equally this also would be fatal to the prevalent system.

MR. DAY'S fifth proposal seems to be that which he himself most favours, the employment of a master builder at a fixed charge or commission, thus turning him into a professional man whose business ability would be exercised in the interest of the client rather than in his own. This is certainly an innovation, subversive of all precedent, that would not be unworthy of consideration in this country if we were less fortunate than we are in having amongst us those who are really master builders as well as men of good business ability and of sound financial position. The professional master builder might readily be found amongst many of those who enter the architectural profession without the artistic capability that is essential to the making of a real architect. He would, however, never be able to compete financially with our present-day contractors of the first rank, who can take advantage of favourable markets to buy and keep in stock material that, although not immediately required, will enable them to submit the lowest tenders for future contracts with the prospect of good profits to themselves. Speaking, as he was doing, to an audience of so-called master builders, one can understand that Mr. DAY should press this proposal as one flattering to their vanity and satisfactory to their pockets, whilst at the same time annihilating the vampire lowest bidder as he exists in the States.

THE last plan put forward by Mr. DAY was that the architect should fill the position of master builder and himself arrange the letting of the different parts of the work to workmen. This, in effect, is nothing else than the system practically universal in Scotland and the North of England, where it is the general custom for the architect to arrange contracts between the client and master-workmen in each trade, mason, carpenter, plumber, and so on through the whole category.

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BOSTON, LINCOLNSHIRE.—By HAROLD OAKLEY.

ILLUSTRATIONS.

HOUSE OF SIR PAUL PINDAR, LONDON.

AMONG the many picturesque buildings which have been lost to London is the mansion of Sir PAUL PINDAR, which passed through many vicissitudes before it was finally removed.

OLD HOUSES, EXETER.

THIS and the preceding illustration show two hitherto unpublished etchings by Mr. ERNEST GEORGE, P.R.I.B.A. In the past Mr. GEORGE has brought out many interesting portfolios. The delicacy of his work is suggested by the present reproductions.

INTERIOR OF CHAPEL FOR GIGGLESWICK SCHOOL.

THE new chapel, designed and built by Mr. T. G. JACKSON, R.A., for Giggleswick School, stands on a rocky eminence in Ribblesdale above the school buildings. It is built of local stones of two colours, red and gray, with dressing of Idle stone for the wrought masonry. The plan is a Latin cross, with a dome over the crossing, covered externally with copper and lined inside with glass mosaic. The mosaic was executed by Messrs. POWELL, of Whitefriars, from sketches by the architect, the figures being designed by Mr. GEORGE MURRAY, a gold medallist of the Royal Academy. The barrel vaults of the arms of the cross are decorated with sgraffito, which was executed by two pupils of the architect, Mr. W. NICHOLLS and Mr. D. STEWART. The chapel is seated with carved pews, and at the west end with canopied stalls for the Masters, which are of Tucoman cedar specially imported from the Argentine Republic. The floor is of marble and the windows are entirely filled with painted glass, executed by Messrs. BURLISON & GRYLLS, the western rose, with subjects of the Creation, being designed by the architect. The carving and marble work was executed by Messrs. FARMER & BRINDLEY; the organ is by Messrs. WILLIS, and the heating and ventilation by Messrs. HADEN & SON. The work was carried out under a clerk of works, Mr. EVANS, without a contractor, the woodwork being executed much to the architect's satisfaction by Mr. BRASSINGTON, of Settle. The whole is a gift to the school by Mr. WALTER MORRISON, of Malham, one of the governors, whose only wish was that the building should be complete in design and decoration, so that nothing should be left for others to do. His gift included a cricket pavilion and a gatehouse, with porter's residence, also designed by Mr. T. G. JACKSON, R.A.

SMALL COUNTRY HOUSES.

THE first design was made for a farmhouse on a gentleman's estate in Essex, the farm buildings already existing. The ground floor to be built of red brick, the upper floor partly half timber and plaster and partly hung with tiles, roofs covered with tiles. The second design was made for a small country house, to be cheaply built. Ground floor, red bricks; upper storey hung with tiles, with half timbered work and plaster in the gables, and roof covered with tiles. The third house was designed to be built with red bricks for the ground floor. The upper floor rough-cast, with a gable of half timberwork and plaster. Roof covered with tiles. The three drawings were exhibited in the Royal Academy. Mr. THOMAS W. CUTLER, F.R.I.B.A., is the architect.

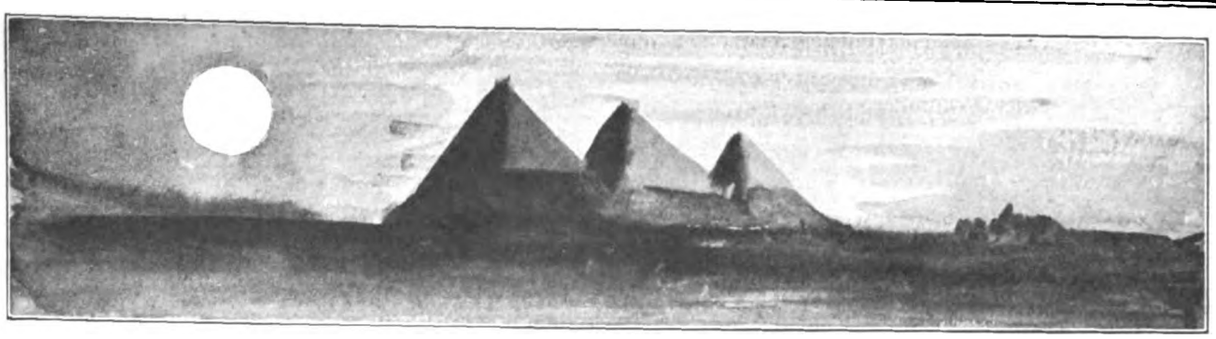
LONDON, EDINBURGH AND GLASGOW ASSURANCE COMPANY'S OFFICES, EUSTON SQUARE, N.W.

THE important British insurance companies are proving themselves to be generous supporters of architecture and the building trades in general. Within the last few years several handsome buildings have been erected by some of our larger companies, and the illustrations from time to time have appeared in *The Architect*. Perhaps one of the finest and most imposing examples is the new block of offices just completed for the London, Edinburgh and Glasgow Assurance Company in Euston Square, London, N.W. The work has been carried out under the supervision and from the designs of Professor BERESFORD PITE, F.R.I.B.A.

LIVING ARCHITECTS.—NO. 1, MR. ERNEST GEORGE.

THESE pen-and-ink drawings, which we purpose giving from time to time, are not to be taken as cartoons as published by some of the journals, but more in the nature of a rapid black-and-white sketch and not a finished drawing.

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ARCHITECTURE: ITS TRUE PRINCIPLES.—I.

By R. OWEN ALLSOP.

THE number of definitions of architecture must by this time amount to a very considerable total. To the plain man it would seem an easy matter to define the meaning of the term "architecture." It is probable that from such, rational common-sense views would be obtainable, but the real truth—could we rightly interpret their language—only from babes and sucklings. For it is not to be denied that in proportion as the mind of the philosopher becomes cavernous, so the difficulty increases in obtaining from him a clear definition in terms.

Architecture is unquestionably beautiful building; but inasmuch as abstract beauty has as yet completely defied attempts at concise definition, we can make no great headway on this road. The art of pure architecture is a high

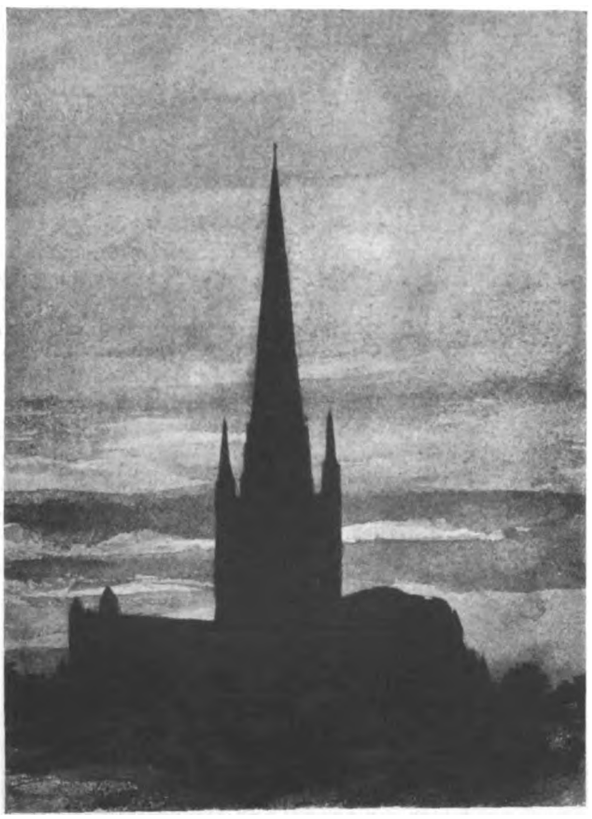


FIG. 1.—NORWICH.

and a difficult one, yet, so hedged about with contradictions is this subject, it is well understood that he who builds artlessly (but well, truly and honestly) makes, or may make, architecture, or at least that which has a savour of true architecture. Again, architects who ponder seriously on the æsthetic side of their lifework have long agreed that we may have building and yet not architecture, albeit that such building may be highly ornamented, or, more properly, profusely covered with ornament, so-called. And all the while, obviously enough, we cannot have architecture without building.

If the writer were required to hazard some additional definition, he might suggest that architecture is a mode or manner simply—a pure abstraction; yet, as it were, so intimately grafted on to the actual entity (building) that no line of junction can possibly be discovered. If we assume that a certain matter-of-fact practical service has to be

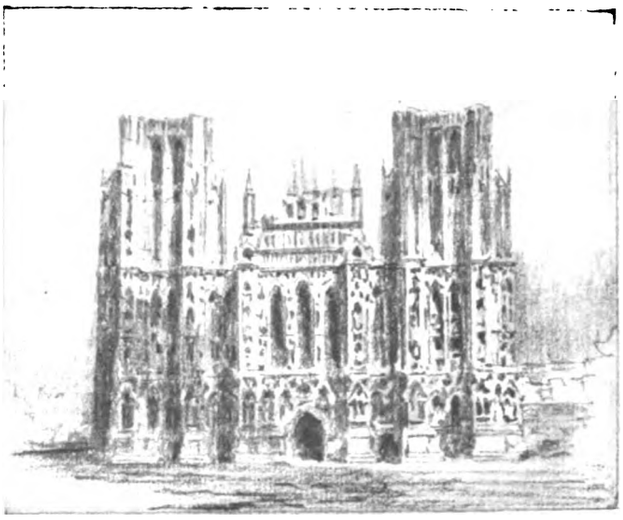


FIG. 2.—WELLS.

rendered, the same may be performed with equal efficiency by one man, a boor in manners, and by another, a refined and cultured gentleman, who epitomises his book of etiquette as "consideration for the feelings of others." If we are here on right lines, then RUSKIN has given one

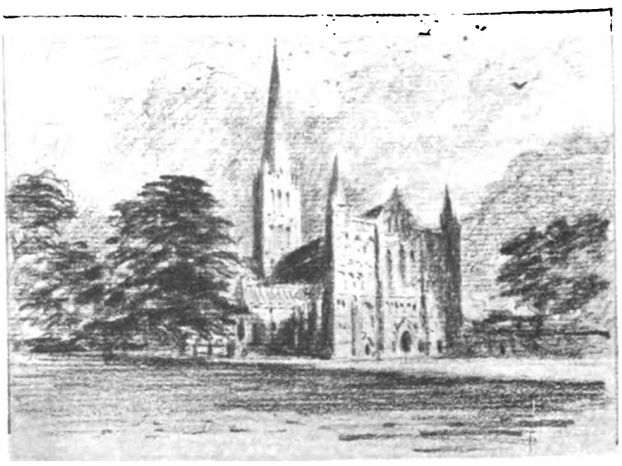


FIG. 3.—SALISBURY.

of the best definitions in his aphorism that architecture proposes an effect on the human mind, not merely a service to the human frame. It is, however, not difficult to see that even here no great logician is required to commence by several approaches formidable attack on this definition of the beautiful in building.

Nevertheless, it were a great step in advance if all could realise that architecture primarily proposes an effect, not merely an exhibition of architectural forms. The ultimate result of architectural design is architectural effect.

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Broad effects are what we miss in modern architecture, and if it is possible to assign a cause for this it would seem to be primarily the superabundance of detail, or what is called ornament, together with lack of imagination and want of appreciation of the interest arising from the massing of light and shade. In an important competition it was publicly stated by one of the competitors that he had first designed his details and then arranged his composition to suit. A fair analogy would be to select some buttons and then make a coat. All good architecture has good, suitable detail; but architectural detail may be examined in a museum, and cannot of itself produce fine architecture, or, indeed, any architecture at all. It is needed in order to sustain interest. When LUCIUS was initiated as priest of ISIS he wore a rich mantle, "and on whatever part you looked there was something to arrest the eye." The prime components of a work of architecture may be scheduled as (1) outline, (2) composition, and (3) detail. The silhouette of Norwich or of Ely Cathedral against the sky may be interesting, but, if nothing but the bare outline alone is to be made out, the eye, wearied, will quickly fasten upon the varying interest of light and shadow of the sky background. Bald masses then cannot afford a full and complete effect of architecture. The

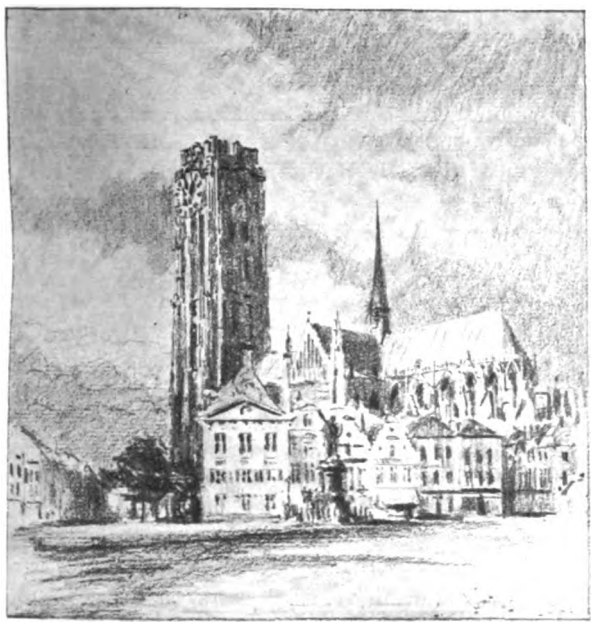


FIG. 4.—MALINES.

analogy is a handsome face and a shallow mind—at first attraction and then weariness at the want of depth of character. Yet, as respects architecture, great masses rearing against a glowing sky constitute beautiful pictures requiring to be duly borne in mind by the architect; for the infinite variation in light and shade effects are not accidents, as they have been termed, but Nature's harmonious accompaniment to man's handiwork. Too much architectural sketching is a matter of lines, as though no sun ever shone in the heavens.

Yet in light and shade is the genesis of architectural effect — a truism generally ignored. The main shadow merely of a building determines its expression—its character; and to take, say, Luxor, it would be only necessary to represent such main shadows and most architects would recognise the group of columns. Expressive lights and shades are the direct result of architectural composition. A similar sketch of the main shadows would be all that would be requisite to indicate Durham Cathedral. For this reason—the expressiveness of main masses—the roughest sketch must, in a building with so definite a character, unfailingly indicate Peterborough. All these effects have nothing to do with detail excepting that such will, as at Wells, give texture in the distant view, or what may be described as subordinate or minor massing—bays, windows, arches, recesses, &c. A spire, such as Salisbury, owes its magnificence not at all to detail, but to the vigour of the component masses. The church at Malines and its surrounding buildings require no detail to suggest the magnificence of the whole group, excepting so far as it breaks up harsh outlines and surfaces. Monochromatic architecture, either internal or external, is primarily the result of the play of light and shade about expressive masses. Polychromy is an added interest—a plus, something over and above. Out of a Cullinan, the cutter produces a sparkling gem, if the stone is moved. As respects architecture, it is ourselves that have to move; and, no doubt, could we have beheld the Parthenon in its glory, and caused the sun to traverse from East to West in a few minutes, the effect would be that, in a sense, a sparkling jewel would be presented to us, and we might think less of elevation and modules however proportioned and deter-

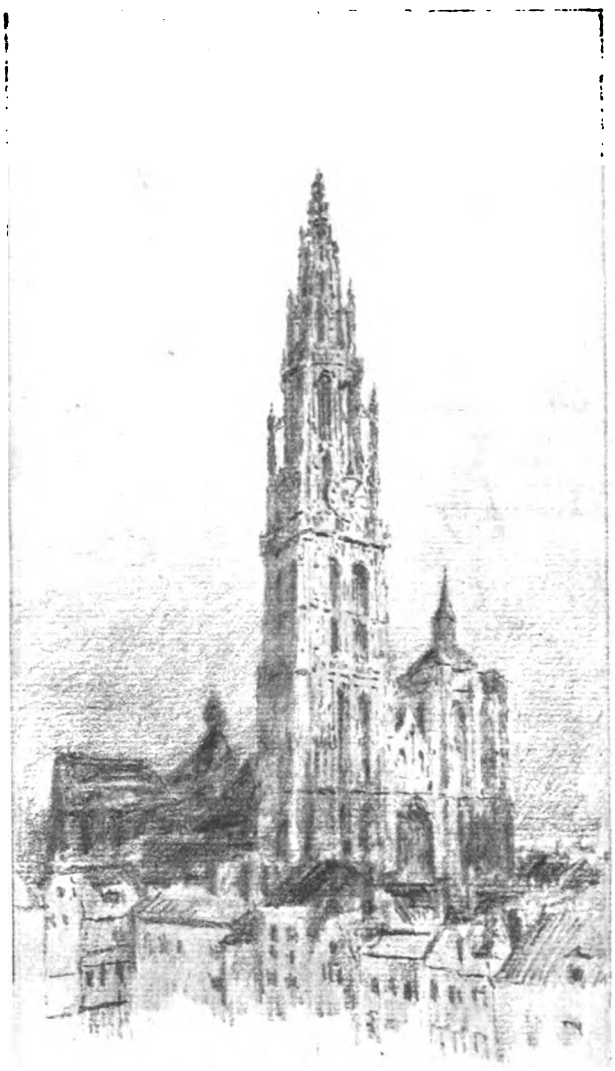


FIG. 5.—ANTWERP.

mined. For of this we may be assured: the fundamental principles of architectural design apply with equal force to the Parthenon and to Salisbury. A style principle teaches us that certain old churches or old temples had columns or arches of this or that shape associated with definite mouldings, definitely proportioned and with certain other necessary accompaniments, while the principles of building tell us that columns must be directed to the earth's centre, and beams defined by circles described from the same centre, if they are to withstand the power tending to destroy their individual existence; and that arches must have abutment. But the principles that lie at the root of the beautiful in building are far deeper and more recondite, and probably of universal application in all art. Immediately we recognise that architectural effect is a matter of form illumined and relieved by the sun's rays we become less concerned about what shape, size, and proportion of forms some old builders adopted, as what forms are of

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themselves of intrinsic beauty, when gauged in the light of their fitness for their several purposes. We are thus at once driven back on to first principles.

Let it not be imagined that we recommend the abandonment of the consideration of what others have done, and the working out, irrespective of this, new ideas architectural. He who resolves to throw aside precedent and design solely on principles, however fundamental, would well deserve to be called a fool. If clever (ingenious) his resulting work would certainly be interesting, but lack the kind of interest required to be awakened, and his lifework would be eclipsed—for true interest—by the most inexperienced youngster humbly following old traditions. Nor let it be thought that we suggest that a study of erudite principles and first causes will lighten the labour of the architect. Rather will it necessarily increase them, since he will be shamed out of mere copyism. Above all, let it not be thought that we pretend to have discovered any royal road to architectural design. The chiefest of the guiding principles for the architect must ever include hard work, laborious striving and endeavour, toiling and doubling, and that overcoming that brings the promised reward. Without such, so-called first principles will prove a stumbling-block to his destruction.

The fundamental principles of architecture as an art cannot be numerous. EDWARD LACY GARBETT in his endeavour to show that the bulky tomes of measured ancient buildings are nearly useless—as compared with a wide and catholic study of all architecture—has suggested that if we could fully comprehend the significance of the principle of contrast alone, much of the secret of effective architectural design would be revealed. The difficulty arises in the application of a principle to circumstances that are legion and varied conditions that are practically infinite. To know that harmonious contrast is a great basic element of beauty, not only in architecture but in all art, is of little practical use to the designer unless by study of precedent in the light of a lively, inductive reasoning, he can apply the principle to particular circumstance. We may see even that, for example, the great rectangular and cylindrical masses of St. Paul's Cathedral may be compared, as to æsthetic potentiality, with similar forms associated in minute mouldings, but unless we have established views as to the prime cause of resultant effects the knowledge is useless.

When the architect, weary of steel girders and constructional problems necessary to his profession, turns to such a work as the principles of MATTHEW HOLBECHE BLOXAM he reads that in this or that dear old English village church such-and-such an arch-form is associated with this or that group of mouldings. The information gained is as to the principle of a particular style. If he reads elsewhere that buildings should be stable, and form suitable to its practical constructional duty, it may occur to him that the statement is little more than platitude. When, however, he propounds to himself such a question say as the relative æsthetic value of a circle in a triangle or a triangle encompassing a circle, or if he communes with himself as to the art effect of a hemisphere placed over a drum of diameter equal to height or of any true proportion, he at once—by way of geometry and pure mathematics—has opened to him the opportunity of founding his design upon eternal truths—upon laws laid before the foundation of the world.

True architecture—if it is an entity—is the soul of noble building. Its elements are the beauty of suitable form revealed by the sun's rays. The principles of its design are alike binding on an Antwerp spire or the interior of a Santa Sophia. Thus, in both such instances extreme geometrical simplicity characterises the main masses. In the case of the spire this may not seem apparent. It is there, nevertheless, the modelling of subordinate parts giving the appearance of complexity and calling for great structural ingenuity.

Architecture has been called "frozen music." We fear that there is unfortunately round about us much that might be termed "congealed discord."

(To be continued.)



CASTLE D'ARQUES, NEAR DIEPPE.
By HAROLD OAKLEY.

THE SCOTTISH MODERN ARTS ASSOCIATION.

By A. STODART WALKER, Chairman.

THE publication of Mr. JAMES L. CAW's scholarly, illuminative and discriminatory volume on "Scottish Painting, Past and Present," constitutes one of the best possible justifications for the formation of the Scottish Modern Arts Association, organised for the purpose of securing such representative examples of modern Art as an enlightened and experienced committee may deem worthy of preservation in a national collection. One may disagree with Mr. CAW fifty times in his judgments as to the merits of individual painters, but one can agree with him whole-heartedly in his contention that Scottish painting is one of the few original and distinctive manifestations in modern Art, and we can supplement this responsible assertion by maintaining that, at the moment, Art is the most vital and expressive force in the life of the Scottish people. Philosophy may be resting, literature may have few master spirits, and science scarcely living up to its great traditions and records, but never before has Art been so justified by the work of its representatives.

The Scottish Modern Arts Association is the first of its kind formed in this country for such a purpose. "No amount of enthusiasm for the Art of the past," says Mr. CAW, "can foster that of the present. Too frequently, indeed, it is due to fashion or to the prestige created by rarity or costliness, and leads to that superior attitude which finds virtue in nothing that is not old or rare. But all the old is not excellent, and all the new indifferent. The former has been sifted by time, however, and has been appraised by many valuators, while the latter is fresh and unrestrained, and its ultimate commercial value problematical. Further, the certainty of great profits, arising from the high prices now ruling for things of certain periods, has influenced most of the professional dealers and attracted that curious hybrid, the 'dealer connoisseur' who poses as collector and loves Art cheerfully for what he can make by it. Yet, as WILLIAM HUNT remarks in his racy 'Talks About Art,' 'Let us remember that Art, like jelly, has always been

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more easily recognised when cold. In fact, most people prefer it *canned*. . . . Give me the fellow that can find some honey in the flower that grows!' And one may add that the fellow who sees no good in the Art about him, which embodies the ideals and feelings of his own day, is little likely to appreciate the finest qualities in that of the past."

It was with the object of giving public recognition to the present that I conceived the idea of founding the Scottish Modern Arts Association. Ridding one's point of view of any of the sordid conceptions of ultimate financial value, and being determined to avoid a blind acceptance of the popular favourite as well as the idol of the coterie, and viewing Art purely for its own sake as an individual, expressive, relevant, potent, and inspiring force, the desire was to give the living artist the chance of finding himself recognised by his contemporaries and his work enshrined in a collection, not parochial but national, and while giving the craftsman his due, vastly improving the artistic assets of the nation.

Not being fortunate enough to have possession of such an endowment as that of the Chantrey Bequest, the movement had to be started on a voluntary basis. The system had the great advantage that it was not handicapped by restriction as to the *venue* of purchase or the *personnel* of the selection committee. Being national it could hope to secure, as it has secured, the co-operation of the artists in permitting their paintings to be acquired at a price which might astonish those who have been accustomed to the *largesse* of the Chantrey Fund. Further, the selection committee consisting mainly of reputable laymen of position, intelligence, knowledge, and generous sympathies, there was little danger of the undue recognition of the academic clique or the more privileged few. Of course, there will always be divergence of opinion even amongst great judges. One has only to study such a volume as Mr. CAW's to appreciate the fact of how impossible it is to secure unanimity even about the greater artists. There are men belittled by Mr. CAW whom others, equally competent to judge, place in the very first rank. But granting the limitations to all correct appreciation, the constitution of the Scottish Modern Arts Association promises the most excellent results. And let it not be forgotten that its object is to secure not names but pictures, and that the only claim that can be put forward on behalf of any possible purchase is that it can be recognised as a work of Art.

The ideal aimed at is the removal of an anomaly from the artistic life of Scotland, which finds evidence in the fact that while the Art of the country was never so important or living as it is at present, there is not a single gallery in which one can obtain a comprehensive view of Scottish painting in all its developments and phases. If the encouragement that has been given to the Association increases in the ratio of the past year, the success of this national scheme is assured. One guinea a year constitutes membership, and the contributor will have the satisfaction of realising that he is paving the way not only for a Scottish Luxembourg—representative not merely of the art of modern Scotland, but of England, the Continent, and America—but also to securing that the interests of Scottish Art are looked after in the National Collections in London. This latter endeavour should ensure for the Association a larger meed of support than if its operations had been confined to an improvement of the artistic assets of Scotland alone.

Already the Association possesses twenty important works painted by modern masters. Supporting the Society by enthusiastic endeavour and generous contributions of money are such noted Art patrons as Sir JOHN STIRLING-MAXWELL, Lord BALCARRES, Sir THOMAS GIBSON CARMICHAEL, Sir EDWARD TENNANT, Sir WALTER ARMSTRONG, Sir THOMAS GLEN COATS, Mr. WILLIAM COATS, Mr. HUGH LANE, Mr. ARTHUR KAY, Mr. J. J. COWAN, Mr. JOHN FINDLAY, and Mr. DAVID ERSKINE, M.P. The energy and insight displayed at the initiation of the Association seem an earnest of fruitful results.

CONCRETE AGGREGATES.

THE Special Commission on Concrete Aggregates appointed by the British Fire Prevention Committee have issued an interim report. It will be remembered the executive of the British Fire Prevention Committee have formed among the members of the committee and representatives of the public authorities subscribing to the committee a Special Commission on Concrete Aggregates, the scope of which is described in the following resolution:—"That having regard to the confusion existing as to concrete aggregates, and the absence of their exact specification, the British Fire Prevention Committee do hereby constitute from among its members and subscribers a special commission to report upon and define the aggregates suitable for concrete floors intended to be fire-resisting, having due regard to questions of strength, expansion, and the chemical constituents and changes of the aggregates."

In forming the Commission it has been considered of importance that the various technical interests should as far as possible be represented.

The Commission's work has been divided into two sections in charge of two sub-committees, the one dealing with (*r.t.*) research work and tests, and the other with (*s.*) specifications.

The constitution of the Special Commission is as follows:—Chairman, Sir William Preece, K.C.B.; deputy-chairman, Edwin O. Sachs; chairman of research and tests sub-committee, W. T. Hatch, M.Inst.C.E.; chairman of specifications sub-committee, Max Clarke, F.R.I.B.A.; hon. secretary, Matt. Garbutt, F.R.I.B.A., A.M.Inst.C.E. Representing the Admiralty, C. H. Colson, M.Inst.C.E. (*r.t.*); representing the War Office, Col. A. H. Bagnold, R.E. supt. of building works at Woolwich (*s.*), and Major R. N. Harvey, D.S.O., R.E. (*r.t.*); representing the Norwich Corporation, A. E. Collins, M.Inst.C.E., city engineer (*s.*), H. K. G. Bamber, F.C.S., cement manufacturer (*s.*); F. S. Capon, assistant architect, L.C.C. (*r.t.*); J. Herbert Dyer, senior vice-pres., National Fire Brigades' Union (*r.t.*); F. W. Hunt, F.R.I.B.A., surveyor, Portman estate (*s.*); W. H. Hunter, M.Inst.C.E., chief engineer, Manchester Ship Canal Company (*s.*); Ellis Marsland, district surveyor (hon. sec., British Fire Prevention Committee) (*r.t.*); E. G. Rivers, M.Inst.C.E., chief engineer, H.M. Office of Works (*s.*); Jos. Randall, A.Inst.C.E., contractor (*r.t.*); A. Ross, M.Inst.C.E., chief engineer, Great Northern Railway (*s.*); J. W. Restler, M.Inst.C.E., dep. chief-eng., Metropolitan Water Board (*s.*); Frank Sumner, M.Inst.C.E., city engineer, Corporation of London (*s.*); J. Winn, Lieut.-Colonel, R.E. (*s.*). Chemist to the Commission, Mr. Cecil H. Desch, D.Sc., Ph.D.; assistant secretary, C. Adami.

Research Work Necessary.

The Special Commission has found that the inquiry necessitates tests being made over a period of years before final recommendations can be drafted, and that a further interim report cannot be expected before 1910, and a final report cannot be expected before 1912.

Specification of Materials for Aggregates.

The divergency of views as to the correct description of the actual materials in use as aggregates has, however, led the Commission to the decision of publishing at this stage, with this interim report the schedule A attached, comprising a series of specifications for artificial and natural materials for aggregates frequently used in this country for concrete.

The specifications may be deemed complete with the exception of (*a*) the percentage of sulphur allowable in certain of the artificial aggregates; (*b*) the weight limits for certain volcanic rocks; and (*c*) the porosity of certain clay products, which points can alone be decided after considerable further inquiry and test. The tests necessary prior to framing recommendations should be with concretes in which aggregates complying with the specifications as now drafted alone will be used. The specifications as they stand, even without any recommendations, should be found useful, and may lead to standardisation in the description of aggregates. As to size to which aggregates should be used to fulfil different purposes, &c., these are also matters for which further research is still necessary prior to the recommendations being framed.

Proposed Tests.

Regarding the tests that are deemed to be of immediate necessity, they may be summarised as:—(1) Crushing tests, (2) fire tests, (3) tests as to the holding power of rods in con-

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crete, (4) deterioration tests, (5) expansion tests, and certain chemical tests and analyses.

Seeing that there are fifteen different materials at least to deal with, and that for crushing tests the trials should be at one, three, six, twelve, twenty-four and thirty-six months respectively, the extent of the research necessary is far beyond the time and means available for the Commission to undertake singly. It has thus been deemed advisable that a considerable part of this work shall be distributed among others interested.

The details of the tests have been considered and laid down in a comprehensive manner as a schedule B, which it is, however, deemed premature to publish at the moment, but to give some idea of the extent of the essential tests only it should be stated that allowing for fifteen different materials there will be required at least 750 blocks of concrete for crushing tests, forty-five large slabs for fire tests, 180 special blocks for holding tests, 288 cylinders for deterioration tests, and 216 blocks for expansion tests.

The British Fire Prevention Committee is prepared to undertake the fire tests. The newly-formed Concrete Institute is to be invited to undertake the crushing tests and the tests on the holding power of rods in concrete. Mr. A. E. Collins, M.Inst.C.E., of Norwich, has volunteered to undertake the deterioration tests, and Mr. H. K. G. Bamber, F.C.S., the expansion tests.

Extension of the Reference.

It has been suggested that the reference to the Special Commission should be extended by adding to the word "floors" "and other purposes," whereby the results of the inquiry would probably not only become of greater general utility, but of greater interest to such bodies as the Concrete Institute, to which body the work of the Special Commission may at a later date be most suitably transferred.

Schedule A consists of provisional specifications for concrete aggregates.

A.—Artificial Materials for Aggregates.

1. Coke Breeze.—Coke breeze for use as a concrete aggregate shall be entirely coke taken from the gas retort, coke oven, or special furnace. It shall be absolutely free from clinker, coal, and all substances that will not float in water, and from any admixture of material taken from the retort furnace or water-pan below it, and from cinder, ash, or other admixture. The proportion of sulphur in coke breeze shall not be more than ..... per cent. It was decided that the determination of the allowable amount of sulphur should be the subject of future consideration.

2. Clinker.—Clinker for use as a concrete aggregate shall be the thoroughly burnt and hard waste product of furnaces, free from dust, shale, or free lime, and not having more than ..... per cent of sulphur. Pan breeze is included in this definition. In this case, as in that of coke breeze, it was decided that the determination of the allowable amount of sulphur should be the subject of further consideration.

3. Blast Furnace Slag.—Blast furnace slag for use as a concrete aggregate to be obtained and selected from pig iron smelting furnaces (to the exclusion of basic slag), to be of porous quality, to be washed to remove dust and sulphur, to be without free lime, and not to contain more than ..... per cent. of sulphur. In this case also, it was decided that the allowable amount of sulphur should be the subject of further consideration.

4. Broken Brick.—Broken brick for use as a concrete aggregate shall be from well-burnt and perfectly sound and hard clay bricks, such as London stock bricks, or bricks of equal quality, and shall be of the size specified, and be free from old mortar and from dust or particles that will pass through a sieve of $\frac{1}{8}$ inch mesh.

5. (*a*) Gault Clay Burnt.—Burnt gault clay for use as a concrete aggregate shall be free from free lime and sulphur and from unburnt particles, and shall be thoroughly hard, so that pieces soaked in water for ..... hours shall not disintegrate. It was decided that the tests sub-committee should be asked to determine the length of time to be inserted in the clause. (*b*) Ordinary Burnt Clay Ballast.—Ordinary burnt clay ballast for use as a concrete aggregate shall be free from free lime and sulphur and from unburnt particles, and shall be thoroughly hard, so that pieces soaked in water for ..... hours shall not disintegrate. It was decided that the tests sub-committee should be asked to determine the length of time to be inserted in the clause. (*c*) Broken Terra-cotta.—(1) Porous: Broken porous terra-cotta for use as a concrete aggregate shall be (*a*) from clean and well-burnt earthenware, unglazed, which has been mixed before firing with some combustible material such as sawdust, so that after firing it is of a porous or cellular texture, or (*b*) from clean and well-burnt earthen or stone ware, unglazed, and shall be incapable of absorbing more than ..... per cent. of its own weight of water. It was decided that the tests sub-committee should be asked to determine the percentages to be inserted in these clauses.

B.—Natural Materials for Aggregates.

6. Natural Ballast (Gravel).—Natural ballast for use as a concrete aggregate shall be gravel from river beds, sea coasts or glacial deposits, washed, if necessary, to remove dirt, loam, earthy or saline matter, clay, and other foreign substances.

7. Volcanic Rocks.—All rock of volcanic origin for use as a concrete aggregate shall be entirely free from decomposed parts and must show no signs of expansion, disintegration, or dissolution after having been immersed in water for seventy-two hours. Rocks of this nature may be divided into the following classes:— (*a*) Basalts, traps, dense lavas, &c., weighing not less than ..... lbs. per cubic foot. These shall be dense, thoroughly vitrified, not scoriaceous, show a clean fracture when broken, be homogeneous and free from marked cellular structure. (*b*) Lavas and rocks of similar character weighing not less than ..... lbs. per cubic foot. These shall be hard and free from all soft or organic matter, but they will not be so hard, and will be more cellular than those of section (*a*). (*c*) Pumice weighing not more than ..... lbs. per cubic foot. It shall be hard, free from all organic matter, soft dust or impurity, and show a bright silky structure when broken. It was decided that the tests sub-committee should be asked to determine the weights to be inserted in these clauses.

8. Granite.—Granite for use as a concrete aggregate shall be obtained from ..... (*here insert name of quarry*), and shall be reduced to the specified dimensions by crushing or breaking, and shall be close, hard, and of even texture; free from large crystals of felspar, dirt, argillaceous or organic materials, all decomposed particles, and from dust that will pass through a $\frac{1}{8}$ inch mesh.

9. Sandstones, Limestones, Quartzites, and Rocks of Similar Character.—Rocks of these characters for use as concrete aggregates shall be dense, uniform, and homogeneous in structure and composition. They shall have small even grains and crystalline texture. (This is not intended to exclude oolites otherwise suitable.) Fractures shall be clean and free from large flaws. The weight of the material shall not be less than 130 lbs. per cubic foot, nor its crushing strength less than 200 tons per square foot, and it shall not absorb more water than 8 per cent. of its weight after immersion for twenty-four hours. The aggregate after preparation shall be free from all dirt, decomposed rock, argillaceous and organic material.

With M. Edouard Detaille as its new president, the society styled "Amis de Versailles" is vigorously engaged in making good the deficiencies of State control. The ancient palace is in a neglected condition, and it has become obvious that a sufficient sum is not allotted annually for its proper conservation. The Society, out of its subscribed funds, is now generously defraying the cost of some most necessary repairs to the bases of certain statues which are being carried out under the direction of M. Marcel Lambert, and they propose further to apply for powers to frame rules and regulations which would make the marking of statuary by inscriptions and other petty acts of vandalism a punishable offence. Parliament has voted a sum of 200,000 francs for the conservation of the palace and parks.

The National Eisteddfod of Wales is to be held in the Albert Hall, London, next June, and the arrangements are being pushed forward. The Eisteddfod Association offer a special prize in the arts section of 25*l.*, with a medal, for a catalogue of London works of art executed by Welshmen or relating to Wales. The adjudicators are Sir Marchant Williams, Mr. Goscombe John, A.R.A., and Mr. Christopher Williams. In the general work of the Eisteddfod the adjudicators in the arts section will be (painting) Sir Lawrence Alma-Tadema, O.M., R.A.; sculpture, Mr. J. Havard Thomas; crafts, designs, &c., Mr. T. Erat Harrison; and architecture, Mr. Ernest George, P.R.I.B.A.

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HIGHGATE FROM PARLIAMENT HILL. By HAROLD OAKLEY.

STEELWORK.

By C. V. CHILDS, A.M.I.C.E.

IT is hardly an exaggeration to state that steel has of late so pushed its way to the front rank of building materials that it can now claim to be the most important of them all in the construction of modern buildings of any great size and importance. Modern buildings are designed to meet modern requirements; requirements are necessarily limited by possibilities; but, at the same time, one keeps pace with the other, so that the architecture of to-day has to a great extent been revolutionised in consequence of what it is now possible to accomplish by the use of steel in constructional work.

From the artistic point of view, the introduction of steel can hardly claim to have had a beneficial effect on architecture, if by this word be meant only the external appearance of buildings, streets or cities. The so-called "sky-scraper" may be taken as an extreme case of what may be accomplished by utilising the strength of such material as steel in building work; and it would require a large stretch of the imagination to class the modern "sky-scraper" as a thing of beauty. It represents rather utilitarianism run to seed; the beauty of it consists only in the increased amount of rent it can put into its owner's pockets. Fortunately, one has to cross the Atlantic to see these multi-storeyed modern towers of Babel in all their glory; fortunately, too, our building regulations act as an efficient alien law in preventing their crossing the Atlantic and naturalising themselves in our large cities. Who would wish to see the streets of London turned into cañons, with precipitous cliffs of buildings on either side, showing only a narrow streak of sky just visible overhead? Another aspect of such a transformation would be the increased difficulty of the traffic problem. With office buildings whose number of storeys would be reckoned in dozens, each street would be capable of accommodating three or four times its present number of business men; and an aeroplane, instead of a season ticket, would become a necessity to the city clerk.

The influence of steel is not so apparent in English as in American cities; but, nevertheless, it may be detected in many ways. The modern shop, for example, with its eight or more storeys of massive masonry and brickwork, is apparently supported by the plate glass of its shop windows; but the steel is there, though the eye only meets the display of goods reflected in the mirrors that encase the useful but unsightly stanchion. Or, again, one may sit in the spacious banqueting hall of an hotel and never give a thought to the fact that under the gorgeously decorated plaster of the ceiling are buried a few tons of steelwork, that alone prevents hundreds of tons of brickwork from crashing down on to the heads of the feasters beneath.

The tendency of late has been to trust more and more to steel for supplying the strength for the structural stability of large buildings, from the very foundations to the ridge of the roof. Even stone and brick have had to take an inferior place in this respect; the massive stone column or pilaster is no longer what it seems to be—the main support of the superstructure. In many cases it takes no bearing on the ground at all, its sole *raison d'être* being for appearance and architectural effect. It even violates the etiquette of architecture, in that it is a sham. Apparently it is there to do some work, whereas it is only adding a greater burden to the steelwork, to which it clings for safety. Masonry and brickwork have indeed lost their pride of place under these circumstances, and have become decorative rather than constructive materials—the flesh, so to speak, that forms a covering for the bones.

It is only within the last few decades that steel construction has arrived at its present state of development; in fact it is only within that short period that steel itself has come into practical being. Cast iron to a certain extent led the way, even as it did and still does in the process of manufacturing steel. The cast-iron column or stanchion has not been entirely ousted as yet, mainly on account of the fact that it lends itself more easily to decorative treatment than stanchions built up of steel sections..

The cast-iron beam with its unsymmetrical flange has had its day and is passing away to the scrap-yard, as it falls a victim to the house-breaker; its probable destiny, after passing through the furnaces, being to reappear as steel in some shape or form. The despised "Belgian joist," after many revolutions that have affected its manufacture, now aspires to the dignity of the "rolled steel joist," refined in quality and of reliable strength—the most important of all the steel structural shapes employed in building work.

In the early nineties the writer was on the engineering staff of the Carnegie Steel Company, and his duty, amongst other things, was to keep the handbook of structural sections up to date: just at that time the changes came fast and furiously. In the 1889 edition the sections were all tinted blue, representing wrought iron. Then, as new furnaces and works were coming into operation, a general revision had to be made, and the sections in the 1892 edition were mostly parti-coloured—pink and blue—representing that the sections were rolled in either steel or iron. In the 1893 edition the blue had disappeared altogether, steel having completely ousted wrought iron. Simultaneously the price of steel, at first the more expensive, gradually drew level with that of wrought iron, and that at once signed the death warrant of the latter material for rolled structural shapes. The old puddling furnaces, with their costly and laborious methods of manufacturing wrought iron, were swept away, and the Bessemer converter and open-hearth furnaces reigned in their stead.

It was during this period also that the evolution of the steel-framed building was taking place. Its birth-place may fairly be claimed by the city of Chicago, about the last place one would have expected to have inaugurated the type of building known as the "sky-scraper"—Chicago covering probably more superficial area than, and having about the worst subsoil for foundations of, any city in the world. The business area, however, was confined by Lake Michigan and the Chicago river, hence necessity became the proverbial mother of invention. The first problem to be faced was to so proportion the footings of the foundations that the weight of the building should be safely carried on the layer of hard pan overlying the saturated soft clay below the level of the lake.

Steel rails embedded in concrete were first used, in the early eighties, to form the footing course under the masonry walls. At this time, ten storeys was about the limit it was possible to build with solid masonry walls. Naturally the attention of the architects was directed to lightening the weight of the walls; the thickness of the wall had to be lessened and as this depended upon the height of the wall some means had to be devised to split the wall into sections—the smaller in height the better. The natural consequence was the steel-framed building, with thin walls carried on girders at each floor level, the total weight of the building, wall loads, as well as live and dead floor loads, being transmitted through the girders, thence through the shafts to the bases of the stanchions.

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Having concentrated the entire weight of the building at certain points, the next problem was to so distribute the loads over the footings of the foundations that the pressure on the ground should not exceed what it could safely carry without an undue amount of settlement. Also that whatever settlement of the building was likely to occur, should take place evenly over the whole area of the building.

For this purpose it is necessary to make a distinction between the live and dead floor loads; the live loads being the maximum the floor girders are likely to carry, the total amount of these in a building is considerably more than the total live loads that actually occur. The loads on the internal stanchions are chiefly due to the floor loads of which the live load is a large proportion; whereas the loads on the external stanchions are chiefly due to the weight of the walls and masonry. Consequently in order that there should be an even settlement at every stanchion base, the total dead weight of the structure is the more important and the live loads affect the settlement comparatively slightly. In a city like Chicago where the settlement of high buildings may amount to as much as a foot or more, this matter is of the utmost importance. Perhaps hardly sufficient attention is attached to it in this country; if the area of the footing courses were proportioned more accurately, so as to make the pressure on the foundations more uniform, there would not be so many cracks, which are often apparent in the stone cornices or over the window heads. Such cracks are apt to be attributed to the deflection of the steel carrying the walls, but are far more probably due to uneven settlement at the foundations of the buildings.

Having proportioned the areas of the foundation for the stanchion bases, a further part of the problem was to distribute the pressure at the bases of the stanchions over the area of the footings in the least amount of depth; not only to effect a saving in the excavation, but the primary object at Chicago was to avoid cutting too deeply into the hard stratum overlying the soft one underneath.

Here, again, steel was requisitioned in the form of rolled joist grillages, that is to say, one tier of joists lying side by side placed over and at right angles to another tier, but stepped off so that the area of the top tier gradually increases, until the area of the lowest tier is sufficient to distribute the pressure safely on to the ground; the whole of the steel grillage being surrounded and embedded in concrete.

In this case, too, the concrete which formerly was the constructive material for the foundation courses is relegated to the inferior position of forming a protective covering to the steel.

It may seem that too frequent a reference has been made to what has taken place in the city of Chicago; but it is interesting to notice how the local problems there evolved in a very few years the modern steel frame building, so that practically within a decade, *i.e.*, between the eighties and nineties, the practice in regard to steel structural work for buildings became, so to speak, standardised, and for the last fifteen years hardly any important features have been introduced. Certainly there is the reinforced concrete structure in all its various adaptations for walls, beams, floors, foundations, &c., but that is another story.

(To be continued.)

In Connection with the proposed memorial to the late Sir George Livesey it is announced that at least 10,000*l.* will be required for the endowment of a Livesey Professorship in Gas Engineering and Fuel at Leeds University.

In Connection with the exhibition of designs for small cottages organised by the West of Scotland Garden City Association, 414 Sauchiehall Street, Glasgow, which is to be held early in the year, the following architects have consented to adjudicate:—William J. Blaine, A. Hislop, C. R. Macintosh, A. N. Paterson and James Salmon, jun. The object of the exhibition is to ascertain the best that can be done in Scotland in the way of cheap cottage building, after making full allowance for climatic conditions.

The Hammersmith Board of Guardians having asked the Local Government Board to furnish them with a copy of Mr. Oxley's report on the public inquiry into the cost of the new workhouse and infirmary, have been informed that it is not customary for the Local Government Board to publish the reports of its inspectors. When all the accounts of the new infirmary and workhouse have been settled, the Local Government Board promise to communicate with the Guardians on the subject of the inquiry.

HOLYROOD CHAPEL RESTORATION.

WE are authorised to publish the following correspondence between Mr. Thackeray Turner, Secretary to the Society for the Protection of Ancient Buildings, and Mr. S. Cowan, J.P., member of the Restoration Committee:—

33 Fountainhall Road, Edinburgh:
December 9, 1908.

Dear Sir,—I have read your interesting letter in the *Spectator* of the 5th inst.

I have been quite familiar with Professor Lethaby's report since it came out fully a year ago. This gentleman is a professional not a practical architect, and I do not attach any value to his report in consequence. The Architectural Association of Edinburgh and the Builders' Association of Edinburgh have met and deliberately considered the matter and have resolved unanimously that the Chapel Royal is quite capable of being restored in the terms of Lord Leven's testamentary instructions. I have myself had great experience in building property in Scotland and am familiar with building details. I entirely disagree with Professor Lethaby. His report is far too extreme, far too absolute, when I consider he is dealing with a controversial question.

In company with an architect I went over the ruins very recently and found abundant evidence that the soft stone in the building does not exceed one in five or six and can easily be removed and hard stone put in its place. The walls being off the vertical is of no consequence when you consider they are 10 feet thick. If the last three bays to the east (of the triforium) are formless in respect of mouldings and details there can be no technical difficulty in restoring them to their original condition. It is not impossible to restore the ruins for use as a modern chapel and preserve the ancient architecture. So at least the Edinburgh architects say. To take down the ruins and rebuild would be quite possible. The stones would not break to powder, and I expect that it has the strength and solidity of solid iron. In such event as rebuilding the soft stone would come out easily. If the *north door*, the *west front* and the *west door* have decayed "out of all definite form" there is nothing impossible in replacing them to conform to the original. Mr. Lethaby disapproves of either restoration or rebuilding, and before the Scottish people could agree to this opinion we must have the said report confirmed and verified by properly qualified architects and builders.

The Chapel Royal is the greatest national and historical monument in Scotland and is venerated by Scottish people. Its history has been sparkling and it has been vexatious. Its preservation is an absolute necessity. You raise the general question of restoration such as you have experienced in England, but I am unable to give an opinion on this subject not having inspected any restored edifices there. In Scotland Dunblane and Dunkeld cathedrals have been restored at great expense and by capable architects, and no man can say that the restoration in either case is a disfigurement.—Your obedient servant,

(Signed) SAMUEL COWAN, J.P.

The Society for the Protection of Ancient Buildings,
20 Buckingham Street, Adelphi, London, W.C.

To Mr. Samuel Cowan, J.P. for Perthshire (Member of Restoration Committee).

Dear Sir,—I have very carefully considered your letter of the 9th inst., for which I am much obliged. Your opening assertion that "The Architectural Association of Edinburgh and the Builders' Association of Edinburgh have met and deliberately considered the matter, and have resolved unanimously that the Chapel Royal is quite capable of being restored in the terms of Lord Leven's testamentary instructions," is, however, I am afraid, somewhat inaccurate and misleading. The Builders' Association of Edinburgh, while doubtless an authority on structural matters, can scarcely be accepted as an authority upon questions that are mainly architectural and æsthetic. Further, while the Council of the Edinburgh Architectural Association in committee with architects outside its circle reported upon the structural possibilities as you summarise, they yet also particularly and specifically stated that "they express no opinion on the historic or æsthetic aspect of the question, as such does not fall under the remit." The meaning of this is surely obvious, viz. that upon the most vital, and indeed the only point at real issue, the committee were not agreed, as, indeed, I think was and is an open secret. I therefore submit that in fairness you are not entitled to

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MORSTON, NORFOLK. By HAROLD OAKLEY.

omit this important and indeed vital reservation and deal only with the portion favourable to your own views.

Again, you state that Professor Lethaby is a *professional* and not a *practical* architect. Apply this reasoning to the legal or medical professions, and please tell me how you differentiate between a "professional" and "practical" lawyer or doctor. Professor Lethaby is an architect and a scholar, and I do not think these qualifications detract either from his ability or acknowledged position. If you are not aware that Professor Lethaby has done a large amount of work, it must be at least within your knowledge that he is surveyor to the Abbey of Westminster, and therefore that the entire fabric of that great building is under his charge.

In your letter to the *Spectator* of November 21 last you speak rightly and reverently of the value of the Chapel Royal of Holyrood, and none can doubt the patriotic spirit impelling your activity. You therein state that, following the Revolution of 1688, "a furious mob of some thousands of persons attacked and looted the Chapel Royal, Holyrood, and burned its entire contents at the Mercat Cross of Edinburgh." That nearly one hundred years later, "another mob broke into the vault of the Chapel Royal, seized all the leaden coffins they could lay their hands on, threw out the dead bodies which were enclosed into the precincts of the chapel, and sold the lead to obtain money. It is not known how many coffins were thus outraged, but the number included James V. and his first wife Queen Magdalen, also Lord Darnley"; and in a footnote you add that "the last restoration of the Chapel Royal in 1758" "was an entire failure." It is at least pertinent to ask what guarantee there is that the restoration presently so ardently advocated will not be an entire failure also. Nothwithstanding all the wanton destruction and desecration you have instanced, is it not amazing that you now deliberately propose to add thereto yet another, and under the specious plea of an impossible restoration to destroy irretrievably all that the vandals of past ages suffered to remain? "Verily ye build the sepulchres of the prophets, and your fathers killed them"; and so "allow their deeds."

You write as if it were indubitably possible to restore the Chapel Royal. I do not for a moment dispute that the structural difficulty can be surmounted, for modern engineering can easily overcome infinitely greater difficulties than any here involved. Where I do join issue with you, and that directly, is that I hold it to be impossible under present labour conditions, and the uncertainty and confusion of architectural styles, either to take down and rebuild, or to cut out and replace the vital and living work of an architectural age, and thereby restore to beauty and architectural fitness by any fatuous modern, mechanical, and forced replica, so dilapidated a building. To insist otherwise is tantamount to asserting that it is possible to scrape down the surface of an old picture, replace four-fifths of the original canvas with new, repaint all in imitation of the original, making up by guesswork what has been destroyed, and thereafter in sanity and truthfulness declare that you have reproduced a work by Raphael or Michel Angelo. Just as reasonable would it be for you, and those who think with you, to claim that you can throw a piece of antique silver into the melting pot, and that the replica you afterwards produce is either the old piece itself, or equal thereto in semblance or value. If for a moment a doubt upon this should arise in your mind, offer the result for sale at Christie's and judge for yourself. Believe me, there is no iconoclast so destructive as he who is consumed by the fervour of ignorance. Would not even the smaller portion of the original and untouched work of a great master be of infinitely more value than any refurbishment or spurious imitation, however costly?

That you personally claim "great experience in building property in Scotland," and "familiarity with building details," is, I am afraid, quite beside the mark, and of no greater real value upon an architectural or æsthetic matter than would be the opinion of any other gentleman of similar building experience.

Further, you frankly say you have no experience of the disastrous result of much of the "restoration" perpetrated in England; and yet as an object lesson it is of a very real value; and I am at some loss to understand why, with issues so important before you as this proposed restoration of the Chapel Royal, you should not only inspect but also carefully study the lamentable results, and learn therefrom to avoid the irretrievable while there is yet time. Surely as well may a voyager refuse to hear of lands he has not seen, or a scientist decline to learn of facts he has not himself observed.

Lastly, that the King's name should be dragged into this controversy is more than deplorable. To ask that His Majesty should become the involuntary adjudicator between two sharply divided sections of his people is neither good breeding nor yet good loyalty, especially when through the recognised official channel a pronouncement has already been made.

We are entirely at one, you, sir, and I, in the desire to retain and perpetuate this valuable monument of Scottish life and history, and to conserve to other generations that most exquisite west doorway, perhaps the most beautiful and unspoilt doorway in these islands; but to cut out and replace what of value remains, to pull down and rebuild, is not to conserve but to obliterate, and if a new Chapel Royal is essential then by all means let it be built, but let not its building or the utilising of even 40,000*l.* be either a reason or an excuse for a destruction which, in the opinion of many, is so wanton and obliterative as that now proposed.

As the subject of your letter and our reply is of public interest, we are intending to send them to the public Press, and in this my committee trust they have your concurrence and approval.—I am, dear sir, yours faithfully,

THACKERAY TURNER, Secretary.

December 19, 1908.

Edinburgh: December 1908.

Dear Sir,—I refer to your letter of 19th inst. In the matter of the Builders' Association of Edinburgh and Leith, that body is undoubtedly an authority on structural matters, composed as it is of many of the most competent and ex-

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perienced builders in Scotland; and I may remind you that it was on structural matters only that Lord Balcarres and Sir John Stirling Maxwell were entrusted with the carrying out of this part of Lord Leven's will, and they declined to act. No other reason was given by them. It was to show the utter worthlessness of this opinion that the builders took the matter up, and on a subject of this nature their opinion is of the highest importance, if not final.

You set up a new point, and call it "the most vital, and indeed the only, point at real issue." And yet this new point was never disclosed by these gentlemen. The only point at issue with them was the frailty of the structure and nothing else. The Architectural Association, like the Builders', contented themselves with the discussion of the real point at issue, and, as you say, "they expressed no opinion on the historic or æsthetic aspect of the question." You infer from this that they were not agreed on this question, which you admit they did not discuss. In the absence of proper information it is, I submit, neither in your province nor mine to anticipate or conjecture what these professional men said or did at their Holyrood meetings. It is sufficient to know that they decided that the building was capable of restoration.

You give Lord Balcarres and Sir John Stirling Maxwell, and even Professor Lethaby, a slap in the face for which they will probably not thank you when you say that "you do not for a moment dispute that the structural difficulty can be surmounted," and you go on to say, "easily surmounted." These gentlemen have denied this, so we have evidently here a house divided against itself.

When I said that Professor Lethaby "was a professional, not a practical architect," I meant, as he was attached to a college, that he was not an architect, with an office and staff of clerks, drawing plans for the general public and deriving his income from that source. Professor Lethaby only made one visit to the Chapel Royal to enable him to make up his report, and I am not aware that he ever was at Holyrood except on that occasion. That single visit was quite inadequate when we consider that his report involved a bequest of 40,000*l.* and the restoration of the greatest national monument in Scotland. His report has been a great disappointment to the nation, and has evidently caused Lord Balcarres and Sir John Stirling Maxwell to refuse to superintend the restoration. This has been followed up by the First Commissioner of Works intimating in the House of Commons that on account of what had taken place "he had advised the King against the scheme." I don't accept the *ipse dixit* of the First Commissioner of Works as final on a great national question like this. The London Board of Works has for 150 years been the greatest iconoclast that the Chapel Royal has had to encounter. It is out of the question to suppose that "good breeding and good loyalty" are in the remotest degree involved in prosecuting this matter within the sphere of constitutional right.

Because the restoration of 1758 was the work of an incapable or imbecile builder, and the structure fell in 1768, you say it is pertinent to ask "What guarantee is there that the present restoration, so ardently advocated, will not also be an entire failure?" I reply that it is not pertinent to put this question, and it appears to me you are doing a deliberate injustice to Lord Leven's memory by introducing useless caricature into the debate of a great historical subject. Your query is unworthy of your high position as representative of the "Society for the Protection of Ancient Buildings."

Notwithstanding the desecration referred to in my letter you say, "Is it not amazing that you now deliberately propose . . . under the specious plea of an impossible restoration, to destroy what the vandals of past ages suffered to remain?" This question of restoration or non-restoration of the Chapel Royal is matter of opinion. You hold one view: I hold another; while the architects and builders of Edinburgh entirely disagree with you. What, then, are the public to think? Why, simply this, that the architects and builders must be right and you must be wrong. And then your attitude indicates a total want of sympathy with the movement.

You repeat that you "do not for a moment dispute that the structural difficulty can be surmounted, for modern engineering can overcome greater difficulties," and you add the following unintelligible sentence:—"I hold it to be impossible under present labour conditions, and the uncertainty and confusion of architectural styles, either to take down and rebuild, or to cut out and replace, the vital and living work of an architectural age, and thereby restore to beauty and architectural fitness by any fatuous modern mechanical and forced replica so dilapidated a building." What this means I do not make out. It evidently indicates that the labour market is not satisfactory, and that the architectural profession is in a very confused state (*sic*), but what you mean by "cutting out the living work of an architectural age" is incomprehensible. In your view "to insist otherwise is tantamount to asserting that it is possible to scrape down the surface of an old picture . . . repaint all in imitation of the original, making up by guesswork what has been destroyed, and thereafter to declare that you have produced a Raphael or a Michel Angelo." I am entirely opposed, and have been all my life, to the restoration or renovation of oil paintings or pictures, but this comparison you make I do not admit—it is ridiculous. The restoration of the Chapel Royal and the restoration of pictures are as different as light from darkness, and in no sense can either restoration be compared to the other. Further, an architect's profession has no relation to the Royal Academy. A Chapel Royal at Holyrood on a different site is not wanted, nor has it ever been suggested; but what the Scottish people, in my opinion, want, and will prosecute till they have achieved it, is the restoration of the Chapel Royal, with the missing parts replaced in *fac simile*. That is neither vandalism nor the work of an iconoclast, and its result would be a charming illustration of the scientific and æsthetic knowledge and the architectural and antiquarian judgment of the twentieth century.

I do not sympathise with you in your antagonistic position to the proposed restoration scheme, nor do I concur with Professor Lethaby's report. I know the Chapel Royal well, having for half a century been familiar with everything connected with it. If the soft stone is taken out and replaced with hard material that in no way affects the æsthetic features of the ancient building, while it protects it from decay and contributes to the support of the structure. There is no intention of pulling down and rebuilding. The present walls would form an integral part of the restoration, and the building in the hands of a learned architect would be conform to the original so far as that is possible.

We have had several Scottish cathedrals restored within the past few years, and Kirkwall is now being proceeded with. For forty-five years I have been a public man in Perthshire, and during that long period I have never heard a whisper against restoration of these ancient buildings. Had there been any such expression of opinion in that county or in the north I was in a position to hear it. In these circumstances you do not suppose that a learned society sitting in London can control the aspirations of the Scottish people.

The historic aspect of the Chapel Royal to which you refer has been dealt with by me in a lecture given in the Philosophical Institution here on the 23rd inst., under the auspices of the St. Andrew Society, and the audience appeared to be unanimously in favour of restoration.

I agree with your suggestion that this correspondence should be sent to the Press, and I will hand a copy to *The Scotsman*, if you send it to such London newspapers as you think proper.—Your obedient servant,

SAMUEL COWAN, J.P. for Perthshire,
Member Restoration Committee.

Mr. Thackeray Turner,
Society for the Protection of Ancient Buildings.

Mr. Samuel Cowan, J.P. for Perthshire (member of restoration committee), 33 Fountainhall Road, Edinburgh.

Dear Sir,—I am obliged for your letter of the 29th December, and note that you concur with our suggestion that this correspondence should be sent to the Press. In these circumstances, and seeing that we are still unfortunate enough to seem at variance regarding the real matter at issue, viz. the structural *versus* the æsthetic, it would appear useless to prolong the correspondence. Briefly, may I say that the structural of necessity involves the æsthetic, and this Lord Leven's trustees were quick to apprehend. In mediæval days each workman was a craftsman, and there was, broadly speaking, one style of architectural building in every European and Eastern country, indigenous thereto alike in building material, thought and aspiration. To-day there is no architectural vernacular, only illiterate confusion of architectural speech. That "an architect's profession has no relation to the Royal Academy," read in the light of the context, would seem to imply that architecture is not an art. In the days of a living architecture—i.e. when the Chapel Royal was built—there was no divorce between the

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arts; and, as instanced in the Renaissance of Italy, it was sometimes difficult to say when an artist was most of architect, sculptor, painter, or even poet, as instance Michel Angelo. This union is not only essential, but perfectly intelligible to anyone with even elementary knowledge of or sympathy with art. Lord Leven's trustees grasped the point intuitively. Your own difficulty in apprehending the difference between light and darkness would seem to imply an innate blindness to things artistic, and the "charming" effect of the restoration you advocate would, I am afraid, falsify your aspiration. Hence our desire to conserve unspoilt whatever of good may remain. Your "learned" architect, if he be also artist, would be the first to admit that architecture is not a matter of learning, any more than is poetry a matter of grammar, but that both are the expression and outcome of artistic and poetic instinct and creative power. I am indebted for your frank admission that you do not understand, and pray believe that the ardent desire of my Society is for the preservation, not the destruction, of whatever of even fragmentary beauty may yet remain of the golden heritage bequeathed by the past. Further, to even venture to presume to "control the aspirations of the Scottish people" would be an impertinence; but these aspirations will be at variance with her history and instincts should she elect not to lead, but to follow, in this instance the unfortunate and retrograde example of England.—I am, dear Sir, yours faithfully,

(Signed) THACKERAY TURNER,
January 6, 1909. Secretary.

Correspondence

[The Editor will not be responsible for the opinions expressed by Correspondents.]

Plumbing and Plumbers.

SIR,—Although only a plumber (a craft in which to attain success there can be no spare time as a scribe) I desire to plead for a more intimate association between the organisation represented by the Royal Institute of British Architects and the more humble and youthful Institute I have the honour to represent.

That architects see some necessity for association and co-operation with plumbers outside purely business connections is evidenced by the interest shown on the part of distinguished members of that profession in many of the well-intentioned but wrongly directed attempts made by various self-constituted authorities to deal with matters in which architects and plumbers have a more or less equal interest.

It is rather unfortunate that owing to the absence for many years of any representative organisation that could rightly claim to represent this small though no less important department of the building trade, that the architects were decoyed into association with several movements engineered by those whose interest was best served by usurping the representative position the Institute claims, but did not at the same time exercise either its authority or undertake its responsibility, and whose only claim to the necessary financial support (without which they could not exist) lay in the assumption of a title which was the only justification they possessed to interfere in matters quite beyond their abilities to direct.

In proof of this it is unnecessary to more than point out that there remains little evidence of any real improvement which can be directly traced to any association or co-operation between architects and the alien authority which delegated to itself the name and functions of representing plumbers or plumbing.

Whilst there were many architects who joined in movements such as registration, standardisation and other desirable reforms, if on right lines, with the utmost sincerity of purpose, there are not a few whose association in these matters savoured of a clandestine attempt to secure an advertisement or preferment to civic honours at the expense of plumbing, with a varnish of public interest denied to them by the etiquette of their own profession.

It is typical of British gullibility, notwithstanding the past abortive attempts of an alien body like the Worshipful Company of Plumbers, London, that there should still be found architects, whose names and reputation are proof of their sincerity of purpose, to assist that ancient body in its spasmodic attempts to justify its continued existence by interference in matters which the reforming hand of Time has placed far beyond the scope of the original intention of their constitution, the only vestige of which remains in their more ornamental than useful necessity in connection with the civic life of the City.

The most recent sign of activity on the part of this Livery Company, with the usual dispensations of doubtful privileges it assumed to confer to gain support, takes the form of resuscitation of the movement for standardisation of water fittings, but this latest attempt differs from its abortive predecessor in so far that the figure-head is a civil engineer this time, and not as on previous occasions an architect.

It is a hopeful sign that the architectural profession is becoming more cautious, or that a new generation are less easily gulled by the glamour of civic banquets.

In this lies some hope of a closer association, which it is my privilege to plead between my Institute and that to which most of the distinguished members of the architectural profession belong.

It may be pointed out by those who for interested motives desire to deprecate the representative scope of the Institute of Plumbers that we only represent a small portion of the plumbing trade, and that our organisation is largely confined to one part of the country; but when the most has been made of that statement (which we deny) we can justly claim to be the only organisation in existence in this country that has a right to and does take the responsibility of all that concerns the education and efficiency of the craft of plumbing, that we are numerically strongest in those parts of the country where some of the best class of plumbing work is done, and that many of the best of the employers on points of qualification and reputation are included in our membership, and as a last but not unimportant qualification we are plumbers in more than name.

With these credentials we are justified in our desire to be allowed to have the chief voice in all matters which affect plumbers' work and feel equal to all the responsibility which such a position entails.

The joint interests of the architect and the responsible plumber are many, and would require rather a series than a single letter to deal with them.

Most of these interests are of a character which prevents the success of any attempt to deal with them as between individuals or in localities, and can only be effectively secured by joint action between organisations that are responsible and national in character, owing to the necessity which is inseparable from all such arrangements, that the temporary advantages of isolated individuals must be made subservient to the collective interest of the members of each and both the representative organisations concerned and the interest of the general public conserved.

A few of the matters to which brief reference has been made may be enumerated:—Standardisation of building by-laws which affect plumbers' work and sanitation; uniformity of practice and design of the essential parts of all fittings and apparatus used and fixed by plumbers; the much-vexed question of p.c. sums, add for profit and fixing and return of empties; the responsibility of the plumber for the efficiency of the apparatus which comes within his trade, at present often limited to fixing only; direct trading with merchants and manufacturers; and lastly, but not least important, single tendering.

This last subject provides an urgent motive for discussion and co-operation between our respective Institutes, as owing to the somewhat ill-advised acquiescence of the architect to the development of a system of general contracting, which on the face showed an advantage of relieving the architect's responsibility and work but which does not work out in actual practice.

The system introduced a practice commercially unsound, fostered the inefficient and unstable employer of plumbers, and provided the elements of financial ruin to many plumbers whose reputation had hitherto constituted their chief asset, and all this without conferring any real advantage to the architect or his client.

A further development of this universal-provider type of general contractor is now operating against the architect himself, and much of the present stress through scarcity of commissions is due to the cause of this viparious nursling they have fostered, which now employs a draughtsman and dispenses with the professional architect as well as the responsible plumber.

In conclusion, on behalf of the Institute it is my honour to represent, I should welcome an opportunity to meet in conference with the heads of the R.I.B.A. with a view to some co-operation on the points of mutual interest to which

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A SACRIFICE TO JUPITER.—Frieze by J. B. CIPRIANI, R.A.

I have referred, and also others which space prevents me enumerating.—Yours, &c.,

WILLIAM CHALLONER,
President Institute of Plumbers, a chief examiner Plumbers' Work Department of Technology, City and Guilds of London Institute.
20 Tothill Street, Westminster, and Blackpool, Lancs.

Commercial Property Dealings, 1908.

SIR,—Under this heading the year 1908 has been somewhat eventful in regard to the disposal of industrial property, principally through the passing of the Patent and Designs (Amendment) Act, August 1907, which became operative in August 1908, the vital clause in the Act being Section 27, as follows:—

"At any time not less than four years after the date of a patent, and not less than one year after the passing of this Act, any person may apply to the Comptroller for the revocation of the patent on the ground that the patented article or process is manufactured or carried on exclusively or mainly outside the United Kingdom."

This was the means which affected the foreigner, forcing him, in order to protect his valuable patent rights, to erect works in this country, with the result that large areas of land have been acquired and works erected; also unused factories, previously failing to obtain occupants, were re-opened, some of the property acquired being large areas of land in Cheshire, Buckinghamshire, Flintshire, Cornwall, Hertfordshire, Queenborough, and several sites in London, numerous works in the neighbourhoods of Leicester, Warrington, Enfield, Cheshire, Hertfordshire, and London.

The prices obtained on the average are good and run into many thousands of pounds, a guide to values being as follows:—

London.—Land.—Thameside, from 600*l.* to 1,300*l.* per acre. Canalside, from 450*l.* to 900*l.* per acre. With railway access, from 500*l.* to 900*l.* per acre. Without railway access, from 400*l.* to 700*l.* per acre.

Provinces.—Land.—Waterside, from 400*l.* to 1,000*l.* per acre. With railway access, from 300*l.* to 600*l.* per acre. Without railway access, from 200*l.* to 500*l.* per acre.

London.—Factories.—Newly built, rental 7*d.* per foot floor area.

Provinces.—Factories.—Newly built, rental 5*d.* per foot floor area.

The provincial municipal authorities are keen to make local conditions favourable to the manufacturer, and we know of no restrictive influence against an improvement in value of provincial property, the tendency being to an increase of same, especially regarding land at shipping ports, greater desire being shown by manufacturers to locate on the seaboard.

An improvement in value of London riverside property is looked for on the establishment of the new Port of London Authority. London's area as an industrial centre being somewhat restricted to manufacturers' operations by the London County Council's requirements and other influences, have forced the manufacturer to seek fresh fields and pastures new, with the result that migration has taken place to the country, with lower ground-rent value, more room for expansion, the erection on up-to-date principles of premises on one floor, with modern plant and machinery equipment. These districts have considerably benefited by the erection of works and houses for the workpeople.

In our opinion beneficial results will be very forcibly noticed in England through the passing of the Patent and Designs Act by an impetus to the building trade, the development of land, increased rateable value to local authorities, extra employment of labour, and a general stimulus to trade in the country.

Judging from the inquiries received, we look forward to a continued dealing of factory property, and predict, with the introduction of capital in the country and improvement in commerce, that greater all-round activity will be the result.—We beg to remain, Sir, yours obediently,

LEOPOLD FARMER & SONS,
Surveyors and Factory Specialists.
46 Gresham Street, London, E.C.

GENERAL.

In the Parliamentary Estimates for the current year the following sums appear for the maintenance and protection of ancient monuments in Great Britain and of historic buildings, viz.:—England, 11,275*l.*; Scotland, 2,935*l.*

The London County Council have decided to commemorate, by means of a triangular stone placed in the roadway, the site of Tyburn gallows at the junction of Edgware Road and Oxford Street. His Majesty's Office of Works are about to fix within Hyde Park railings a bronze tablet bearing the inscription:—"Tyburn Tree. The triangular stone in the roadway, 75 feet north of this point, indicates the site of the ancient gallows known as 'Tyburn Tree,' which was demolished in 1760."

Mr. Arthur Hamilton Smith has been appointed keeper of the Department of Greek and Roman Antiquities in the British Museum, in succession to Mr. Cecil Harcourt Smith, on his appointment to the directorship of the Victoria and Albert Museum.

The Autumn Exhibition at the Walker Art Gallery, Liverpool, closed on the 2nd inst. The receipts show an increase of 71*l.* over the previous year. The exhibits sold to the public number 138, the catalogue prices of which amount to 2,069*l.* 19*s.* 6*d.* The catalogue prices of the 181 works sold last year totalled 4,446*l.* 3*s.* 6*d.*, but the Corporation purchases have still to be added to the 2,069*l.* 19*s.* 6*d.* quoted above.

Falmouth All Saints Church Reredos Committee have accepted a design. The general subject is the Ascension, and is to be carried out in stone. The whole work is expected to cost about 600*l.*, towards which 365*l.* has been received or promised.

The Bury Education Committee on Monday adopted the report of the assessor, Mr. John W. Simpson, vice-president of the R.I.B.A., on the competitive designs for the municipal secondary school. Mr. Simpson examined 141 designs, and awarded premiums to the following:—(1) Mr. J. Theo Halliday, Stockport; (2) Messrs. Castle & Warren, London; and (3) Messrs. Appleyard & Quiggin, Liverpool. In commenting on the exhibition Mr. Simpson wrote:—"It is to be regretted that many competitors have not given sufficient attention to the very clear conditions and instructions furnished and to the regulations of the Board of Education, which were also furnished. The somewhat peculiar nature of the site, the difficulty of obtaining fall for the drainage system, and the important questions of aspect and cost, have compelled me in several cases to set aside designs which are in many respects meritorious." The committee will therefore adopt Mr. Halliday's plans and designs.

The Blackpool Town Council have received over 130 sets of plans in the competition for the erection of a central public library on a site fronting to Queen Street and Maybell Avenue. Mr. Carnegie gave 15,000*l.* towards the scheme.

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The Architect.

THE WEEK.

THE discoveries made at Glastonbury Abbey during the excavation of the foundations of St. Edgar's Chapel promise to lead up to some rather important data, and Mr. F. BLIGH BOND, in a lecture to the Somerset Archæological Society during the past week, intimated that he expected to prove that the Abbey Church of Glastonbury was the longest ever built in England if not in Europe. An abstract of the paper is given on another page.

THERE is no cause for the public to be alarmed because scaffolding has been put up in front of the west entrance to St. Paul's Cathedral. This does not mean that the building is dangerous, but only that the custodians are, under the guidance of the present energetic and able surveyor to the fabric, Mr. MERVYN MACARTNEY, carrying out their duty to repair, maintain, support and uphold the precious monument entrusted to their keeping—that they are, in short, pursuing the policy that should be followed by all cathedral authorities, of sustentation rather than restoration.

THE exhibition of the work of the leading students of the Royal Female School of Art, conducted by Miss ROSE E. WELBY, and now absorbed by the London County Council Central School of Arts and Crafts, was held on Friday and Saturday last in the new building recently opened in Southampton Row. Naturally we were most attracted by the designs for altar cloths, but we cannot honestly say that these, even that receiving the King's gold medal, were so successful as designs by the students in other directions. There was a lack of ecclesiastical character and an absence of symbolism that, to our mind, are essential in the design of an altar cloth, whilst all the designs fail in the detail of ornament. The designs for chintzes, brocades and other textiles were, on the other hand, admirable, well composed and excellent in their colour schemes. One can readily understand that such subjects would be more consonant with the *métier* of young women students, and doubtless an adequate incentive for their best effort is found in the substantial encouragement afforded by manufacturers, notably Messrs. WARNER & SONS, who have purchased several of the students' designs and produced materials therefrom on a commercial basis. We are pleased to note that students start from the study of the antique, but without the over-elaboration of mere finish in technique that some schools encourage, and that quick work in time-studies is an important part of the curriculum as a corrective to mere industry and a valuable means of cultivating grip and comprehension in an artist student.

WHAT course are the Council of the Royal Institute going to adopt with reference to the resolution passed at the business meeting on the 4th inst.? Will they follow their former tactics and, pursuing the same policy of masterly inactivity, ignore the resolution? Such a course can but result in either a distinct and unequivocal vote of censure or in a determined and probably successful opposition at the next election. The general body of members of the Institute, in a business meeting, has pronounced against limited competitions for public buildings erected with public moneys, and it is futile for some members of the Council to attempt to override this pronouncement because they do not agree with it. The principle of open competitions in such cases may be right or it may be wrong, that is a matter of opinion, and even on the Council itself opinion on this point is not unanimous, for Mr. GAMMELL'S resolution was amended on the proposition of members of the Council and as amended was supported and carried by the help of members of the Council. The great question at issue is therefore this. Is the opinion of some members of the Council, even though they may be the majority of that body, to prevail over the will of the members of the Institute as constitutionally expressed in a general business meeting? If this is so, then business meetings may as well be abolished and all by-laws that give the members of the Institute any voice in the management of their own affairs should be deleted. Surely there are but two courses that, alternatively, can honestly be followed by the Council, either they must accept and obey the mandate of their constituents or those members who are not prepared to do this must resign. Last year there was another course that might have been adopted. The Council might either at a subsequent business meeting or in their annual report have stated that they had considered the question and deemed it unwise to attempt to carry out the resolution of January 1907. They could then have asked the members to reconsider their resolution and demanded a vote of confidence in the superior judgment of the Council. This course for the present Council is now impossible, after they have flouted the will of the members not only in this matter of limited competitions but also in the question of the election of Fellows. The autocratic and high-handed position that the Council has assumed is an impossible one, and the members of the Council that maintain it must either climb down or get out.

THE discussion at the Conference of London County Council school teachers on open-air schools cannot be without interest to architects. The movement in favour of open-air teaching originated in Germany, and appears to have already shown satisfactory results, while it is evident that the idea meets with some favour over here. There is, therefore, another problem for architects to solve, the evolution of a type of building which shall give the advantages of open-air teaching without the inevitable interruption that a liberal acceptance of the term would mean in our climate or collection of weather samples. Open-air teaching could, of course, be combined with the ordinary type of school building, the classes being held in the open in fine weather and indoors in bad weather. The advantages of the new method would, however, be very uncertain and irregular with such an arrangement. The type of classroom suitable for open-air teaching may possibly be found in a modified form of Dutch barn or of such a structure as was shown by the Economic Chalet Company at the Ideal Home Exhibition, a building with protection breast high, with a widely overhanging roof and top light.

THE shrinkage of trade from which this country has suffered during the past year has, we learn from the monthly circular of the British Chamber of Commerce in Paris, been experienced also, though in a lesser degree, by our French neighbours, whose foreign trade has diminished during the first ten months of last year by, in round figures, 16½ millions sterling as compared with the corresponding period of 1907. This is a loss of slightly over 4 per cent. as against our own 10 per cent. diminution. The trade between the United Kingdom and France has fallen by 6¼ millions sterling during the same period, a declension of nearly 8½ per cent. Without entering into any discussion of the part that our fiscal system plays in these unhappy results, it is clear that such figures point to the necessity of increased energy and push on the part of our manufacturers. Whilst the working costs should be reduced wherever possible, the expenditure on publicity should be increased. The man who cuts down his advertisements in slack times will find his share of the diminished trade smaller than ever and will be squeezed out by his competitors who double their advertisements. Architects realise this and enter strenuously into competitions which in busier times they would not touch. Now they are looking round to learn what better and cheaper materials and manufactures are in the market, and they scan with interest advertisements and circulars that would formerly have gone into the waste-paper basket.

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THE WINTER EXHIBITION AT BURLINGTON HOUSE.

DEPARTING from the usual custom of an exhibition of the works of old masters, the Royal Academy has this winter presented us with a collection of the work of modern artists, not necessarily an epitome of all that is best in modern art or even representative of what would be in the judgment of present Royal Academicians thus representative, but the collection of a private individual and wealthy amateur. We must suppose that the Royal Academicians by their acceptance and exhibition of the collection of the late Mr. GEORGE MCCULLOCH have endorsed his selection of the works he has purchased, and that they regard his example as one to be followed by amateurs of sufficient wealth, possibly by reason of the principle that Mr. MCCULLOCH appears to have followed, never to buy a picture that had not been painted in his own lifetime. It is as if they would say to wealthy picture buyers, "See how much better it is to buy ten or a dozen modern paintings of excellence or at least sufficiently high quality at a couple of thousand pounds a piece, to live with them and enjoy them, than to pay twenty thousand for an old master which you do not enjoy, but only buy because you have outbid the other fellow." And there is a great deal to be said for this view. The inflated prices of old masters, manipulated largely by the dealers, depend largely upon, first, the rarity of the works, and, secondly, upon the foolish desire to bid more for a certain painting than anyone else has given or is prepared to give. Buying an old master is a good deal like buying a great auk's egg; buying a modern masterpiece endows you with a lifelong pleasure, assuming, of course, that you are a real amateur, and, if you are as well a connoisseur, it may prove also a lucrative investment for yourself or your heirs.

As natural at the Royal Academy, paintings and those principally in oil are virtually the subject of the exhibition, but we enjoyed best the few examples of sculpture, all the bronze examples of which and RODIN'S marble group, "The Kiss," are excellent and delightful. Curious that of the eleven bronzes five are by JOHN M. SWAN, R.A., and there are only two paintings of his in the exhibition.

The most outstanding feature of the collection of 346 pictures is its catholicity, the next the high standard of achievement running throughout the whole. Every phase of that which is best in modern British painting, from LEIGHTON to WHISTLER—not that we thus imply that either is superior to the other—is here represented, and if not the absolutely best work of each man, certainly high-level work of each has been selected. It would, perhaps, be impossible for any individual to collect the absolutely best works of the 194 painters favoured by Mr. MCCULLOCH, even if we could all agree as to which was the best work of each man, or of any one man who was a real artist with an artist's idiosyncrasy, and not a mere machine producing works always of the same field of effort. Take, for example, the works of Sir JOHN MILLAIS: who should say whether "Sir Isumbras at the Ford" or "Lingering Autumn" is the better work? Are they not equally admirable examples of excellent work of a great painter? One can understand that the GEORGE MCCULLOCH who could purchase two such pictures was a man of broad views and catholic appreciation of all that was excellent in modern painting.

Nor, although the work of British painters largely predominates, is the selection confined to that of our own countrymen. Some of the gems of the collection are from abroad, the "Dutch Landscape" of JAMES MARIS and DAGNAN-BOUVERET'S "Dans le Forêt," for instance. DAGNAN-BOUVERET, by the way, seems to have been a favourite with Mr. MCCULLOCH, for there are eleven of his works in the collection, including portraits of Mr. MCCULLOCH himself and of his wife. Speaking of nationality, it is hardly surprising that in the collection of the Glasgow-born millionaire the paintings of Mr. DAVID MURRAY should outnumber by far those of any other individual artist, no fewer than sixteen being here exhibited, including "The Half-Moon" and "Mangolds."

Naturally, most of the Royal Academicians are represented, for it must be admitted, in spite of all cavilling, that the painters in the Royal Academy "forty" are men who have done good work, whatever may be said of their maintenance of the standard to which they have attained or of their superiority to all of those outside the fold.

The notable exceptions are Sir EDWARD POYNTER and Sir HUBERT VON HERKOMER, neither of whom is represented.

Mr. ABBEY'S selected works are "Richard, Duke of Gloucester, and the Lady Anne," and "Lear and Cordelia," both excellent examples of one phase of his work.

Sir L. ALMA-TADEMA is fittingly represented by "The Sculpture Gallery" and his small painting "Love's jewelled Fetters"; Mr. GEORGE CLAUSEN by his early works, "The Little Haymakers" and "Ploughing," and his later production, "Going to Work." Mr. DAVIS is seen in "A Gleaming Day in Picardy," "Loch Maree," "Now came still Evening on," and "Summer-time."

Of Mr. FRANK DICKSEE'S work there is only one example, but that is a fine one, if somewhat theatrical, "The Burial of the Viking." Sir LUKE FILDES also is represented by only one picture, "The Alfresco Toilet." Two of Mr. GOW'S historical pictures are to be seen, "After Waterloo—Sauve qui peut" and "After Langside—Queen Mary's Farewell to Scotland," one of his best. Mr. PETER GRAHAM'S pictures appeal to a Scotchman above all lovers of fine painting, and we have before us "Where Gannets Build," "The Hamlet by the Sea," "Caledonia Stern and Wild," a great work; "A Highland Glen," also admirable; and "Evening-time." Mr. GREGORY is represented by a single work, "The Old Wedding Gown." There are four examples of Mr. LEADER'S popular landscapes, "Mead and Stream," "Worcester Cathedral," a charming picture; "When the Sun is set; a Worcestershire Village," and "Conway Bay and the Carnarvonshire Coast." By Mr. SEYMOUR LUCAS there is but one picture, but a worthy one, "The Call to Arms."

More Scotch is seen in Mr. MACWHIRTER'S excellent works, "A Highland Bay," "The Sleep that is among the Lonely Hills," and "A Spate: Glen Affaric." To Mr. DAVID MURRAY'S sixteen paintings we have already referred.

Sir QUILLER ORCHARDSON is to be seen at a high level in "Music, when sweet Voices Die, Vibrates in the Memory," "The Young Duke," "Blossoms Fair," and one of the best pictures in the collection, "Master Baby." Mr. BRITON RIVIERE is one of those of whose work there is only one example, and that not of his best, "So Near and yet so Far."

Mr. SARGENT'S art is seen in six pictures, and amongst them some of his best work and some of the best paintings in the collection. "On his Holiday: Salmon-fishing in Norway" and a sketch with the same title; "Portrait of the late George McCulloch, Esq."; "Salmon," a pencil sketch of Mr. MCCULLOCH, and one of Master ALEC MCCULLOCH. Mr. SOLOMON has tempted the collector by only one work, and that of the year 1901, "The Judgment of Paris," beautiful, but hardly his best. The well-known—from engravings—"A Gambler's Wife" is the only example of Mr. MARCUS STONE. Mr. SWAN'S two paintings are "Orpheus" and the pastel, "A Tiger Drinking." Mr. WATERHOUSE is represented by "Saint Cecilia," "Flora and the Zephyrs," and "Ophelia"; Sir ERNEST WATERLOW by "The Orphan" and "Autumn Glory"; Mr. WOODS by "The Christening," "The Flower-seller—Venice," and "Good Afternoon," all Italian scenes; whilst Mr. W. L. WYLLIE is seen in a good example of his work, "Toil and Grime on a Flowing Tide."

From the elect to the stranger without the gates. "Valparaiso," one of the best of WHISTLER'S nocturnes, and his portrait, painted by himself, on the walls of the Royal Academy.

"The Garden of the Hesperides" and "The Daphnephoria" of Lord LEIGHTON in the same collection as

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WHISTLER'S "Valparaiso" are surely sufficient to prove the truth of our assertion of the catholicity of taste and patronage dominant in the collector.

Many other pictures we should like to notice as those we enjoy—Mr. HENRY MOORE'S blue sea and "Breezy Day"; Mr. ALFRED EAST'S "Angry Dawn"; MICHAEL MUNKACSY'S "Tête-à-tête"; Mr. NAPIER HEMY'S "The Crew" and "Bass-fishing"; Mr. BRETT'S "The Grey of the Morning"; Mr. ORPEN'S "The Mirror"; FRITZ THAULOW'S "A River in Winter, with Trees," and many others.

One must not forget to mention that examples of BURNE-JONES'S work are in the collection; of BASTIEN-LEPAGE, of BOUGUEREAU, of GEROME, and of nearly all British painters that one admires, so that here is a unique opportunity for seeing some of the best of modern painting, collected with wide impartiality, but with wise discrimination.

STEELWORK.

By C. V. CHILDS, A.M.I.C.E.

[In the final sentence of the article that appeared in our last week's issue, reference is made to ferro-concrete construction; the following should have appeared as a footnote, but it had to be held over owing to want of space until this week.]

IT is the intention of the writer to deal with the subject of ferro-concrete in a few articles subsequent to those on steel construction; but in view of the fact that, before these may be published, new regulations may be drafted for the proposed new London Building Act, it is as well to draw attention to some facts in relation to this system of construction, which apparently have been overlooked, or perhaps glossed over by those who proclaim it the ideal method of construction applicable to structures of every sort and under all conditions.

Ferro-concrete has its own proper sphere in constructional work; but one may almost say that the craze for this class of work is causing it to be used under conditions which constitute it a serious danger, not so much at the present time, but in the not very distant future.

It seems extraordinary that the weak point in this construction has been overlooked, and it would be to the benefit of constructional firms, who make ferro-concrete a speciality, if they recognised the limits within which it is safe to use this form of construction; otherwise it may, before long, become discredited altogether, simply for this reason: a few bad failures might drive it away from its own legitimate sphere.

The weak point in ferro-concrete lies in the fact that the claim put forward as one of the chief reasons for its use is false.

This claim is, that the steel being embedded in the concrete, is protected from corrosion; true enough if the premises be correct; but this is not so in the case of ferro-concrete beams carrying even comparatively light loads, when exposed to the weather.

The usual allowable safe stress specified in ferro-concrete work is about seven tons per square inch for the steel tension bars. Within its elastic limit (for ordinary steel this is usually about fifteen tons per square inch, though for specially made steel this may run considerably higher) the strain is proportional to the stress; the strain being the amount the steel bar stretches. Without becoming too technical, it may be accepted that for a stress of seven tons per square inch this strain or elongation will be one 140th of an inch for every foot in length of bar stressed up to seven tons per square inch, and it is impossible to get the bar to take up the stress without developing the elongation. In other words this stress produces a strain of one 1,700th of the length of the steel bar.

It is seldom that concrete will stretch under tensional stress more than one 10,000th of its length. Converting this back into the steel bar it means that when the concrete has reached this limit and cracks appear, the bar in stretching one 10,000th of its length is stressed only up to one and one-fifth tons per square inch. The dead weight alone of the ferro-concrete beam may cause this amount of stress in this steel bar.

In actual tests, carried out on ferro-concrete beams, there is a distinct point where, after a small amount of loading is applied, the concrete, so to speak, lets go, and the steel takes up the tension, as is evidenced by a sudden slight deflection; this is undoubtedly due to the steel stretching slightly, when, instead of the concrete resisting the tension, this work is thrown suddenly on to the steel bars. These being more ductile than the concrete, they therefore elongate slightly more before adapting themselves to resist the tension. The case then stands that, when the loading produces a stress equal to about 1½ tons per square inch, the concrete has developed cracks, and the supposition is that the slight amount of elongation it was capable of has vanished; the under surface returns to its original length plus the width of the minute cracks; the concrete that was previously in tension now acts the part of the vertical struts in a king or queen post truss.

Presuming the load for which the girder is designed is applied and the stress in the steel bars becomes 7 tons per square inch, and presuming one crack opens in a two-foot length of the beam, the width of this crack would be $\frac{1}{70}$th of an inch at the distance up from the bottom of the beam where the steel is located.

Only a hair crack, it may be said, but so much the worse on this account, and all the more liable to contain moisture by capillary attraction, where the beam is exposed to the weather; it is also quite enough to expose the steel to oxidisation from either moisture or injurious fumes.

This then places the limit on ferro-concrete construction for beams. It essentially needs indoor protection and is in its proper sphere for filling in for floors, between main girders, and for that class of work.

For external work, unless some method can be devised by employing in its construction material in which the elongation can take place without exposing the steel, its use is distinctly dangerous; it may be, in a few years' time, when the small steel bars have become corroded, that failures will occur in ferro-concrete beams, especially those in exposed positions, where, as is usually the case, no further protection is afforded the steel than the concrete.

A drawback in ferro-concrete is that its most important element—namely, the steel—is buried out of sight and it is impossible to inspect the real condition of the beams; the steel is in bars or rods of small cross sectional area, and therefore more easily destroyed by corrosion than the larger areas used in the flanges of constructional steelwork. Yet how important it is for work of this description to be open to inspection at any time, when used in positions that expose the steel to corrosive agents; one has only to remember the scare that was occasioned a few years ago by the discovery of the dangerous condition of some of the girders over the Underground Railway. And yet the ferro-concrete enthusiast might probably advise the use of this construction in places such as these, claiming that the steel is so embedded and protected by the concrete that it is therefore indestructible.

(To be continued.)

ROYAL ACADEMY LECTURES—PAINTING.

THE second lecture of the course to be delivered in the lecture-room of the Royal Academy by Sir Hubert von Herkomer dealt with "Portraiture." He said that the practical side of his subject would be dealt with by him next year if he were alive. Portrait painting was the most human of all the arts, and might claim to be the most satisfying. It became history painting in the truest sense, for to paint man was to represent the world in its history. It was the most popular, the most indispensable and the most difficult of all the arts. From time immemorial man has tried to practise it. Man had ever been most interesting to man. In the early days the artist gave him the attributes of the beast. In spite of religion forbidding the exact representation of the human form, the idea was always there in Christian times. One may say that man is not a mere adjunct to the world—he is the world.

There will ever be those who deny the foremost position to portrait painting. But what is genre painting but portraiture? It is based on portraiture. Artists will always hold divergent opinions on the relative merits of their arts. We have portraiture in subject painting and subject painting in portraiture. This combination is seen in Millais's *The North-West Passage*. It is evident that the old man is visualising that passage as the young girl sitting at his feet reads without emotion. The frailty of the girl is emphasised by her robe, and makes a contrast with the rugged strength of the sea-dog. His calling is made obvious by the surroundings. She acts as a foil as she sits giving womanly consolation.

Historical painting is usually considered to mean the representation of scenes and incidents of which the painter

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was not a witness. Portraiture is the basis in all the arts in which the human figure appears. In portraiture the personality of the sitter is everything. His character and temperament must be brought out in such a way that his friends will say "That is the man." Portraiture had to be first of all convincing—that is, it should be an artistic representation of nature. The truest portrait painter does not merely copy what is before him, he takes only such as is necessary to emphasise the character of the sitter. Yet the painter who accepts a commission for a portrait must give a satisfying likeness if he does what he is paid for. It is also true that the art he puts into his work cannot be paid for. In the career of Sir Joshua Reynolds many portraits were returned to him as unsatisfactory likenesses. Obtaining a likeness of the sitter was what made portrait painting most exacting. It has since become more acute than ever before owing to photography. Every urchin was familiar with the features of celebrities—statesmen, churchmen, actors, professionals of all kinds and music-hall ladies. Painters were apt to look slightingly on the faculty of likeness. But unless a portrait painter possessed it, he could never hope to be successful. In the case of an unsatisfactory likeness the artist says in defence, "That is what I see." But that will avail him little. He must either resort to bluff or return the fee. When a person on being shown a portrait said "It is a fine work of art," the artist could be certain there was something wrong with the likeness. Many painters failed because they did not study the character of the sitter before meeting him as a model. The likeness must be manifest in attitude as well as in face.

That portraiture enters into subject painting is suggested, in the first instance, by the fact that it is very usual for an artist to think of a subject after he has found a good model. That proceeding was hardly likely to lead to monumental art. Millais did not bother much about the subject when he had discovered a pretty model. Of many of his pictures it could be said that they are neither subject paintings nor portraits. Put briefly, the more they are portraits the less they are subject paintings, and *vice versâ*.

In painting the subject grows and enlarges if the original idea is a good one. Suppose a genre painter has found a couple of models for an Irish man and girl, and is uncertain how to use them. He is anxious to avoid repeating a worn-out love scene. Happy thought! Make it a gusty day, with Pat trying to light his pipe under a colleen's cloak. How is the spectator to know that he is using his last match? Happy thought! The title can tell him that. To add further importance to that last match introduce a pig (whose string Pat is still holding), trying to pull him away from the shelter of the cloak. Nobody would think that the pig was an afterthought. All this is genre portraiture.

True portraiture must start on a physiological basis representing the character and not the characteristics. A great portrait must speak. It should be not only a likeness, but a living likeness too. Though, paradoxical as it might sound, a portrait might be lifelike and yet fail as a likeness, it might be an excellent likeness and yet not be lifelike. It may be neither and yet be a very fine work of art. The greatest portraits have possessed the essential quality of repose which makes them monumental. Restlessness in a picture becomes disquieting—a twisted head induces a crick in one's neck. It is the result of a desire to surprise instead of charm. Merely to make a portrait recognisable is not enough to satisfy the demands of true portraiture.

The pictorial treatment of a man or a woman has probably had its last day. The evolution of portraiture as we know it through the centuries would be a most interesting subject. For instance, who first introduced behind the sitter a curtain hanging from nowhere, the landscape coming into the room, the staircase, the column and the various other devices we meet with over and over again? None of these probably came spontaneously, but they had become a convention. In many genre pictures there are absurd effects introduced in the backgrounds.

There was another convention that had come down to us. Supposing in a genre picture the sole figure is a man by a fireside, the light of which alone illuminates the room. It will be often found that on the canvas the side of the face away from the light is lighted up, showing that the work has been painted in the cold north light. The most illogical effects have been introduced in the greatest pictures. If they looked at Titian's great equestrian portrait of Charles V. in armour they would see that the dark side of his face is against a lurid sunset sky. Yet pictorially this illogical effect was stupendous. A background could make or mar a portrait. All he had said led to one thought—that a really good portrait is a wonderful thing. It is no small boon to mankind to have death robbed of much of its annihilating reality by the hand of the artist.

Sir H. von Herkomer took as the subject for his third lecture "The Philistine." He said that when he commenced writing it he did so with an open mind, not feeling quite sure on ,which side his sympathies would fall. The Philistine was a much maligned creature. The designation had been always most loosely used in this country without inquiry as to its meaning, and it illustrated the ease with which a corruption has set in. He himself had consulted encyclopædias and dictionaries without success. But by a fortunate circumstance he was now able to give the date and history of its original use, thanks to the help of a Professor at the University of Jena, whom he had met while painting in Devonshire, and to whom he had mentioned his difficulty. Early in the eighteenth century the students at that University distinguished themselves from the non-students in Jena by labelling them "Philistines"; the exact date of its earliest employment was 1693. Frequent serious quarrels took place between the two parties, for though the students mixed freely with the townspeople in the taverns (especially in those where dancing took place), once they were outside in the street no student would be seen with a townsman. In one of these conflicts the townspeople arrived in overwhelming numbers and routed the students, one of them being killed. The text chosen by the preacher for the funeral oration was "The Philistine is upon you." From that moment it signified the lesser minds or the middle line of intelligence.

Sir Hubert said that he wished to remove the quality of opprobrium which had been attached to the word in this country, where it represents the parochial intellect, the bourgeoisie. There must always be the low people, the middle and the high people. The middle people are bound hand and foot by their own morality, and somewhat despised respectability, which consists in avoiding the too little and the too much. Most curiously it was the artist who always uses the word Philistine as a term of opprobrium, though not very discriminately. An artist, after showing a visitor round his studio, mutters between his teeth "Philistine" as the man leaves without making an offer for a single picture. Should the same visitor come again next week and buy a canvas, the artist says, with a happy smile, "Good chap, after all!" Having weighed his qualities, he himself was prepared to say, "Bless the Philistine." What would the world have been without him? From time immemorial he has held the balance between sense and nonsense. According to his lights he has patronised the arts. Surely he is a man to be reckoned with. Moreover, he is a staunch friend, a right good fellow, a clear-headed counsellor. He sees the ground on which he stands, and rarely stumbles, though indeed he may keep on the dead level. Everything in his life is regulated by simple and conventional rules. Sir Hubert said he liked that man, he was glad to spend an evening with him occasionally. The Philistine is a good listener, being of an open mind, though it might remain open. The only complaint was that he will not have his portrait painted, arguing that he had no wish to eat his dinner in front of his likeness, an ungrateful nation would not buy it, and that he had better ways of spending his money.

The Philistine strikes a balance in morals and modern life; he is the middle line of intelligence from which we judge that which is above and that which is below. Philistinism should never be confounded with Puritanism—i.e. Puritanism as bearing on art and not on religion. In no European country has art felt the baneful influence of Puritanism as in England. The noblest forms of art represented the human figure, and flesh-painting was the highest achievement of the painter. If a man produced a work of art of that kind there was no need to inquire as to the means by which it was evolved, or as to the models. But the Puritan could not differentiate between the nude for art's sake and nakedness for immorality's sake. Of course there were abnormalities in that class of picture which sprung from diseased minds. Some years ago he sent to the Royal Academy a nude female figure with a sylvan background which he called "All Beautiful in Naked Purity." The hanging committee told him that because of English susceptibilities they did not dare hang it in the room it deserved. The gallery where it was placed was deserted (though its sole offence was that the figure was merely clothed in nature's garment), the seats knew no occupants, visitors rushed through casting a furtive glance at that picture. At last a Philistine boldly planted himself in front of it, but he was

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carried off (mutely protesting "What is the harm?") by his wife. Yet these people who are so exacting in modern art are not prepared to logically follow their ideas to the old masters, whose nudities are accepted without demur. His picture was bought by a gentleman in Berlin, who built it into a niche in his dining-room.

The Philistines make up the large majority, and it was to them the painter and the sculptor must look for substantial rewards. If the artist relied on the sale of his works for a livelihood he could not escape the introduction of trade into his art. Art for art's sake—that studio cant phrase—was a contradiction in terms, or at best a stimulus. It was a very open question whether the artist would reach a higher level if he did not have to work for money. Such a condition weakened rather than strengthened the artistic capacity. For fear of being misunderstood he (Sir Hubert) would say that if money was a necessity to the artist, purity was a far greater one. The artist must preserve a purity of purpose, he must let nothing degrade him, he must force his personality on the public. But he ought to be just towards that middle line of intelligence. Doubtless his audience had discovered that he himself was a rank Philistine. He was willing to admit that he felt like one every time he sat with his colleagues of the Royal Academy. He was convinced that there was a touch of the Philistine in every human being from the artist to the grocer, and from the statesman to the ploughman. The Philistine demands something more than mere vertuosity in paint, he requires a story in a figure picture, a likeness in a portrait.

A friend of his had once asked why artists were so sensitive as to what newspaper critics said concerning their works. It was useless to pretend that an artist's reputation was built up on the verdict of his fellow artists; that is not enough, for it is not they who buy pictures. There is, however, a curious divergence between the criticisms of the Press and the opinion of artists; the former rarely fail to reveal the puzzled condition of the writer's mind. But there was much to be taken into account before they condemned the art critic. His time is too short, many visits to an exhibition being necessary for a sound opinion instead of one of merely a few hours. Frequently the writer would, if he could, change his mind on a maturer consideration of his hasty impression. Moreover, the critic is not always an altogether free agent, being under his unsympathetic editor, who probably regards the space occupied by art criticisms as wasted. Their articles are sometimes so edited as to be unrecognisable. Some people say that a war is going on between art critics and editors.

Artists have often strong opinions, and are impatient of ideas that do not conform with their own. On one occasion Millais was walking with Sir Hubert through the Grosvenor Gallery, and in passing by a room containing pictures by Burne-Jones he waved his hand and remarked, "Oh, I cannot understand that man."

Something must be done to check the ever growing indifference of the public of this country to art. Artists themselves were not altogether without blame in the matter. First, they ill-disguised their contempt for that middle line of intelligence on whom they depended for worldly reward; secondly, they offered work that often outraged taste; and lastly, they expected to be judged differently in art and conduct from the rest of mankind. The artist should in every way strike a note of probity. It is no compliment to say that he should be judged by a standard different to that of the rest of mankind. No one has benefited by the absence of sober judgment in his work or life. A little exaggeration both in their admiration and condemnation, and a little less impatience with all opinions that differed from their own, was a consummation devoutly to be wished.

THE ARCHITECTURAL ASSOCIATION.

A MEETING of the Association was held on Friday evening last at Tufton Street, Westminster, Mr. Walter Cave, president, in the chair.

Messrs. W. G. Newton, W. J. Price and M. F. Surveyor were elected members.

On the motion of the PRESIDENT, votes of condolence were passed to the widow and family of the late Mr. W. M. Fawcett and the family of the late Mr. E. A. Gruning.

The PRESIDENT announced that Mr. J. H. Markham would read a paper at the next meeting, January 22, on "Reinforced Concrete," Mr. Buckland's paper, dealing with "Schools" and originally fixed for that date, being postponed until February 5.

Mr. H. D. SEARLES-WOOD read the following paper, entitled—

Materials.

Some interesting results as to the relative strength of concrete made with aggregates of broken brick and gravel respectively, and also with broken brick and gravel mixed in varying proportions, have been obtained from experiments instituted by H.M. War Department in connection with the construction of a large building, for which it was calculated that a maximum weight of two tons per foot super would be brought upon the concrete foundations.

The experiments were carried out by means of cubes of concrete 1 foot by 1 foot by 1 foot, mixed and put together under precisely the same conditions as occur in actual practice. The aggregate of broken brick or gravel was broken to 1½-inch gauge and mixed with a sufficient proportion of sand to fill the interstices. Briquettes of the Portland cement used for making the concrete were previously tested, and successfully withstood a tensile strain of 400 lb. per square inch of section after seven days' immersion in water. Four blocks of each of the following varieties of concrete were then made, viz.:—

1. Concrete composed of six parts cleaned broken brick, one part sand and one part Portland cement.
2. Concrete composed of six parts uncleaned broken brick, one part sand and one part Portland cement.
3. Concrete composed of six parts broken stone, one part sand and one part Portland cement.
4. Concrete composed of three parts of cleaned broken brick, three parts broken stone, one part sand and one part Portland cement.
5. Concrete composed of four parts cleaned broken brick, two parts broken stone, one part sand and one part Portland cement.

The bricks used for the aggregate were very old, rather soft and easily broken, having pieces of the old mortar adhering to their surfaces; in the remaining instances the old materials were roughly cleaned from mortar before breaking to the required gauge. The concrete blocks were forwarded to Messrs. Kirkaldy & Sons, and their actual resistance to compression ascertained after being allowed to set in air for thirty-one days. Each block was bedded between pieces of yellow pine, ⅜ inch thick, before being tested.

DIAGRAM I.—*Strength of Portland Cement Concrete Blocks to Resist Compression after being Allowed to Set in Air for Thirty-one Days.*

No.	Description of Concrete.	Weight lb. per cube foot.	Slightly Crushed. Tons per square foot.		Crushed. Tons per square foot.	
A^1	6 parts cleaned broken brick, 1 part sand, 1 part cement	123	22·6		24·4	
A^2	Do. do.	115	17·9	17·1	20·1	20·0
A^3	Do. do.	124	12·0		18·1	
A^4	Do. do.	119	15·9		17·3	
B^1	6 parts uncleaned broken brick, 1 part sand, 1 part cement	124	20·3		21·3	
B^2	Do. do.	123	17·2	16·8	18·3	18·6
B^3	Do. do.	119	15·0		18·1	
B^4	Do. do.	118	14·7		16·7	
C^1	6 parts broken stone, 1 part mud, 1 part cement	137	15·6		17·1	
C^2	Do. do.	138	13·4	12·3	15·0	14·1
C^3	Do. do.	141	13·4		14·4	
C^4	Do. do.	139	6·7		10·0	
D^1	3 parts cleaned broken brick, 3 parts broken stone, 1 part mud, 1 part cement	128	18·1		19·4	
D^2	Do. do.	126	15·4	15·4	16·4	16·6
D^3	Do. do.	128	15·4		16·3	
D^4	Do. do.	126	12·9		14·1	
E^1	4 parts cleaned broken brick, 2 parts broken stone, 1 part mud, 1 part cement	124	14·3		16·3	
E^2	Do. do.	124	12·6	12·4	16·0	15·2
E^3	Do. do.	1 6	13 7		15·4	
E^4	Do. do.	128	9·1		13·3	

The terms "sand" and "gravel" are a trifle indefinite, so for the sake of distinction all mixtures that will pass a sieve with a ¼-inch mesh is sand, and all that will not pass is gravel. Good authorities state that loose gravel of ¾-inch diameter and under contains about 33⅓ per cent. of voids, which is reduced to 21 per cent. by ramming. From this it can be seen that one part of sand will fill the voids in three parts of gravel; that is a mixture of 1 to 3 The percentage of voids increases somewhat with an increase in the size of the gravel, which would correspondingly decrease the above ratio. The gravel should be of different sizes, varying from coarse to fine screened or washed entirely free from clay, loam or other foreign matter, and be free from scale, slime or humus.

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Gravel sufficiently clean can often be obtained from river beds or gravel pits, but rarely from gravel banks. Gravel can be readily cleaned by sluicing. Sufficient water should be used to carry away all objectionable matter, including fine sand. As a rule, more cement is required in gravel concrete than in the same volume where broken stone is used; 10 per cent. is about the amount of extra cement that should be used in gravel concrete over and above that required with broken stone.

If the building is on a clay subsoil an excellent substitute for the layer of cement concrete over the site of a domestic building can be made by burning the clay and mixing the burnt ballast with gas tar whilst it is hot; the mixture can be left for some time till the brick footings are laid, and then it is spread over the site and well rammed, and it will be found to be more impervious than the cement concrete.

With the introduction of reinforced concrete building much greater attention has been paid to the methods of testing Portland cement and selecting the materials for the aggregate.

The following is from a report of the materials sub-committee of the reinforced concrete committee of the Royal Institute of British Architects:—

Cement.—Only Portland cement complying with the requirements of the specifications adopted by the British Engineering Standard Committee should be employed; in general, the slow-setting quality should be used. Reasons for this recommendation:—The exclusion of concrete made with lime or natural cement appears desirable, not only because the term "reinforced concrete" is now generally applied to work in which only Portland cement concrete is used, but because the presence of unslacked particles of lime and the uncertain results obtained from limes and natural cements constitute an element of danger. Moreover, the lower resistance of the resulting concrete prevents the full strength of the reinforcement being utilised.

The slow-setting quality is desirable, in that a certain time must always be required in putting the concrete in position and thoroughly ramming it, and a quick-setting cement might set before these operations were completed, to the danger of the work.

The cement should be delivered on the works in bags or barrels bearing the maker's name and the weight of the cement contained.

Every lot of cement delivered should be tested to make sure that it complies with the requirements of the standard specification before it is used. These tests may be made at the maker's works or elsewhere. In addition, the tests for soundness and time of setting, which can be made without expensive apparatus, should be applied frequently and all cement rejected which fails to pass the tests. These tests are:—(1) Gauge a small portion of the neat cement into a plastic mass with from one-fifth to one-fourth its weight of water, place this on a small piece of glass, slate or enamelled tile (not porous) and allow same to set out of contact with the sun, draught or vibration and in a damp atmosphere—say, under a damp sack, so that the sack does not touch the cement. After the expiration of twenty-four hours place the set pat in a saucepan (preferably enamelled) with cold water, and bring same slowly to a temperature a little below boiling and keep at same for about three hours. If the pat remains sound or shows only slight hair cracks, the cement may be safely used immediately. The setting time may also be noted by pressure of thumb nail on similarly gauged protected pats, when it will be easily seen whether the cement is a quick-setting or slow-setting one, in accordance with what is required. The cement may be considered set when hard pressure with the thumb nail only makes a slight impression.

Sand.—The sand should be composed of grains of various sizes up to particles which will pass a ¼-inch mesh. Fine sand alone is not suitable. It should be clean and free from core, ligneous, organic or earthy matter. The value of a sand cannot always be judged from its appearance, and tests of the mortar prepared with the cement and the sand proposed should always be made. Washing sand does not always improve it, as the finer particles which may be of great value to the compactness and solidity of the mortar are carried away in the process. Sand which looks impure is not always unserviceable. It appears that freely divided particles of clay or loam which do not adhere to the grains of sand may improve the resulting mortar. It is, however, difficult to fix upon the actual amount of impurity which may be allowed, and the word "clean" is retained, calling attention to the fact that a certain degree of impurity is not prejudicial. The word "sharp" usually employed in the description of sand has been omitted, as it appears that the angularity of the grain which gives the quality of sharpness is of very little importance compared to the size and variation in size.

Gravel or Hard Stone.—The gravel or hard stone should be clean and angular, varied in size as much as possible between the limits of size allowed for the work. In all cases material which passes a sieve of a ¼-inch mesh should be excluded or reckoned as sand. The maximum allowable size is usually ¾ inch, which should be reduced to ½ inch or less in thin floors or in columns. The maximum limit must always be such that the gravel or broken stone can pass between the reinforcing bars and between these and the centring.

The sand should be separated from the gravel or broken stone by screening. It was thought desirable to confine the recommendations at present to the use of gravel or hard, broken stone, as concretes of cinder, coke-breeze, slag, or soft stone are of much lower strength, and are comparatively little used in reinforced work.

The material to be used must, of course, be fixed in relation to the stresses allowed upon the material. As it is very necessary to have correct proportions for all the materials it is advisable to screen the gravel.

The amount of cement to be added to the aggregate should be specified by weight. The weight of a cubic foot of cement for the purpose of proportioning may be taken at 90 lbs.

The amount of cement in a cubic foot varies much with the method of filling and the size of the vessel used and the size of the volume used. The French standard measure is a litre, and the method of filling is through a conical riller having a sieve in the middle of it, and of which cone the nozzle is about 2 inches above the litre measure. Determined by this method, the weight of cement is usually under 1,100 grammes per litre, which is equivalent to 68.64 lbs. per cubic foot, and there is little variation in repeated trials of the same cement.

If a larger measure than a litre is used, there is not only a greater weight per volume, but a greater variation in different weighings of the same cement in the litre measure; about 3 per cent. variation may be expected in a 50 litre measure; there might be as much as 13 per cent. even when carefully filled in by a standardised method.

In fixing the proportion betwen volume and weight the committee had also to consider what had been generally understood by the expression "one of cement to one of sand." It appears that a 200 lb. bag of cement has been hitherto generally considered as the equivalent of rather more than 2 cubic feet, and that proportions are generally determined on the basis of 90 lb. per cubic foot. The German Engineers' and Architects' Association recommend that for mixtures by weight, 1,400 kilos should be taken as the specific weight of the cement. This is equivalent to 86.36 lb. per cubic foot. The sand and ballast are also sometimes determined by weight. It is found that sand weighs from 85 lb. to 117 lb. per cubic foot, and the contents of a vessel containing a cubic foot of cement varies between the same figures according to the manner of filling. The adoption of so small a measure as a litre, though giving a more accurate comparison between the weights of two cements, would make the equivalent mixture much leaner than has hitherto been understood.

The exact determination of the ratio between weight and volume does not appear of so much importance for proportioning as general agreement upon the meaning of such expressions as "one of cement to two of sand and four of gravel." The committee therefore recommend that the cubic foot be taken as weighing 90 lb.

The proportion of sand to be added to the cement should be specified independently of the gravel, broken stone or other aggregate. In general the volume of the aggregate should be double the volume of the sand. There are two or three methods of doing this. The American practice appears to be to give the proportion of cement, sand, and aggregate between colons—1:2:4 or 1:3:6. On the Continent of Europe it appears usual to specify weight of cement in kilos.: cubic metres sand: cubic metres aggregate, also between colons.

The metal used should be steel having the following qualities:—

(*a*) An ultimate strength of not less than 60,000 lb. per square inch.

(*b*) An elastic limit of not less than one-half the ultimate.

(*c*) An elongation of not less than 22 per cent. in the lengths stated below.

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(*d*) Standing bending cold, 180 degrees to a diameter of the thickness of pieces tested without fracture on outside of bent portion.

Test pieces should be planed or turned before being tested except in the case of rounds less than ½ inch diameter.

The elongation should be measured on a length of 8 inches, except in the case of sections less than ⅝ inch diameter, in which case the elongation should be measured in a length equal to eight times the diameter.

Before use the metal ought to be clean and free from scale or loose rust. It should not be oiled or painted, and a wash of Portland cement grout is desirable. Welding should in general be forbidden. If it is found necessary, the welding should be at points where the metal is least stressed, and it should never be allowed without the special sanction of the architect or engineer responsible for the design.

The requirements for the metal are those usual for mild steel, save that there is no upper limit of ultimate strength. This upper limit has been expressly included in order that a harder steel may be used when thought desirable, provided only that the elastic limit is correspondingly raised. It is the elastic limit which is the important one, as reinforced concrete beams usually fail when the stress in the steel slightly exceeds that limit. In cases where rods are too long to be in one length, it appears desirable to hook them or to overlap and bind them with wire.

In all cases the concrete should be mixed in small batches in accurate proportions on large, boarded platforms. The bag of cement containing a fixed weight forms a convenient unit, and gauge boxes of a size to contain the proportionate quantity of sand and gravel or broken stone to be added to the weight of cement contained in the bag should be used.

If one box is used to contain the proper quantity of sand and gravel or stone it may be divided by a mark on the box into two unequal parts, the lower part for the sand, which should be filled in first, and the upper part for the stone or gravel, which should be first wetted. When the materials are mixed by hand they are to be turned over and thoroughly mixed by shovels and rakes with long prongs until the colour of the cement is uniformly distributed over the aggregate. Sufficient water should then be added to ensure that when a ball of the concrete is made and pressed together in the hands the water comes to the surface. The reason for the concrete being mixed in small batches is that it can be used at once on the work; when concrete is made in large batches some of it is almost certain to begin to set before it is used. Before the work is begun, and during progress test, pieces should be made of the cement, sand, and aggregate to be used in the work mixed in the proportions specified. These pieces should be either cubes of not less than 4 inches each way, or cylinders not less than 4 inches diameter, and of a length not less than the diameter. They should be prepared in iron or hardwood moulds and firmly punned with iron beaters. Not less than four cubes or cylinders should be used for each test, which should be tested by comparison in a proper machine, the load being slowly applied. The average of the results should be taken as the strength and should not be less than 2,500 lb. per square inch. Loading tests on the structure itself should not be made until at least two months have elapsed since the completion of the work. The test load should not exceed one and a half times the accidental load. Consideration must be given to the action of the adjoining parts of the structure in cases of partial loading. Tests of too severe a kind are calculated to permanently injure the structure, and are not desirable. Cracks may be more easily detected if the surface of the concrete is wetted, and this may be done while the load is on.

Up to a few years ago, the general opinion was that the addition of sand to calcined fat lime (although primarily added as a deterrent and to prevent shrinkage) had a chemical function, causing the formation of a hard silicate of lime. At the present time the opinion is that the setting of mortar made with pure fat lime and sand (or broken brick or similar material) is solely due to the drying of the lime and to the formation of carbonate of lime with the carbon dioxide in the atmosphere, and that no chemical action occurred between the sand and lime. The presence of powdered brick or sand merely allows of a greater number of air passages in the mortar, thereby facilitating the drying action and carbonising action of the atmosphere. The particles of lime also adhere more readily perhaps to the sharp fragments of brick or sand than they would to one another. In other words, the action of sand and similar substances on lime is purely physical, not chemical. If, however, the calcined lime is mixed in the presence of water not with sand, but with silica in an "active" form, i.e., amorphous, and generally hydrated or with a natural silicate which contains silica in an active condition, then it will unite with the silica and form a silicate of lime capable of withstanding the action of water to a certain degree. This resulting substance is called a pozzuolanic cement, and the great difference between a pozzuolanic cement and a Portland cement is that in the former the silicate of lime is formed after burning the lime by the addition of active silica, and in the latter the silicate of lime (and aluminate of lime) are formed during the burning of the lime at an extremely high temperature. There are several substances occurring abundantly in nature, mostly of volcanic origin, which contain active silica, such as pumice, tufa, trass and pozzuolana, which last, for instance, contains about 60 per cent. of silica, over one-half of which is soluble or active silica capable of directly combining with the lime on the addition of water. River sand is largely used on the Continent for making mortar. Experiments have been made with ½ trass, ½ cement, 3 sand, which gave a breaking weight of 333⅓ lb. per square inch at six months and 343½ lb. at twelve months; while the same cement mixed 1 cement, 3 sand, gave only 265⅔ lb. at six months and 230 lb. at twelve months. Seven trass, 1 cement, 3 sand, 7 gravel failed at 3,000 lb. per square inch, the same cement mixed 1 cement, 3 sand, 6 gravel failed at 2,000 lb., both were tested at 100 days.

Pumice gravel is used as an aggregate for concrete when lightness is required, the average crushing stress it stands is 536.63 lb. per square inch; the specific gravity of this concrete was found to be .49 when dry, and 1.24 after twenty hours' immersion in water.

(*To be concluded.*)

An Exhibition is to be held, under the patronage of Queen Alexandra, at the Tuileries in May and June next, of 100 English and French portraits of women of the eighteenth century. A representative French committee has been formed to select the portraits of the French school, and an English selection committee for the British school has been appointed, under the chairmanship of the Earl of Plymouth, consisting of the following gentlemen:—Sir Walter Armstrong, Mr. Lionel Cust, Mr. A. G. Temple (honorary secretary), Mr. Claude Phillips, Mr. Sidney Colvin, Mr. Roger Fry and Mr. Herbert F. Cook. Some of the greatest works of Boucher, Nattier, Van Loo, Largilliere and others will appear in the French section, while in the English Reynolds, Gainsborough, Romney, Hogarth, Raeburn, Hoppner will be seen. The total value will be one million sterling. The profits of the exhibition are to be devoted entirely to the Society for the Aid of Widows and Orphans of French Naval Officers and Seamen.

In the Report of the progress and work of the Society of Antiquaries of Scotland during the year it is stated that, commencing the year with a membership of 704, the Society had lost by deaths and other causes forty-two members, but the number of new members added had been forty-five, so that they began the new year with a membership of 707. The excavation of the Roman fort at Newstead, begun in 1905 under the supervision of Mr. James Curle, Melrose, had been continuously carried on during this year with satisfactory results, as would be seen in the very remarkable collection of relics from it, now numbering over 2,000, which were exhibited in the museum. Inclusive of these the museum had received additions during the year of 1,430 objects by donation and seventy-three by purchase, while the library had been increased by 165 volumes by donation and fifty-two by purchase. The most important of the donations received during the year was presented by the representatives of the late Sir Francis Tress Barry, Bart., consisting of about 1,400 objects, chiefly obtained during his extensive excavations of the brochs on his estate of Keiss, in Caithness, and in the surrounding neighbourhood.

The Education Committee of the Heriot Trust, Edinburgh, have resolved to grant facilities to the provincial committee for the training of teachers for the practical training in teaching in George Heriot's school of students of the Edinburgh College of Art who desire to obtain recognition as art teachers. Mr. Campbell Mitchell, superintendent of the evening classes at the College of Art, has been recognised by the Scotch education department as master of method to supervise the training. The provincial committee will make to the governors a payment of 10*s.* per student as a fee for the teachers of the art department for their trouble.

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NOTES AND THE WEEK.

IT is, we think, little known to architectural students generally that among the British Institution Scholarships is one for architecture of 50*l.* a year, tenable for two years, candidates for which must be not more than twenty-five years of age, and must have obtained a gold medal or a scholarship or money prize of the minimum value of 5*l.* in any art school in the United Kingdom. We take it that the Architectural Association, University and King's Colleges, London; Manchester, Liverpool, Leeds, and Sheffield Universities would be recognised as art schools for the purposes of these scholarships.

THE British Fire Prevention Committee has just issued three of its Red Books dealing with tests made on fire extinguishers. The first of these Red Books records the tests made by using plain water applied from vessels in common, everyday use—buckets containing about two gallons, bedroom pitchers, kitchen quart jugs, and kitchen tumblers, also an ordinary hand-pump such as is commonly used for garden purposes. These all proved effective when energetically applied in extinguishing small fires in their early stages, save in the case of petrol, even burning celluloid being mastered by plain water in twelve seconds.

THE second series of tests recorded were made with a 125-gallon high-pressure tank fire extinguisher of American manufacture, and demonstrated its efficiency in dealing with small fires either as operating sprinklers or as a supply for hose and nozzle. As the liquid ejected upon the fires was a plain water solution of bicarbonate of soda, impelled by and partly impregnated with carbon dioxide gas, it is scarcely surprising that it was unable to completely extinguish burning petrol, although successful against other varieties of small fires. The time limit of the efficiency of the tank is, of course, chiefly determined by the size of the particular tank.

THE third Red Book is an account of tests arranged in conjunction with the Incorporated Association of London Dyers and Cleaners, and was especially directed to the problem of dealing at an early stage with fires likely to occur on the premises of dyers and cleaners from the ignition of petrol. The value of asbestos cloths for smothering, checking and extinguishing burning petrol was conclusively proved. It was also shown that steam injected into a chamber containing blazing petrol extinguished the fire, provided the amount of steam was sufficient in comparison with the size of the chamber.

ILLUSTRATIONS.

HOLBORN TOWN HALL.—ADDITIONS—THE PRINCIPAL ENTRANCE—THE COUNCIL CHAMBER.

THIS building was erected in order to carry on the municipal work of the borough under one roof. In 1906 an architectural competition was instituted in order to obtain designs for the new offices, and from among the names submitted to them the Council selected six firms to compete, viz. Messrs. COLLCUTT & HAMP, HENRY T. HARE, E. T. HALL, Sir BRUMWELL THOMAS, G. C. HORSLEY, and Messrs. WARWICK & HALL. The designs of Messrs. WARWICK & HALL, of 13 South Square, Gray's Inn, W.C., were selected as being the most suitable to the requirements of the Council, and they were accordingly entrusted with the carrying out of the work. The foundation-stone of the new offices was laid on October 3, 1906, by the Mayor, Professor WILLIAM R. SMITH. The building was formally opened on October 13, 1908, by the Lord Mayor of London, Sir JOHN BELL. The work was carried out by Messrs. JOHN GREENWOOD, LTD., of London, during the mayoralties of Professor W. R. SMITH, 1906; Mr. W. DONALDSON RAWLINS, K.C., 1907; and Lieut.-Colonel LACY W. RIDGE, 1908, who were each chairmen of the building committee in turn. The building is erected at the junction of High Holborn and Broad Street, adjoining the Holborn Public Library, with which it forms one building when seen from the street. Although the library heights are followed in the elevations, the old offices of the Borough Council are retained intact in the new plan, and have been used by them throughout the execution of the work, without the necessity of their finding temporary office premises. Internally each floor has a large circular hall adjoining the main staircase, in which a passenger lift is provided to all floors. The council chamber, on the second floor, is in a quiet position, free from the noise of all traffic. A gallery for the public is provided, entered by a separate staircase from the street. On the same level as the council chamber are the committee rooms, members' rooms, mayor's parlour, and ante-room. Immediately under the council chamber is the Court-room, in which the magistrates will hear licensing and other business, and where rating assessments will be conducted. Inquiry and waiting rooms are planned close to the Court. The remainder of the building is occupied by the borough officials, whose departments are in each case self-contained. Service lifts for food and books are provided from the housekeeper's rooms on the fourth floor to the strong rooms in the basement, with a servery on each intermediate floor.

The sub-contractors were:—Constructional steelwork and fireproof floors, G. ASTON & SONS, LTD.; heating and ventilation, J. JEFFREYS & Co.; stone, the Ancaster Stone Co.; artificial stone staircases and granolithic paving, F. BRADFORD & Co.; marble and mosaic, DIESPEKER, LTD.; electric passenger lift and service lifts, R. WAYGOOD & Co., LTD.; wrought-iron lift enclosure, balcony and gates, the Bromsgrove Guild; electric lighting, FOOTE & MILNE, LTD.; stone and wood carving, panelling and seating in council chamber, H. H. MARTYN & Co., LTD.; fibrous plaster work, VERONESE, LTD.; metal casements and leaded lights, R. E. PEARSE & Co., LTD.; electric-light fittings, J. W. SINGER & SONS, LTD.; grates, BRATT, COLBRAN & Co.; door furniture, CARTER & AYNSLEY, LTD.; locks, CHARLES SMITH & SONS, LTD.; sanitary fittings, SHANKS & Co., LTD.; furnishing, THOMAS WALLIS & Co., LTD., and JAS. SHOOLBRED & Co.

EASBY, NORTHWOOD.—ENTRANCE VIEW—GARDEN VIEW.

THIS house was built a few years ago on a high and beautifully wooded site at Northwood. The external walls are of brick, covered with rough-cast and whitened, and the roof is of tiles. The ground floor has the following accommodation:—Hall with fireplace, dining-room and drawing-room (both leading on to the verandah of garden-front), study, lavatory, w.c., kitchen, pantry and the usual offices; also a two-stall stable and coach-house. The first floor has five bedrooms and a dressing-room, with bathroom, &c., whilst there are two large bedrooms and a boxroom in the attic. The internal and external joinery is mostly finished in white; but the main staircase is of oak, some old balusters having been incorporated in it. Mr. F. HILL, of Northwood, was the builder, and Mr. WALTER E. HEWITT, A.R.I.B.A., of 22 Buckingham Street, Strand, W.C., the architect.

LIVING ARCHITECTS.—NO. 2, MR. T. G. JACKSON, R.A.

THIS week we give the second of our series of pen-and-ink drawings representing architects in practice in this country. The one shown last week was of Mr. ERNEST GEORGE, P.R.I.B.A. Our second represents Mr. T. G. JACKSON, R.A.

"ARCHITECTURE: ITS TRUE PRINCIPLES," by Mr. R. OWEN ALLSOP, of which we gave the introductory chapter in our issue of last week, will be resumed on January 22. The letterpress will be again accompanied by a number of text illustrations. Dr. HOLDSWORTH'S Articles on the Workmen's Compensation Act will also be resumed.

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"EASBY," NORTHWOOD: ENTRANCE VIEW.
WALTER E HEWITT, A.R.I.B.A., Architect

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LIVING ARCHITECTS: No. 2. MR. T. G. JACKSON, R.A.

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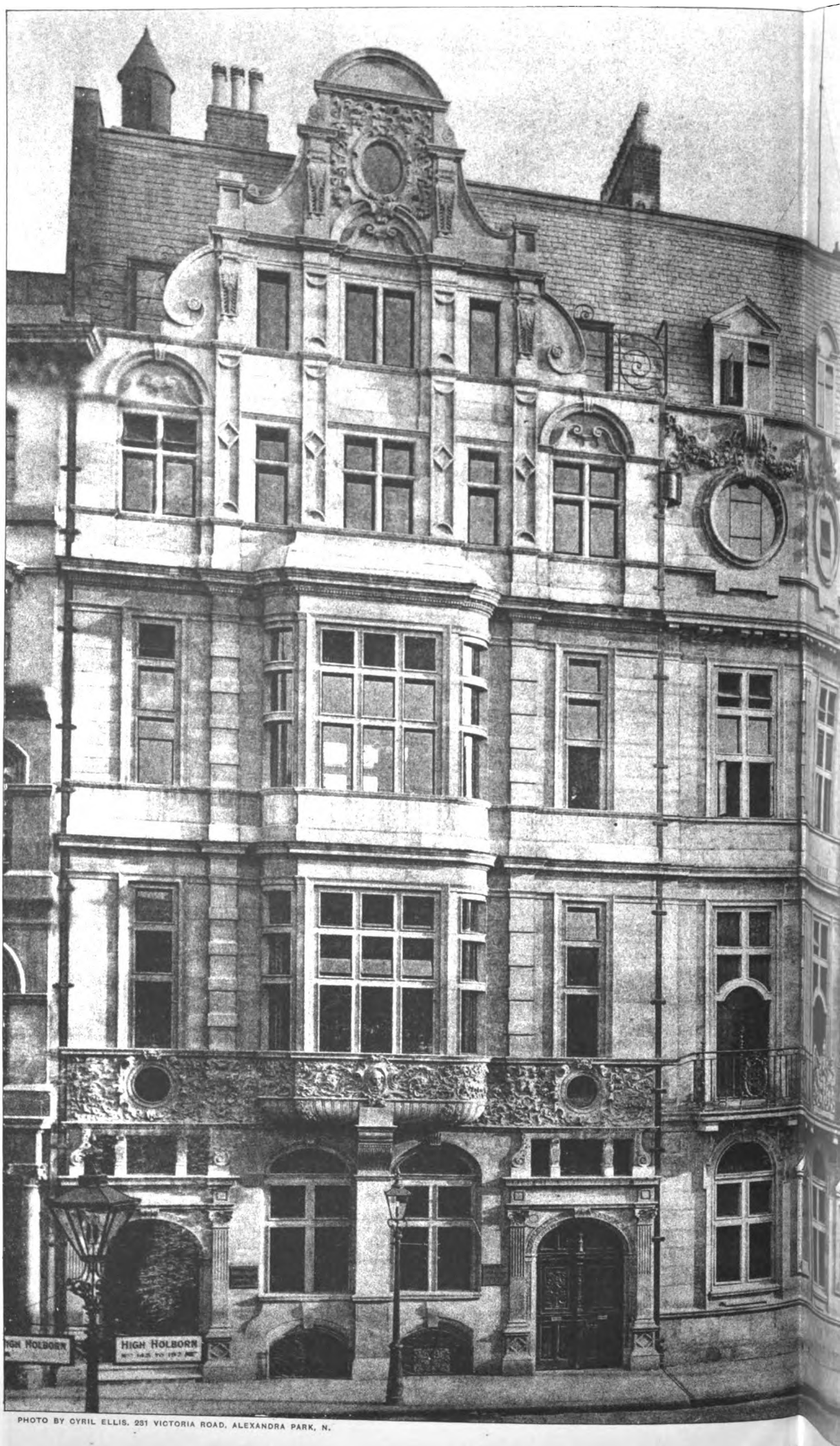
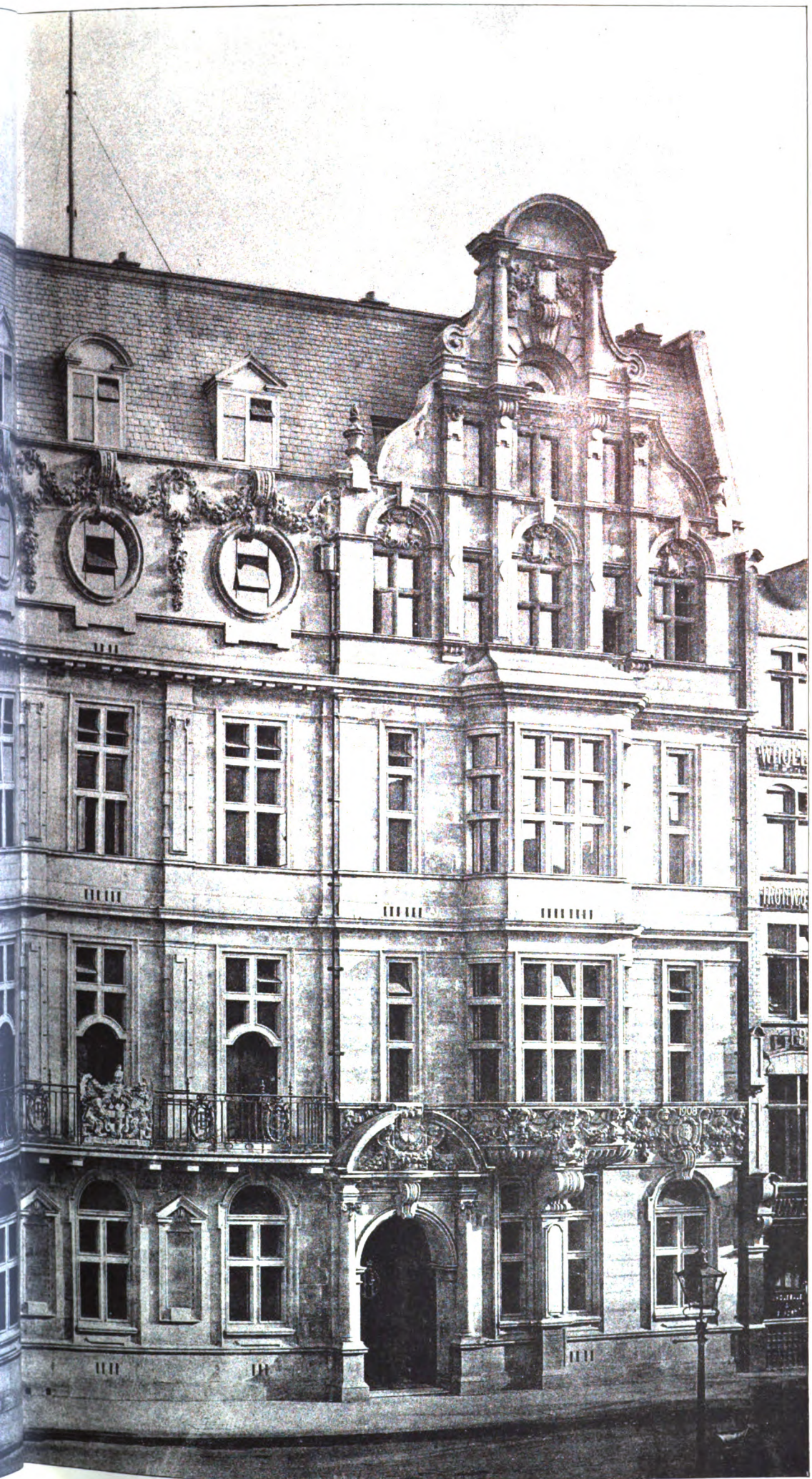


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HOLBORN TOWN

Messrs. WARWICK &

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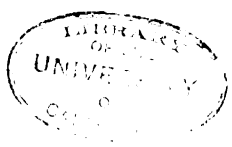


TOWN HALL: ADDITIONS.
WARWICK HALL, Architects

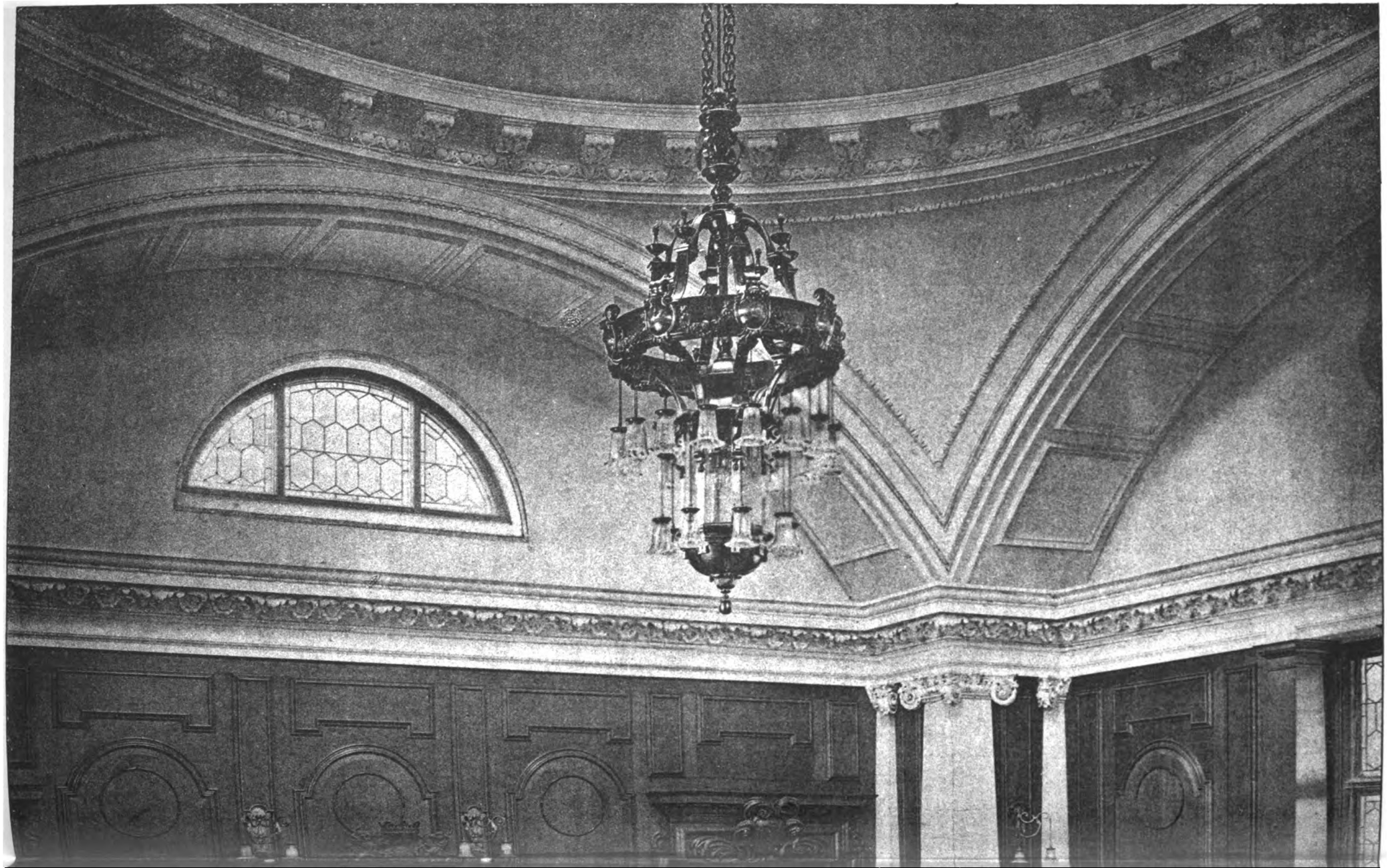
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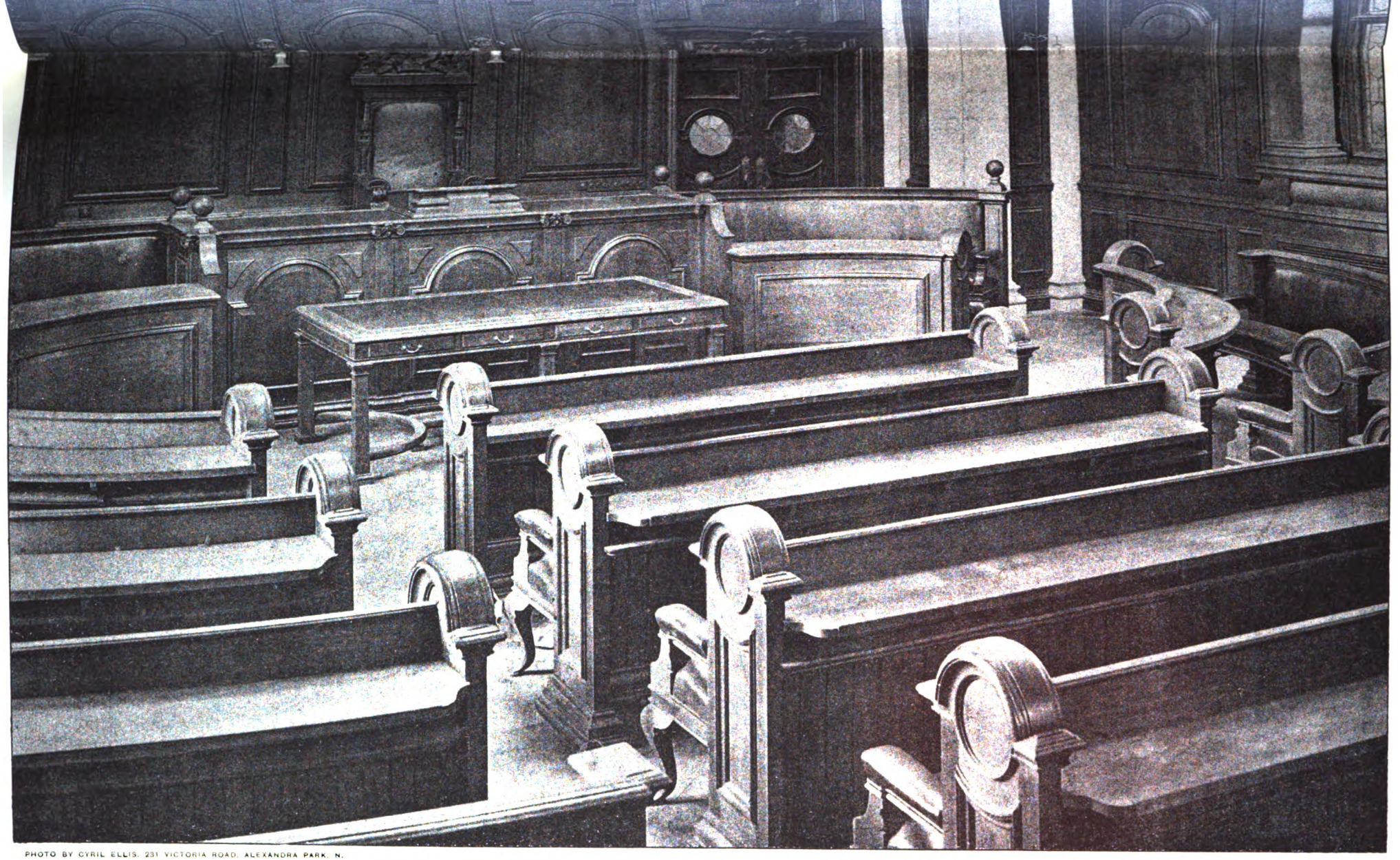


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HOLBORN TOWN HALL: THE COUNCIL CHAMBER.

Messrs. WARWICK & HALL, Architects.

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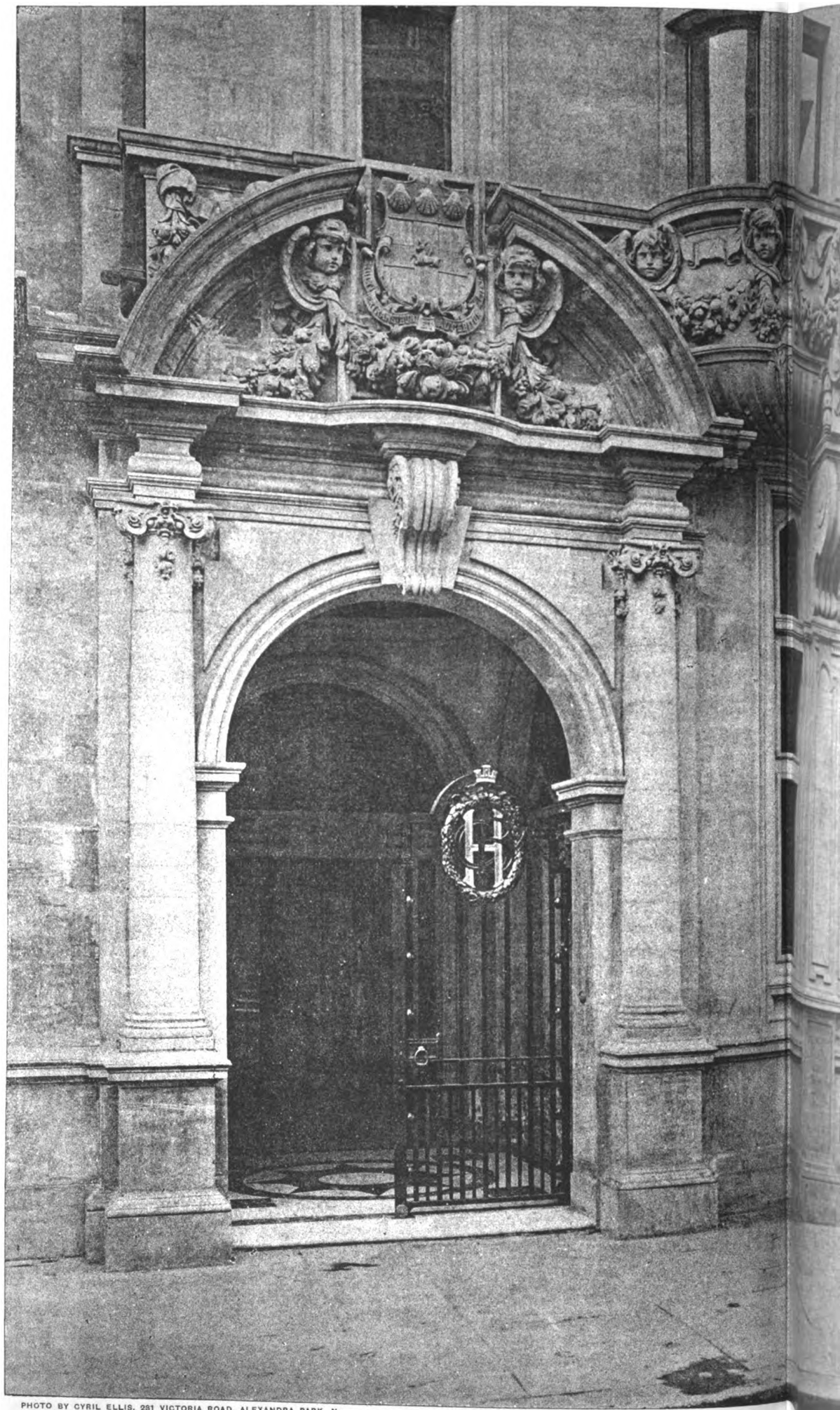
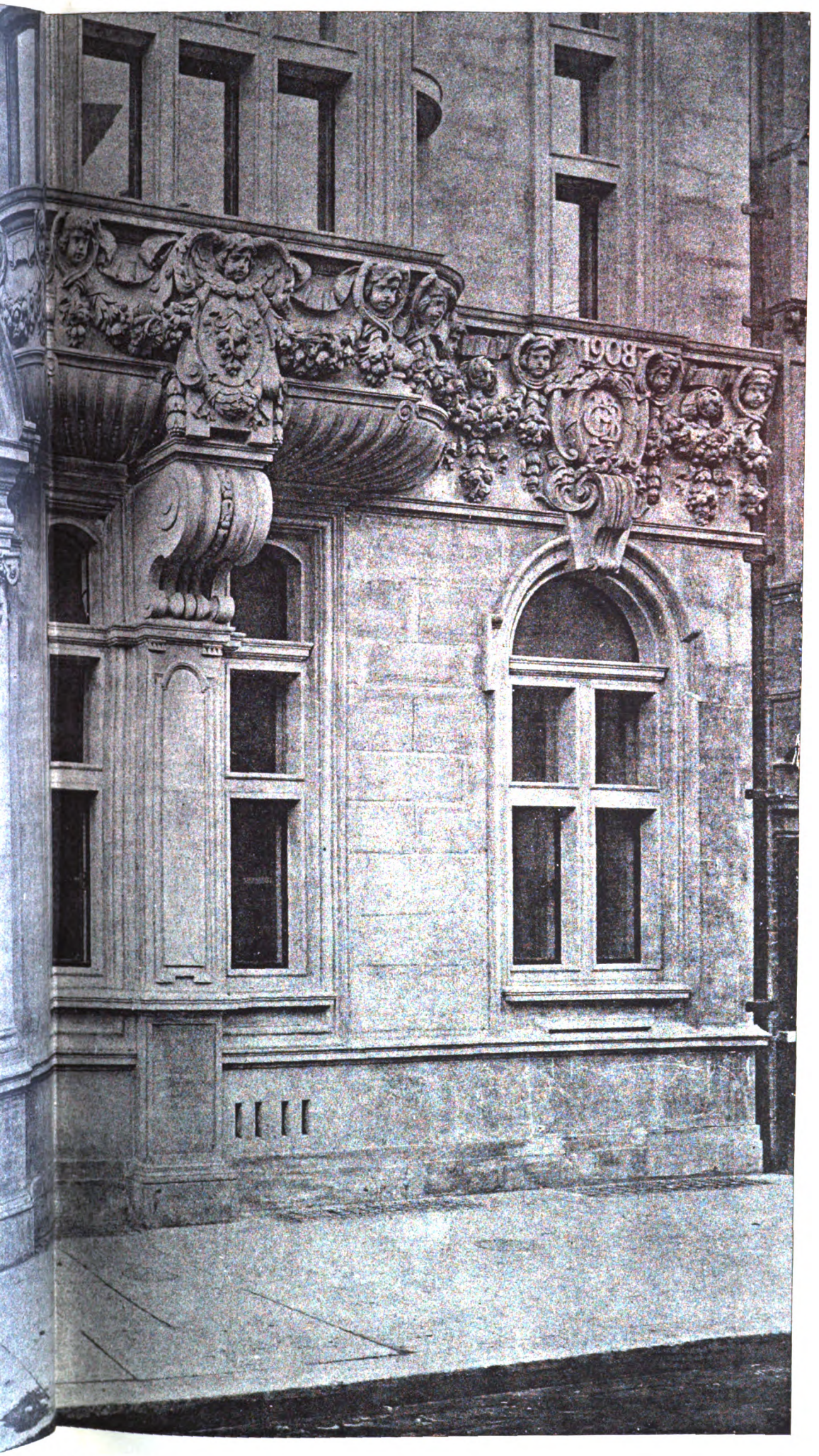


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HOLBORN TOWN HALL: THE ENTRANCE

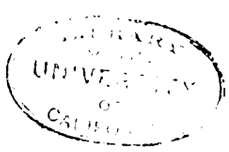
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TOWN HALL. PRINCIPAL ENTRANCE.
Messrs. WARWICK ALL, Architects.

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"EASBY," NORTHWOOD: GARDEN VIEW.

WALTER E. HEWITT, A.R.I.B.A., Architect.

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RHEIMS CATHEDRAL—THE CORONATION CHURCH OF FRANCE.

By Professor CHARLES GOURLAY, B.Sc., A.R.I.B.A.

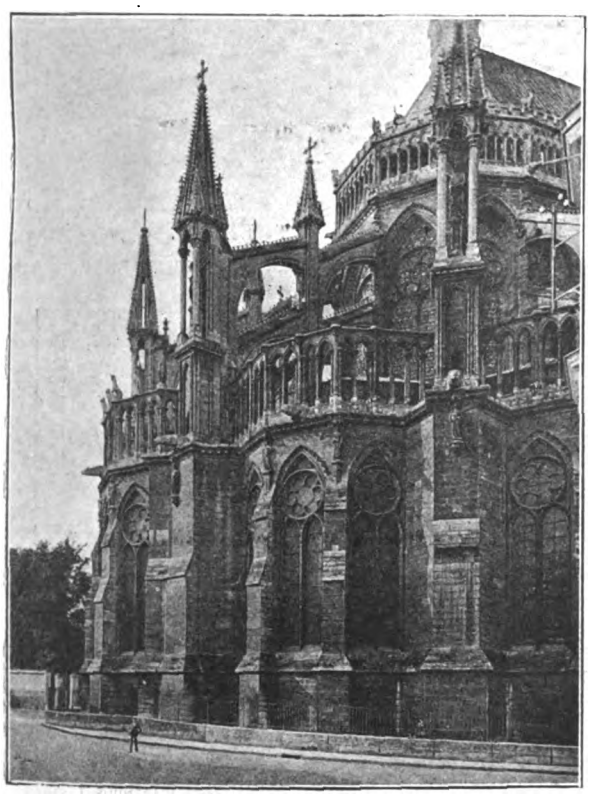
(Concluded from last week.)

EXTERIOR OF APSE AND EASTERN CHAPEL.

PROFESSOR LETHABY has recently pointed out the remarkably close resemblance of certain parts and details of Rheims Cathedral to similarly situated parts of Westminster Abbey. He says:—"The most striking likeness in detail is that one type of window, consisting of two lights with a big rose above, combined into tracery, is used throughout both churches, in the aisles, around the chapels and along the clerestories." This window has fully-developed bar-tracery.

The exterior of the apse and eastern chapels is very richly treated. The large buttresses have angels with outspread wings sculptured on them, and they are terminated with pinnacles containing statues and richly decorated slender spirelets. Round the eaves of the roofs of the chapels there is a tall open arcading which takes the place of the parapet, while there is a similar arcade, blind in its upper part, round the eaves of the roof over the apse proper. Directly above the smaller buttresses angels again are sculptured, and they are very happily placed at the junction of the straight sides of the small apses to the chapels.

There were no later chapels added to the aisles of the nave at Rheims, as was done at Amiens and elsewhere;



RHEIMS CATHEDRAL.—APSE AND EASTERN CHAPEL.

hence, externally, the buttresses are seen in their true projection down to the ground line.

NORTH ELEVATION.

At the base of the rose window in the north transept there are large statues of ADAM and EVE, and in smaller figures in the arch-mould there are representations of the Creation, Fall, Murder of ABEL, and Invention of the First Trades. Above is a gallery of seven statues representing the Prophets. In the gable, which dates from the beginning of the sixteenth century, there is sculpture representing the Annunciation.

Over the crossing there formerly existed a high leaden flèche, but now there is a small belfry of seventeenth-century date enclosing a chime of thirteen bells. There formerly existed four spires at the ends of the transepts, but now these are roofed with low pyramidal roofs, the original spires, as also that over the crossing, having been destroyed by fire in 1481, which disaster absorbed the resources available at that time for the normal completion of the edifice. The very beautiful octagonal flèche which forms the crowning feature of the chevet is 13½ feet wide at the base and about 56 feet in height. It dates from about 1505. The cove at its springing from the roof is decorated with eight large statues which are of lead. This flèche was formerly terminated by the figure of an angel, made of copper, carrying a cross which acted as a vane as well as finial; hence the name given to this flèche is the *Clocher de l'Ange*. This figure, however, was taken down in 1860 and has never been replaced.

SOUTH ELEVATION.

At the base of the rose window in the south transept are the two well-known statues representing, to the west, the Church Catholic—the figure holds a chalice in her hand; to the east, the Synagogue—the figure in this case has a veil over her eyes. Around the rose window appear the Prophets and the Apostles. The seven statues in the gallery above represent the sacred Writers; these have small angels between their heads, cut in the solid tympana of the intermediate arches of the arcade, which forms a series of canopies over the heads of both statues and angels. The sculpture in the gable of this transept represents the Assumption, and dates from about 1506, while at the apex is a leaden figure representing SAGITTARIUS in the act of discharging an arrow to the court of the Archbishop's Palace below, where formerly was a bronze stag at which the arrow was directed.

PINNACLES AND BUTTRESSES.

The cathedral suffered from mutilations in the eighteenth and during the first half of the nineteenth centuries. Since the middle of the nineteenth century very important restorations have been effected at many parts and these are still being continued. The elaborate balustrading or parapet of open arcading at the eaves of the roof of the nave is a restoration. It is about fourteen feet high and has a very rich effect.

Referring to the fine effect of the great flying buttresses, FERGUSSON says truly:—"The beautiful range of buttresses which adorn the flanks of the building are perhaps the most beautiful in France, and carry the design of the façade back to the transepts."

INTERIOR, NAVE.

Standing in the interior at the crossing and looking westwards in the nave, the general effect is grand and, generally speaking, much simpler than the exterior. The proportions of each bay—the piers with the arcading, the triforium and clerestory—appear to be perfect, and with all this the quadripartite vaults are quite in harmony. The excellent proportions of the west central doorway, with its traceried tympanum and internal sculpture, lighted arcade above it, and large rose windows, are seen to advantage from this point, and it must be admitted that the combined effect is splendid. The lighted arcade below the rose window enables a comparison to be made with the dark arcade of the triforium, whereby the great advantage which a lighted triforium gives to an interior over that of a "blind" storey is strikingly apparent. The stained glass in the clerestory of the nave all belongs to the thirteenth century, and its effect is fine and rich. As, however, there is no stained glass in the aisle windows the lighting of this interior is not satisfactory, because the principal light in such a cathedral nave as this is should come from the clerestory and not from the aisles. If the aisles were even now to receive stained glass the main lighting would come from the clerestory and the effect would be delightful. The height of the inferior to the underside of the vaulting is nearly 125 feet.

INTERIOR, CHOIR.

Looking now to the eastwards the apse is seen to be divided into three storeys, not four, as is the case in the Abbey Church of St. Remi in the same city, and which, being an earlier edifice, must have influenced the design of the cathedral to some extent at least. The clerestory

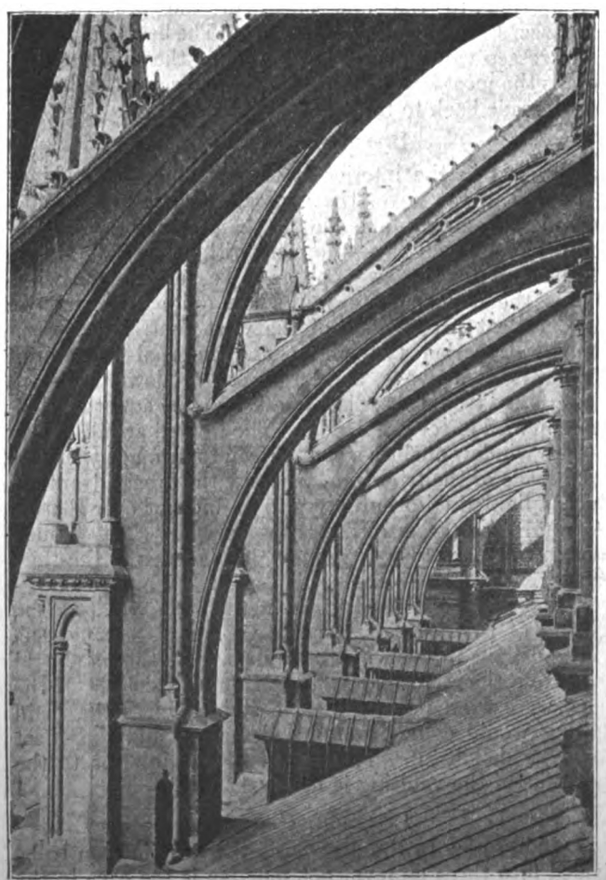
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RHEIMS CATHEDRAL.
VIEW OF NAVE AND CHOIR, LOOKING EASTWARDS.



RHEIMS CATHEDRAL.
VIEW OF NAVE, LOOKING WESTWARDS.

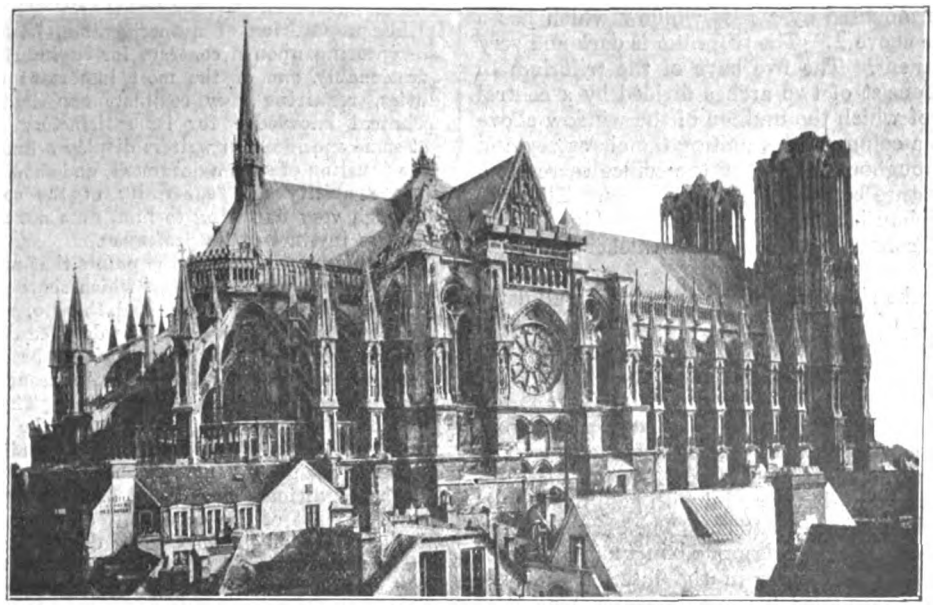


RHEIMS CATHEDRAL.
FLYING BUTTRESSES ON THE NORTH FRONT.

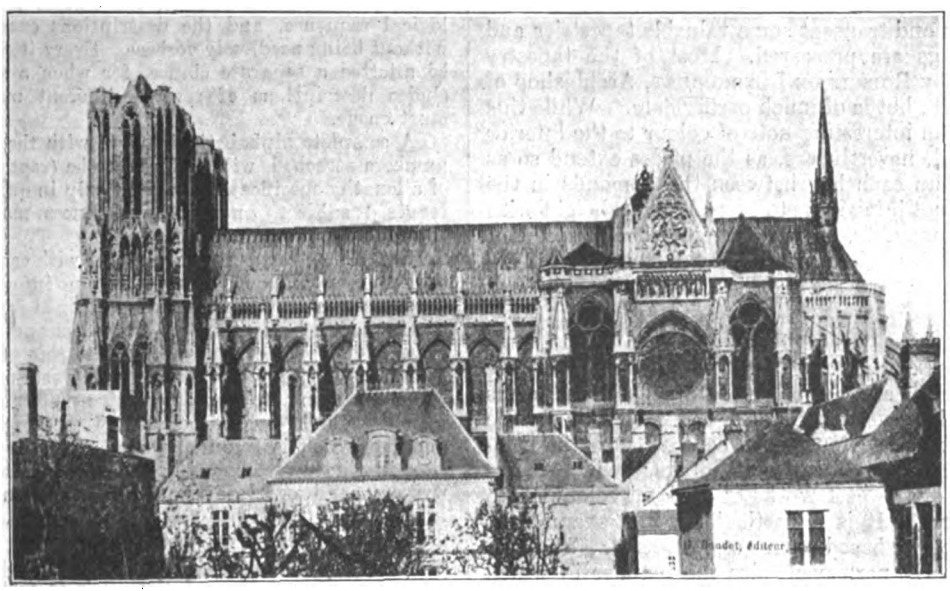


RHEIMS CATHEDRAL.
PINNACLES AND BALUSTRADING FROM THE SOUTH FRONT.

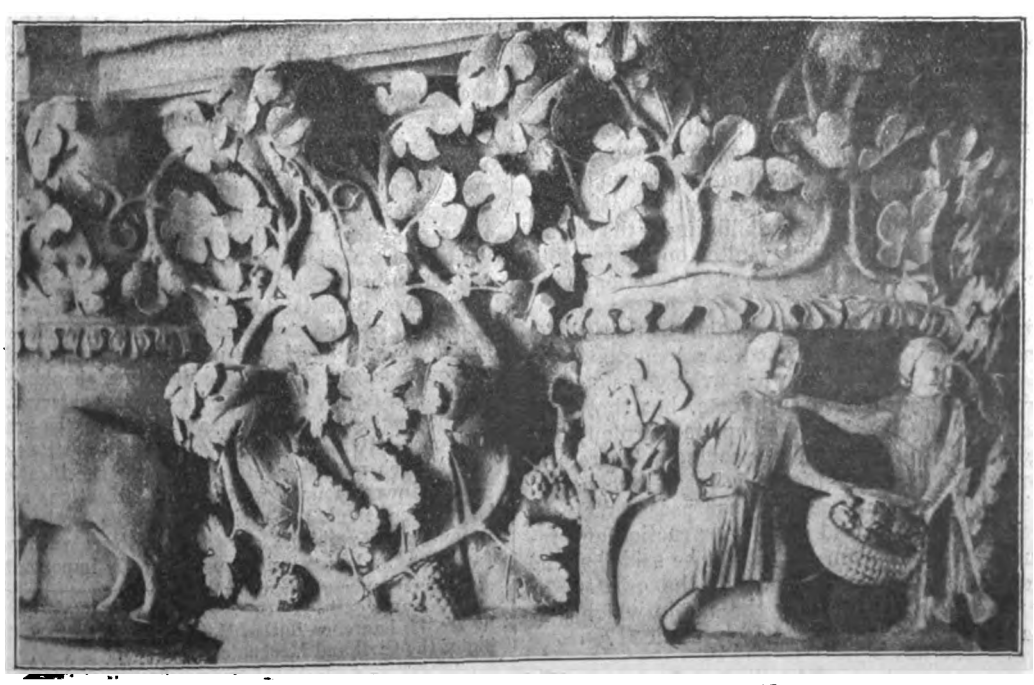
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RHEIMS CATHEDRAL.—NORTH FRONT.



RHEIMS CATHEDRAL.—SOUTH FRONT.



RHEIMS CATHEDRAL.—CAPITAL REPRESENTING THE VINTAGE.

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is formed of windows, which are divided into two by a mullion and surmounted by a rose window which has a very large space above it. The triforium is dark and very simple in treatment. The five bays of the triforium in the apse each consist of two arches divided by a central pillar, in front of which the mullion of the window above passes down as a column, thus uniting the clerestory and triforium. Throughout the rest of the edifice there is no such binding feature between the two storeys. The wall behind the triforium has been painted a dark blue, which makes the small columns in front appear thicker than they really are.

The glass in the clerestory of the apse, which all dates from the middle of the thirteenth century, has a blue ground, and is admirable in its translucency, variety and richness. Owing to the presence of modern stained glass in the lower windows of the chevet chapels, there is not in the choir that unhappy effect of its being lighted from below which, as already stated, exists in the nave. The vault of the choir, including the crossing and all eastwards, is painted a dark blue ground with gold fleur-de-lis over it, arranged as a diaper pattern. The chapels of the chevet have nearly all been decorated in modern times. It is when looking eastwards in the interior that the striking resemblance of the interior of Westminster Abbey to that of Rheims Cathedral makes itself most strongly felt.

TAPESTRY.

In the nave and transept some valuable tapestries and several paintings are preserved. Most of the tapestry was presented by ROBERT DE LENONCOURT, Archbishop of Rheims, in 1573, but is of much earlier date. While this tapestry gives an interesting note of colour to the interior of the cathedral, nevertheless, as the pieces extend so as entirely to fill up each bay between the responds in the aisles, and are not hung so as to correspond in height with any horizontal member, they appear to give a discordant note to the interior—they certainly tend to spoil the proportions wherever they are seen in conjunction with the architecture.

CARVING.

The carvings of the capitals of the pillars of the nave are greatly varied, and are all based upon natural forms to a greater or less extent. That of the sixth pillar to the right, dating from the fourteenth century, has the celebrated "Capital representing the Vintage," which is undoubtedly one of the best works of its kind belonging to the Middle Ages. It is a particularly fine example of architectural foliage based upon natural forms. The vine is well and clearly portrayed, also the manner in which the grapes are gathered by the workers.

CONCLUSION.

The "Lamp of Beauty," as expressed in Rheims Cathedral, has been the subject of this article, but few of those who study this great mediæval monument from the point of view of the science displayed in its constructional design and compare it in this respect with other examples, such as Amiens Cathedral, will disagree with the well-expressed statement of EDOUARD CORROYER, in which he says:—"Rheims Cathedral may be taken as the most perfect manifestation of persistent efforts to establish a method of construction based on equilibrium—the equilibrium, that is to say, of a building vaulted on intersecting arches, the thrusts of which are received by exterior flying buttresses."

When it is recollected that the erection of this edifice occupied many years, it is well worth observing how the original design by JEAN D'ORBAIS has evidently not only been adhered to by successive architects, but that they have carried out their work in complete harmony, as regards scale, with that previously executed. Therefore, on the grounds of the directness of its well-conceived plan, its singleness of purpose, its unsurpassed mastery of the relation of solid to void in its construction and remarkable unity of expression, may it not be said that the cathedral church of Rheims is one of the greatest of Gothic structures, and is probably the one in which perfection as a whole has been most nearly attained?

SPECIFICATIONS.*

THE preparation of a specification, as a preliminary to entering upon a contract for engineering works, is unquestionably one of the most important of an engineer's duties, requiring very complete experience and thorough technical knowledge for its satisfactory accomplishment; yet some specification writers display a fine disregard of the true function of such a document, and show a child-like faith in the ability and generosity of the contractor, which, although very flattering to him, does not say much for the business instinct of its professors.

In this paper some of the points that are essential to the production of a specification which shall properly fulfil its purpose are touched upon, and this purpose is to amplify the contract drawings by giving detailed descriptions of the materials to be used, the methods of preparing and using them, and other information which cannot be conveniently written on the drawings themselves. The two main divisions of an ordinary specification are the conditions of contract and the specification, properly so-called. The form of tender is not infrequently attached.

The conditions of contract, as their name implies, form the legal part of the document, as distinct from the technical description of work to be done, but it cannot be too clearly borne in mind that the whole of a specification, when duly signed by the parties to the contract, is a legal document which must be produced in Court if a dispute should unfortunately arise with reference to the works; and it is, therefore, of the utmost importance that it should be lucidly written in simple language, the clauses being arranged in logical sequence, and the descriptions exact and complete without being needlessly verbose. Every item of work should be allotted a separate clause, for when a single clause includes descriptions of several different matters confusion must ensue.

A complete alphabetical index, with the clause and page numbers attached, will be found to be (especially in the case of a lengthy specification) a great help in quickly finding any required subject, and cross references may sometimes be introduced with advantage.

Brevity, so far as it is consistent with completeness, being the hall mark of a good specification, no information should be introduced which may be clearly obtained from the drawings, the intention being that the drawings and specification are to be taken together, and a clause to this effect is sometimes inserted. On the other hand, it is waste of labour, besides being confusing, to put descriptive matter on the drawings which would be better included in the specification; and a mistake which is frequently made is to duplicate information in this way, obscuring the drawings with unnecessary writing, and overloading the specification with identical information.

A very common fault in specifications is indefiniteness of description, and this generally arises from the writer not having a clear notion of the work or materials which he attempts to describe, though in some cases it is due to the obscurity of the language, or to the misuse of certain words, especially "proper" and "sufficient." The engineer should know what is proper and sufficient, and should describe it in precise terms, otherwise he is only opening the way for trouble when it becomes necessary to find the meaning of these words in terms of actual materials and workmanship. The word "etcetera" should be rigidly excluded, and the matters covered by it clearly defined.

It should be hardly necessary to say that the drawings must be completed and inked in before the specification is written, or at all events before it is finally completed, as any other procedure will almost inevitably lead to more or less important omissions, with the result that "extras" will be writ large in the contractor's little bill. It is an advantage, when time permits, to have the detail drawings (if any) completed at this stage, as it is not unusual for important modifications to be found necessary when the details are got out on a larger scale. The drawings should, of course, be numbered, dated, initialled by the draughtsman, and signed by the engineer; and it may sometimes be useful to have reference letters or numbers on certain portions of the drawings, which may be alluded to in the specification.

An inexperienced writer of specifications is very apt to be uneven in his description of the work, writing with unnecessary verbiage on those matters with which he is familiar, and dismissing some equally important point with

* A paper entitled "Specifications for Engineering Works," read by Mr. H. Laurence Butler, M.J.Inst.E., M.R.S.I., at the last meeting of the Civil and Mechanical Engineers' Society.

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a brief direction that "the work shall be done to the satisfaction of the engineer." A general direction of this kind usually implies that the engineer does not know what he wants, and therefore leaves the matter to the superior knowledge of the contractor—an attitude not very creditable to the former.

The only really legitimate use of this phrase is in a general clause referring to the whole of the works. An example of uneven description within the knowledge of the author exists in the specification for certain works of sewerage, in which the tests for Portland cement occupy a half-page of closely printed foolscap. None of the tests were applied, and apparently they were not intended to be applied, but the whole description was taken *en bloc* from another specification, presumably with a view to overawing the contractor. In the same specification the description of some pumping machinery at the disposal works appears to have been copied direct from the estimate of a firm of mechanical engineers, only the prices being left out, and the curious commercial brevity of the phraseology, comprising such phrases as "including all necessary fittings complete," stands out in striking relief from the rest of the document.

It is evident, then, that one of the most essential qualifications for a specification writer is a thorough knowledge of his subject, and he should have also a sufficient command of the English language to enable him to express his meaning clearly and tersely. It is quite unnecessary to indulge in legal jargon and high-sounding phrases which the writer possibly does not understand, and it is by no means a fault to repeat words again and again if they express the meaning of the writer more clearly and forcibly than an alternative phrase would do. A specification is seldom judged by literary standards of excellence.

It is also necessary that the specification writer should have a thorough knowledge of trade customs, such as discounts (in order to define "prime cost"), the methods of measuring timber and scantlings, the different modes of dressing masonry work, whether the word "best" applied to certain materials will really mean best, or if by trade custom it may be taken to mean an inferior quality. Moreover, in the case of structural work, he should make himself acquainted with the regulations in force in the district in which the building is to be erected, and should make it clear in the specification if the contractor is to take the responsibility of complying with the local authority's requirements or otherwise.

Another error which may occur through inexperience is that of specifying impracticable sizes of materials, such as timber and metals, and this may also occur when clauses are copied from obsolete or badly written specifications. The method of compiling a specification on the "scissors and paste" principle, by taking clauses from old specifications, is one that will lead an inexperienced writer into error more quickly than any other, because if he has any doubts as to the reliability of the description, it will be more or less discounted in his mind by the fact that that particular clause has been used before, regardless of when or under what circumstances it was used.

The degree of detail which a specification should contain is governed very largely by the magnitude and importance of the work, as it is obvious that the detail in the specification for a 50,000*l.* contract would be merely a display of misdirected energy if applied to the specification of works costing, say, 500*l.*

A practice which should be studiously avoided wherever possible is the specifying of alternative workmanship and materials. It is far better to be exact in defining what is to be done or supplied, because it then affords no ground for dispute or difference of opinion. However, with regard to the actual methods of carrying out the work, the contractor should not be tied to any particular means of effecting the required end, unless special circumstances require it, for, provided the materials and workmanship are satisfactory, it is better to allow the contractor to use his own discretion as to the manner of producing the required result.

The arrangement of a specification is generally as follows:—

(1) Conditions of contract and general regulations applying to the whole of the works.

(2) General description of materials and workmanship, excluding purely local or particular directions.

(3) Detailed description of the various portions of the work, systematically arranged.

The conditions of contract usually begin with a definition clause, which, in order to obviate needless repetition, defines such words as "employer," "engineer," "contractor," "prime cost," and similar matters. Other clauses enumerate the conditions to be observed in carrying out the works, and make the contractor responsible for giving notices required by the local authority, require him to sign the drawings and specifications within a given time from the acceptance of his tender, to provide sureties for the satisfactory completion of the work, and to commence the work within a stated period after receiving notice from the engineer to do so.

A very useful clause is that empowering the engineer to vary or alter any part of the works without vitiating the contract, and a clause requiring the contractor to render weekly accounts in writing of all omissions, extras and variations, greatly assists the engineer in deciding what payments may be made from time to time on account of work done, as well as in the final adjustment of accounts.

Other clauses may refer to the method of ascertaining prices for extra works, the power of the engineer to take samples for testing purposes, the opening up of work for inspection, the prohibition of assignment or subletting of the contract, responsibility for accidents, time for completion, period of maintenance, suspension of works through various causes, mode of payment, engineer's certificate of completion, and other matters of this nature, the conditions usually concluding with a clause providing that all disputes may be referred to an arbitrator for settlement.

It is not unusual, however, to have, in place of the arbitration clause, a condition that the engineer shall have the exclusive right to authoritatively determine the meaning of the contract. Such a provision is, perhaps, rather unsatisfactory from the standpoint of the contractor, who may be inclined to consider the engineer unsuitable to act in this capacity, by reason of the fact that the latter has generally formed an opinion on any dispute which may arise before the matter is referred to him for settlement; but unless it could be demonstrated that the engineer's opinion was not open to argument or reconsideration, or that he had deliberately shown prejudice or partiality, the Courts could scarcely be persuaded to declare that he was unfit to be arbitrator. The chief advantage of the clause, from the engineer's point of view, is that it supplies a summary means of remedying the faults and supplying the omissions in a badly drafted specification. It would appear that the arrangement most satisfactory to all parties is for the engineer to have the final decision as regards workmanship and materials, and to provide for appeal to an external arbitrator on all matters relating to payment, such as the amount of extra works, loss to the contractor through delay or alteration of the works, and similar questions. A further modification of this provides that no appeal to an outside arbitrator shall be made during the progress of the works, but that disputes on any matter arising out of the contract shall be temporarily decided by the engineer, and his decision shall be binding on all parties until the completion of the works, after which the matter (unless explicitly reserved for the final and binding decision of engineer, without appeal) may be brought before a referee. This arrangement is designed to prevent any disputed matters from causing delay in the execution of the works.

In alluding to the drawings, it is a good plan to add a paragraph to the effect that figured sizes are to be followed in preference to the scale dimensions, except in cases of obvious clerical error. The clauses enumerated above do not by any means exhaust the list of provisions that it may be necessary to make in the case of a large contract, and in very small works some of the clauses may be reasonably omitted, but they are mentioned as being generally applicable to contracts of moderate size.

The specification proper usually begins with a description of the site of the works, specifying any unusual features which may exist; and if the site is very inaccessible, involving a great deal of haulage work, it is an excellent thing to provide a key plan, showing the distance from the nearest station, and marking on it any unusually steep hills, bad roads, or other circumstances likely to affect the cost, although some engineers prefer to let the contractor find out all these things for himself, and insert a clause in the conditions to the effect that "the engineer cannot be held responsible for any incorrect information supplied."

The next clause generally enumerates the drawings, giving the number and title of each one, with the words "and such further detail drawings as may be supplied by the engineer to the contractor from time to time." Then follows the description of materials and workmanship applying to the whole of the works, and including such matters as cement, sand, mortar, concrete, bricks, brickwork and the

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like, leaving the particular description of the individual parts of the work to be dealt with later.

The general description may conveniently conclude with a clause requiring the contractor, before commencing the work, to deposit with the engineer a sample of each kind of material intended to be used, all materials employed in the execution of the works to be equal in quality to the samples so deposited.

The remainder of the specification consists of detailed descriptions of the different parts of the work, subdivided under general headings. A systematic arrangement of this nature tends to exclude the probability of any serious omission, and assists any subsequent reference to the specification. Printing a brief note of the contents of each clause on the margin of the page is a convenience when it is desired to refer to any particular item, but it should be made clear that these marginal notes are merely auxiliaries, and do not form part of the specification any more than the index does.

Another arrangement is to divide the work up under the headings of various trades, such as "Excavator," "Bricklayer," and so forth, the general description of materials preceding the detailed enumeration of particular items under the heading of the appropriate trade. This method is usually applied only to specifications for building works.

Some engineers and architects advocate the free use of marginal sketches to further elucidate the intention of the written description, but where the specification is printed this method is inapplicable, owing to the extra expense involved in printing, and in any case it is doubtful whether such details would not be better demonstrated on the drawings. A competent specification writer should be able to describe his meaning with sufficient clearness to enable him to dispense with such a superabundance of illustrations. In the case of any very complicated piece of work, a detail drawing to scale is obviously of more utility than a mere sketch, and in simpler cases a written description should be all that is required.

Trade catalogues form one of the most useful items in the specification-writer's stock-in-trade, and here again the advantage of system will be apparent. A complete set of trade catalogues filed on the decimal system, and accompanied by a card index in two divisions, one of subjects and the other of names of firms, will enable the engineer to turn up at the shortest notice the information with regard to any manufactured article that he may require, and to make a comparison between the manufactures of different firms, with a view to finding the particular article best suited to his purpose.

In this connection it may be said that the practice of specifying that certain articles shall be supplied by a particular firm is one that should not be carried to excess. It is not an unheard of thing for a manufacturer, who has been specified to supply certain goods, to raise his prices for the occasion, but if estimates are obtained from firms of equal standing and reputation, it is generally possible to obtain a lower price than if the other course were adopted. The selection of one firm to the exclusion of all others may also suggest unfairness on the part of the engineer, and may create the idea that his selection is not without profit to himself, although it is to the credit of the profession and the manufacturers that cases of bribery are so extremely rare as to be practically non-existent. It may here be remarked that a good commercial knowledge (including the ability to price out roughly the present market value of any ordinary materials and labour) is a distinct advantage to a specification writer, enabling him when selecting goods to thread his way through the maze of trade discounts, discounts for cash, and special discounts for large quantities with which some merchants conceal the actual cash price of their manufactures, especially as in some cases it is not unlikely that he may be called upon for advice upon particular items when the settlement of accounts takes place.

A matter which too seldom receives thorough consideration is the question of what part (if any) of the materials for the works can be obtained locally. The practice of specifying goods which must necessarily be conveyed long distances before they can be utilised, while equally satisfactory materials can be procured near the site of the works, argues negligence on the part of those responsible for drafting the specification, and is usually due to culpable ignorance of local conditions. As illustrating this point, a case may be mentioned where a contract was secured at abnormally low prices, the contractor making a good profit by utilising the sand and gravel obtained from the excavations, which other less wideawake contractors had counted upon having to bring several miles by road. In this instance it was even hinted that the contractor went to the extent of carting away alleged "surplus material" from the site, which he afterwards turned to his own use and profit.

Although the preparation of bills of quantities does not form part of the work of writing a specification, it may not be out of place to mention that attempts have been made in the past to combine the two documents in one, but as each has an independent function, any attempted combination must be unsatisfactory. The bills of quantities are merely schedules of labour and materials, arranged so that prices may be conveniently attached, and the endeavour to make them serve another purpose is inevitably foredoomed to failure. Moreover, if the quantities are made a part of or annexed to the contract, and any dispute should arise, the Court may hold that the contract on the builder's part was not to complete the works, but only to execute the quantities.

It is not possible within the limits of this paper to touch upon all the points which may arise in connection with preparing a specification. Enough has been said to demonstrate that specification writing is worthy to rank high amongst other showy, but scarcely more interesting, professional work. Indeed, it requires for its satisfactory accomplishment a high degree of technical knowledge, something more than a smattering of legal information and a sound commercial training. If, in addition, the specification writer possesses plenty of sound common sense, allied to practical experience in his work, he will be well fitted to assist in dispelling the much too popular fallacy that the preparation of specifications is a necessary but uninteresting piece of drudgery, carrying with it no reward but that which always accompanies work well done.

GLASTONBURY ABBEY.

MR. F. BLIGH BOND, F.R.I.B.A., who during the past year has directed important excavation work at Glastonbury Abbey, delivered a lecture on the result of his explorations at the Taunton Castle Museum on the 7th inst., under the auspices of the Somerset Archæological and Natural History Society.

Mr. Bligh Bond at the outset of his illustrated lecture, said the subject needed no apology from him for bringing it forward, as it was one of intense interest to all patriotic people; it was, in fact, of interest to the nation as well as to the Church. His lecture would principally deal with the architectural features of the Abbey, and he had brought a set of lantern slides. The ruins were so far advanced in decay that to the casual observer it was extremely difficult to make out the plan of the whole building, and in the absence of so much of the fabric it was difficult to form a picture of the church as it stood complete. Describing St. Mary's Chapel, he remarked that it was acknowledged on all hands to be the most beautiful work of the period in the country. It exhibited a studied refinement and a great degree of imagination, and the character of the building confirmed one's view of the really holy nature of the place. Its construction and decoration formed enough evidence to show that there was some good reason for the veneration of that spot. They all knew the tradition that the first Christian church in England was founded at Glastonbury, and was a wattled or wickerwork church, a reputed picture of which had come down to them. The wicker church was supposed to have been standing in the eleventh century, and to have been destroyed in the great fire of 1184. After alluding to the unsuccessful excavation work undertaken in 1904 on behalf of the Royal Archæological Institute, Mr. Bligh Bond went on to describe the result of his own researches. He had come to the conclusion that the chapel of St. Edgar, which had been the work of the last two abbots, was much larger than had been supposed. In an inventory sent to Queen Elizabeth the full length of the church was given as 594 feet, 90 feet being entered as the measurement of the chapter-house. He considered that a mistake had been made in that particular, and that by chapter-house the east end chapel was meant. Following the lines of the walls according to the old plan they found on excavating that beyond there was something more. The foundation lines of a rectangular chapel, 49 feet long, had been worked out, and portions of the stone work were discovered. The excavations showed that the chapel must have been a very substantial building, and had been connected with the choir of the great church. The discovery of the chapel, however, did not satisfy the inventory, as it only brought the total length

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up to 580 feet, and when the work was resumed it was expected that they would find there was an annexe at the east end. Several objects of interest had been discovered during the excavations, and these gave additional corroboration of the existence of the chapel. St. Edgar's Chapel was, no doubt, one of that class represented by the magnificent chapels of Westminster Abbey, with massive stone walls and stone roof of the fan tracery type, while the walls were supported by substantial buttresses. The work was probably similar to the chapel of Henry VII. at Westminster. Before concluding, Mr. Bligh Bond described a strange interment found close to one of the walls of the church. It was a complete skeleton with the head set in a stone shaped for that purpose, but with no covering, and nothing to show that there had been a coffin. The remains, which were discovered perfectly preserved in the clay, were those of an elderly man, measuring 6 feet 2 inches in height. As to further excavations there was plenty of work to do next summer. Last year about 43*l.* was subscribed, which money lasted until the end of September, although the work was continued, as they had great faith in being able to get sufficient support.

In response to a question in reference to the discovery in St. Edgar's Chapel of an old piece of wattle work, which might confirm the story of the early chapel of St. Mary, Mr. Bligh Bond replied that they had found during excavations signs of some early habitation, including the burnt stone of the hearth and the curious wattle work referred to.

Correspondence

[*The Editor will not be responsible for the opinions expressed by Correspondents.*]

Winchester Cathedral.

SIR,—I read with some surprise in a copy of *The Architect* the account of the work in progress at Winchester Cathedral. Your informant says that we are still making discoveries. I am not aware of anything new having been found out lately in regard to the condition of the fabric. He says:—"Having underpinned the two corners of the north transept, it has been found that the wall between them must be underpinned also." This is simply what has always been intended. Because we began at the corners it does not follow that we meant to stop there. One must begin somewhere.

He proceeds:—"Another discovery is that the buttresses of the north aisle do not support but hang on the wall." This discovery is not new. It was made, if I remember, two years ago.

He adds:—"As this was known to be the case with buttresses at the east end of the church several years ago, the recent discovery is somewhat belated." Your informant is entirely mistaken. It is not the case with any buttresses at the east end; and had it been so, I fail to see any analogy between the two cases.

More amusing still is his apprehension that the cement injected into the walls may find its way into the peat. It would indeed be strange if grout injected into the superstructure should find its way through solid masonry to a stratum of peat 10 feet below ground. All fissures are, of course, stopped at the bottom first, and then continuously upwards; and as a matter of fact there is no peat left under the wall, for it is removed to make way for our underpinning.

It seems to me that these captious criticisms, based on imperfect knowledge and on erroneous information, are much to be deplored. The repair of Winchester Cathedral may fairly claim the sympathy of all lovers of our English art. No one is more sensible of the responsibility attached to it than those who have charge of the building and those to whom the work is entrusted. To spread abroad such misstatements of fact and such unfounded criticisms as those I have exposed is neither fair nor generous.—I am, Sir, your obedient servant,

THOS. G. JACKSON.

14 Buckingham Street, W.C.: January 11, 1909.

Earthquake-proof Houses.

SIR,—I note Mr. Wray's letter on earthquake-proof houses seems to lose sight of the essentials of the American system of steel-framed buildings as set forth in Freitag and other authorities, viz. that of cross-bracing the end bays, which is a means of triangulating the angles. It is a deplorable fact that at Messina it is the invariable habit of the local builders and architects to build massively on self-supporting stones, and to a height of six and seven storeys. My opinion is that towns within the earthquake zone should not be constructed above three storeys from the ground, and then on a basement in the form of a groined vault.

The system adopted by Mr. Wray would be much improved by building the walls of concrete on an expanded metal mesh. I have designed many such buildings, and even for concert halls for South America and Africa, which have been despatched out ready for erection in crates. There is room for artistic display and balconies and large eaves to roofs obtained without much structural alteration. —I am, yours truly,

43 Chancery Lane, W.C. ALBERT E. BULLOCK.

P.S.—With reference to the extensive correspondence on the subject of Lord Leven's bequest for the restoration of Holyrood Chapel, may I ask whether it is known if there are any drawings extant showing the work of Nicholas Stone in 1616?

"Jully 1616 was I sent into Scotland, at Edenborrow, where I undertook to do work in the Kinge's Chapell and for the Kinge's closet and the organ so much as com to 450*l.* of wenscot work, the which I parformed and had my money well payed, and 50*l.* was geven me to drenk wharof I had 20*l.* geven me by the Kinge's comand." (Quotation from Stone's diary.)—A. E. B.

SIR,—I trust that in writing a criticism—wholly friendly or at least unbiassed—on some of the matter contained in your very interesting current number I shall not be esteemed as hypercritical. I say unhesitatingly that I have seldom, if ever, read a more interesting issue of *The Architect*—if I except those to which I may have contributed—but I have been trying to puzzle out a solution (and have not succeeded) as to the merits of Mr. Wray's suggested anti-earthquake panacea, and of Mr. Allsop's views (as expressed) on architectural principles.

What is there in 12 inches of concrete, or in twice 12 inches, to obviate such a disaster as that which has befallen Messina, Reggio and neighbouring districts? When Mr. Wray makes an exception to the value of his scheme to the effect "unless the shock was sufficient to turn the house completely over," does he imply merely turtle-turning, or is side-slipping included? But my—perhaps limited—intelligence fails to see how a house can "turn completely over." As a scientific experiment I should very much like to witness such a demonstration. Again, what is an "earthquake seam," and is it "reasonable to believe that the combustion would glide off to the edge of the concrete before shattering the house"? Besides, if it is going to shatter the house, why trouble, in the first place, to "glide off to the edge of the concrete"? I perceive that Mr. Wray inserts the words "if the said foundation is sufficiently strong," but that is begging the whole affair. Concrete, again, is not a damp-proof foundation; it is merely to an extent damp-resisting, which makes all the difference in the world.

I am by no means scoffing at Mr. Wray's wish to find a solution that may minimise the fearful results of seismic disturbances, but I fear that more consideration is necessary than that provided by a suggestion of 12 inches of concrete.

And Mr. Allsop. What can one say of his initial essay on Principles of Architecture? Within the last two years there have been published two books and various essays on the subject, and these have, as one would think, fairly set forth the basis of consideration. Architecture "a pure abstraction"? Absurd. Mr. Allsop is more in order when he says it is often "congealed discord"; but if congealed, how can it be an abstraction? Again, "in modern architecture" we do not miss "broad effects," at least not in the architecture of the very present day. I would add more, Sir, but have already, I fear, unduly trespassed on your valuable space.—Yours obediently,

NASCITUR, NON FIT.

The R.I.B.A. Dilemma.

SIR,—I am glad to see from your note that you have taken up such a strong position in connection with the Royal Institute of British Architects; the paragraph is firm with-

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out being in any way unpleasant. We are, I trust, all proud of the Institute, and proud of the men who devote their time to its management, but this does not say we should be compelled to agree with every act of theirs, and although minorities should always have and receive every consideration, this instance is a case of the minority ruling, a position which is absolutely untenable. Pardon the liberty, if such it is, but permit me to congratulate you on your last issue. Trusting 1909 may be a very prosperous year,—I am, yours faithfully,

A.R.I.B.A.

Concrete Aggregates.

SIR,—It is interesting to note from the interim report of the Special Commission on Concrete Aggregates which appeared in your issue of January 8 that this important matter is receiving the consideration it merits. From an architect's point perhaps the most important section of the inquiry is that which deals with the lighter aggregates used in the making of suspended concrete. Since the extensive adoption of iron in our modern buildings, dictated by the necessities of increased protection from fire, the matter of light concrete has become an important factor, and whilst elaborate specifications and standards have been prepared for the cement and other binding material, the question of the equally important aggregates has received little attention. Noting the suggestions of specification for coke breeze, slag and clinker contained in the report, it will be interesting to learn how the proportion of sulphur which is inseparable from these forms of aggregates is to be determined in actual practice. In a laboratory the process is easy, but those who have experience in carrying out a superintending work know full well the difficulties which will attend the testing of the bulk as delivered in the work or in the blocks and slabs after they are made. The difficulties are increased by reason that the sulphur is incorporated throughout the particles and cannot be displaced by washing, and its effect is not discernible for a lengthy period after the concrete is made; certainly not before the process of permanent hardening (as distinct from the initial set) has sometime commenced. Disastrous results owing to the presence of sulphur have occurred after a long lapse of time in work which showed no indication of deterioration until the building was completed and occupied. It is gratifying to find that the quite recent suggestion of pumice gravel as a light aggregate has found a place amongst the materials with which tests are to be made, and it is anticipated that the results will bring about the adoption of that material, which, whilst possessing all the advantages of burnt carbon materials, has none of their disadvantages.

Tests extending over two years have already been made with this material and satisfactory and permanent results obtained.—Yours faithfully, M. C. I.

GENERAL.

The Royal Scottish Academicians—Sir James Guthrie presiding—have decided to elect a painter in room of Mr. George Henry, who has requested his name to be placed on the non-resident list of members. The election will be made on February 10.

The Billericay (Essex) Rural District Council offer 10*l.* 10*s.* as a premium for plans and estimates for four and six-roomed cottages, of which there is a serious dearth in Essex.

Mr. Joseph Henry Richardson, architect, 22 King Street, Hammersmith, died suddenly on Sunday. He designed the Hammersmith town hall and Council offices, and had much to do with the growth of the district.

The Committee who have the question of improving the Newport Bridge, Mon. (of which we published a report last week) in hand, are of opinion that an expert bridge engineer should be consulted in the matter, in order that his opinion may be ascertained as to the stability of the present structure and as to the necessity, or otherwise, of its early renewal. It has also been agreed that should it be the opinion of the engineer that the bridge requires renewal at an early date, he should be asked to advise the Council what material should be used. It was resolved that Mr. G. E. W. Cruttwell, C.E., a partner of Sir John Wolfe Barry, should be consulted.

The Blackburn Small Holdings and Allotments Committee have decided to invite architects and surveyors in the borough to submit competitive plans for the laying out of the estate at Oswaldtwistle recently purchased for small holdings. Premiums of 25*l.*, 10*l.* and 5*l.* are offered.

Mr. Stead, late of Natal, and formerly assistant surveyor under the Lancashire County Council, has been appointed assistant county surveyor to the Somerset County Council.

The Manchester Art Gallery Committee has adopted a scheme for acquiring a collection of slides representing the undoubted masterpieces of arts and crafts. The slides are to be kept at the art gallery and lent out to literary societies and other bodies for use in lecturing and other educational purposes.

The School of Art Wood-Carving, South Kensington, has removed to new premises at 39 Thurloe Place, South Kensington, three minutes from South Kensington Station. Students connected with the wood-carving trade and professional teachers are admitted to the school at one-half the full fees, provided they attend regularly during the usual school hours, unless absent with the written permission of the manager.

Mr. A. G. Temple, F.S.A., director of the Guildhall Gallery, has received the freedom of the Worshipful Company of Painters in recognition of the public services he has rendered, in many directions, in the interests of art. The ceremony took place in the ancient hall of the Company in Trinity Lane. Only three individuals have been so honoured during the last twenty years—the late Lord Leighton, P.R.A., Sir E. J. Poynter, Bt., P.R.A., and Mr. Andrew Carnegie.

Mr. Butler Wilson, F.R.I.B.A., of 45 Gower Street, W.C., and Greek Street Chambers, Leeds, is preparing a sketch of the life and work of the late Cuthbert Brodrick, the architect of the Leeds town hall. He has in his possession the designs for several important buildings executed by Mr. Brodrick. There must, however, be in existence other designs prepared by him, and Mr. Wilson would be grateful if the owners would allow him to see them. The greatest care would be taken of them, and they would be returned as soon as they have been examined.

The Council of the National Museum of Wales held a special meeting last week at the Cardiff city hall. Arising out of the discussion of the draft Bill to take over the Cardiff Museum, with its responsibilities, the question of Mr. Edwin Seward's claim upon the Corporation for the preparation of plans for a museum was considered. A unanimous feeling was expressed that the Council could not accept any responsibility with regard to that claim. The Council decided to inform the Cardiff Corporation that they were prepared to take over the contents of the Cardiff Museum free of all debts and liabilities, and Principal Griffiths gave notice that he would at the next meeting move that plans for the National Museum be offered to public competition. He hoped that by doing this it would bring to an end the long-standing dispute between the Cardiff Corporation and Mr. Seward, F.R.I.B.A.

The Art Gallery Committee of Aberdeen have purchased six works for the permanent collection in the gallery from the exhibition of the Aberdeen Artists' Society. The works, with the catalogue prices, are:—"At Eventide," by Mr. J. Coutts Michie, A.R.S.A., 60*l.*; "Almost Night, Concarneau" (water-colour), by Mr. Terrick Williams, R.I., 15*l.* 15*s.*; "Glen Clova," by Mr. Alec Fraser, Aberdeen, 100*l.*; "The Little Court," by Mr. William Smith, jun., Aberdeen, 10*l.* 10*s.*; a bronze bust, "Enid the Fair," by Sir George Frampton, R.A., 50*l.*; and a bronze head, "Frametta," by Mr. Henry Wilson, 25*l.*

The Royal Institute of Architects of Ireland held their January Council meeting on the 6th inst. A letter was read from the secretary of the Dublin University Commission asking for a detailed statement of the subjects and courses of study suitable for students seeking diplomas in architecture. It was decided to hold a special Council meeting to consider the matter. In the course of the meeting the following resolution was passed:—"The Council of the Royal Institute of the Architects of Ireland note with satisfaction that the Galway County Council have lately resolved to require their county surveyor to devote his entire time to the duties of his official position, and the Council of the Institute take the opportunity of expressing the hope that a similar resolution, but including also the assistant county surveyors may, without delay, be passed by every County Council in Ireland who have not already done so, inasmuch as it is contrary to the interests of the public service that persons holding the important and responsible position in question should engage in professional competition with architects and engineers in private practice, upon whom, moreover, such competition inflicts a serious injustice, which they, as ratepayers, are justified in strongly protesting against." A copy of this resolution was ordered to be sent to the secretary of every County Council in Ireland.

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The Architect.

THE WEEK.

To the lover of architectural art the news of the earthquake shock in Northern and Central Italy is even more alarming than the dire catastrophe in Sicily. Although happily the damage so far recorded is comparatively insignificant, the fact that the chief severity of this new seismic disturbance was felt in Venice, Verona, Padua, and Milan arouses our liveliest apprehension. Those of us who have visited Venice cannot but remember that scarcely one of its many campanili is truly perpendicular, whilst the wooden piles on which rest the foundations of its architectural masterpieces, not only of the Mediæval period, but also of the Renaissance, have in many instances quite or almost reached the limit of their durability, and it is only the fact of the close proximity in which they are grouped together that has prevented their failure long ere this. To buildings in this sensitive condition a severe shock of earthquake is likely to prove disastrous, and the knowledge that these charming old towns of Northern Italy are situated on the line of possibly severe earth movement is disquieting in the extreme.

IN April next will be opened in Venice the Biennial International Exhibition of Fine Arts, and, as usual in matters of art, official assistance in England is not forthcoming, although other Governments have given adequate support. Private generosity must therefore rectify the omission on the part of our own Government, and Sir DAVID SALOMONS has liberally given the 3,000*l.* required for the purchase of a pavilion. Additional funds are still required for the proper exhibition of British art, and an appeal has been made to the public for the necessary cash. Donations may be sent to the hon. treasurer, Mr. MARCUS B. HUISH, 21 Essex Villas, Kensington.

BEFORE the Royal Commission on Ancient Monuments in Wales and Shropshire some interesting evidence was given by Mr. GEORGE EVANS, who spoke of the many interesting things to be found in the eighteenth-century churches and chapels of Wales. A walking tour in some of the out-of-the-way parts of the Principality would doubtless furnish some of our younger architectural students, who are nowadays keen on Renaissance detail, with many subjects for their sketch-books, as well as afford them the advantages of fresh mountain air and beautiful scenery. They should take advantage of Mr. EVANS's tip that the rural policemen and village schoolmasters are useful sources of information.

MANY architects, particularly those whose earnest student days have been included in the last quarter of a century, must have regretted to hear of the death of Professor H. G. SEELEY, who occupied the Chair of Geology at King's College, London, and who conducted the London Geological Field Class for the last twenty-three years. It is to be hoped that this class may still be continued under capable leadership, for amongst the many things, of which a modern architect ought to know something, is geology, and to those whose practice will or may be carried on in the metropolitan district, the study of London's geological character is of some importance. The subsoil of London, even of the central area, still more of Greater London, is very far from being an uniform, impervious, homogeneous lump of London clay.

IT is a pity that the 150th anniversary of the foundation of the British Museum could not have been celebrated by the opening of the important extension now in progress from the designs of Mr. J. J. BURNET. Since Montagu House and its grounds were bought for 10,000*l.* for the housing of the Harleian Manuscripts, the Cottonian Library and the Sloane Collection, growth, whether of acquisitions or of accommodation, has been continuous, but from an architectural point of view few of the treasures added to the national collection have equalled in interest and value the Elgin Marbles. The high importance of these has, it is true, rather eclipsed the light of many other instructive antiquities, particularly the remains of architectural and sculptural work of the provinces of the later Roman empire, including those preserved from the Roman occupation of our own country. We are looking forward to the completion of Mr. BURNET's work, when we may expect to see properly displayed the many treasures that are now huddled together and hidden away in the basement.

Il Monitore Tecnico gives some illustrations of the latest design of the many that have been made by various architects during the last twenty-five years for the Chamber of Deputies of the Italian Parliament, for which the building on Monte Citorio, erected from the designs of BERNINI, is to-day insufficient. The design now under contemplation is that of Signor BASILE, who proposes to preserve the work of BERNINI and FONTANA and to complete the cortile with one wing on the Via delle Missioni, another on the Via dell' Impresa, and the completing block with the principal façade towards the new piazza. The particular parts of the design illustrated are this principal façade, from a drawing of the elevation, and the interiors of the Chamber and the Salle des Pas Perdus, from models. The elevation is a quiet and sober composition, which rather lacks any principality of feature or grouping, and in which the detail, as far as can be observed from the very small scale, appears to be reminiscent of the early manner of BRAMANTE, modernised in treatment.

SIGNALISING the centenary of the Conservatorio di Musica Giuseppe Verdi, at Milan has been recently opened a new concert hall 43 metres long, 26 metres wide, and 16 metres high, erected from the designs of Signor BROGGI, architect, and Signor NAVA, engineer. Balconies some 24 feet wide project from the outer walls on three sides, and, constructed in reinforced concrete, are partly carried by vertical piers, also in reinforced concrete, these latter being continued up to the level of the ceiling, which is flat. The floor of the hall is also in reinforced concrete, carried on brick piers.

IN Germany they have always seemed to be badly bitten by the craze for "L'Art Nouveau," the eccentricities and extravagances of which seem to have caught the fancy of our Teutonic colleagues, whilst the spirit of rebellion against precedent and academic regulation has naturally captivated the imagination of those whose early experiences in school, in college, and in the army have been chiefly marked by continual subjection to martinet authority, and who have been dragooned throughout their career to rigid formalism. The fascination of bizarrerie which led the sixteenth-century Germans to found their national treatment of Renaissance on the least correct phase of early French work, and to continue that treatment until the latest development in Latin countries gave them an opportunity for supplementing their first line of effort by the Barock style, has also no doubt played a part in the eagerness with which the New Art has been seized upon in the Fatherland.

THE attempt to be easily original by ignoring all precedent and devising something too eccentric to have ever been done before by more truly artistic workers, has led to the many extravagances of the earliest productions of the new mode. The exponents of this mode have overlooked or never learnt the truth so well expressed by RODIN:—"L'originalité, telle que l'entend le public, n'existe pas dans le grand art. Les artistes qui n'ont pas la patience d'atteindre au vrai talent recherchent la bizarrerie, la singularité du sujet ou des formes, en dehors de la vérité. C'est ce qu'ils appellent de l'originalité, mais ça ne sert à rien."

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STUDENTS' DRAWINGS AT THE ROYAL INSTITUTE.

TAKEN as a whole we fear that we must say that the students' drawings this year are not up to the high-water mark of past history; but nevertheless good work has been done by all the prizewinners, and, except in one case, we think the first prize in each competition has been awarded to the best man. The one exception in which we are disinclined to agree with the award is that of the Institute silver medal and ten guineas for measured drawings of ancient buildings in the United Kingdom or abroad. The prize has been given to the one competitor who has gone abroad for his subject, and it would appear that the student who desires to win this particular medal must place first and foremost inaccessibility of subject as the prime factor of success. We cannot agree that for a British architectural student the church of the Madonna di San Biagio, Montepulciano, the work of ANTONIO DA SAN GALLO the elder—a far less able man than the younger of the same name—is as worthy of study as some of the other buildings illustrated—as the Royal Naval College, Greenwich, the work of INIGO JONES; as the parish church of Lavenham, one of the finest examples of our late Perpendicular work; or ADAM'S work in the Royal Infirmary and DAVID DALE'S house at Glasgow. Nor can we recognise that either the draughtsmanship or the industry of Mr. ERNEST W. WRAY, the winner, is, to put it mildly, markedly superior to that of some of his competitors. Montepulciano is a fine name, and rolls as beautifully off the tongue as "that blessed word, Mesopotamia," but we take it that the chief charm of Montepulciano lies in the picturesque situation of its church and the excellence of its wine. The architectural merit of the design, particularly in detail, of the church of the Madonna di San Biagio is not, to our thinking, with all respect to the opinion of the late Mr. ANDERSON, transcendent; and save, as we said before, for its inaccessibility, does not merit prolonged study on the part of a young architectural student.

The Soane Medallion, with a travelling studentship of 100*l*., has brought out ten sets of drawings for a casino on the borders of a lake, and the winning design, by Mr. A. R. BARKER, has an excellent plan, in which the concert hall, with promenade around the auditorium, is surrounded on all sides by a series of rooms en suite, quite the best arrangement for a casino, and far superior to the rambling plans of the other competitors. The composition is good, with a low central dome over the concert hall, dominating the whole; and the detail is a sufficiently free treatment of Renaissance to give a casino-like expression without being over-exuberant. In the design placed second—that of Mr. ADRIAN BERRINGTON—the plan occupies three sides of a quadrangle, the concert-room in the centre with the other accommodation in the wings, hence disassociated. The exterior is treated in a severe Italian manner, and its restraint must have been felt a relief by the judges after the extravagances of some of the other designs. The winning design is undoubtedly first, but several run the second rather close in our opinion. "Pan" is a good design, but somewhat chaotic and restless in composition from the multiplicity of features. The plan is virtually three buildings, the concert hall in the centre being flanked by a club on one side and a corresponding building containing billiard-room and restaurant on the other. We fear the author has been rather misled by a desire to make a Welcome Club, on the lines of Earl's Court and Shepherd's Bush, part of his scheme, whereas the "Cercle Privée" of the Continental casino is merely a nom de guerre. "Nisch" is good, both in composition and plan, with detail of a late and florid Renaissance type, including rococo features permissible in the design for a casino. We should be inclined to give this design a fairly high place in the competition. "Gee Ess Ae" is so similar in parts to the winning design that we should imagine it to be by the same author. It has a very similar dome, but smaller and covering only the entrance salon. We like the flanking towers of this in composition, but the plan is not equal to the successful one, though the design as a whole is good and well drawn. "Rush" is a very fair design, but fails in the central feature, the top of which looks as though it would blow off—not actually as a piece of construction, but from its apparent insufficiency of union with its supports.

Next to the Soane Medallion in importance comes the Pugin Studentship, not perhaps for its actual money value, in which it is surpassed by the Owen Jones Studentship and the Godwin Bursary, but for its prestige. It is delightful to know that although Gothic is absolutely dead for all present-day architectural design save church work, in which Renaissance is no mean competitor, and although there is precious little activity in church building, there are still to be found sufficient earnest students of mediæval architecture to furnish nine competitors for this prize. The work they submit is of a high order throughout, some of it perhaps tending too much to the pretty-picture order of draughtsmanship, and some of the measured work lacking in a wise discrimination of the relative value of subjects. Mr. SYDNEY H. MILLER fairly wins the prize by good measured work in the presbytery bay from Ely and the sedilia at Howton, excellent perspective drawing and a wise proportion between sketches and measured work. Good serious work and capable draughtsmanship mark Mr. MILLER as worthy of a place amongst the Pugin students, though we cannot quite place him in the front rank of that galaxy of talent. Mr. H. HUBERT FRASER would seem to be a friend of Mr. MILLER, for one of his principal contributions is also from Howton, the Easter sepulchre; and a very praiseworthy piece of measured work it is. We like, too, his measured drawings of the porch of Southwold Church, and we are glad he did not leave that charming church without drawing one at least of the figures from the beautiful screen. Mr. FRASER has been honoured by the judges, and in our opinion he has run Mr. MILLER very close for the Studentship. Mr. FRANK HEARNE has sent in too much measured work and too little perspective and freehand sketching. Mr. JOHN L. BERRY and Mr. A. G. BLACKFORD have worked on the right lines, but their draughtsmanship is not good enough to win. Mr. PERCY MAY has contributed some good and pretty sketches, but not enough serious work. Mr. L. McD. GILL has some very fair water-colour sketches of French mediæval architecture, but the subjects he has chosen for his measured work were hardly worth doing in competing for the Pugin Studentship.

The Tite Prize has attracted no less than twenty-one competitors, more than twice as many as any other prize, but we fail to see one that complies entirely with the original intention of "Design according to the Principles of PALLADIO, VIGNOLA, WREN, or CHAMBERS."

The subject, a covered arcade of shops, has evidently proved attractive, and as planning forms no part of the problem, the competitors were free to give their attention to the more obvious part of architectural design.

Mr. R. W. M. GUNN has sent in a remarkably good design, but it is modern French of "le dernier cri," and if the author has not actually worked in a Parisian atelier he has evidently made a close and intelligent study of the latest mode in Paris. His draughtsmanship also shows French influence, though his well-drawn perspective in pencil is superior to what we should expect from a student wholly trained in a French school. The design placed second, which is by Mr. BERTRAM E. LISLE, is far more in accordance with the type of design Sir WILLIAM TITE would have favoured, and if the original founder of the prize had been the assessor, would probably have secured first place. It is severe and restrained in treatment and a thoroughly good design. The design placed third is that of Mr. S. HERBERT MAW, who, by the way, was the Soane Medallist of 1905, and is in that phase of ultra-modern English Renaissance of which Mr. R. FRANK ATKINSON is so able an exponent. This, too, is a really good design, and is illustrated by some very fine drawings, of which the coloured perspective and the detail in shaded

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Indian ink, with remarkably clever coloured pictures in the panels, are especially noteworthy. Although Mr. MAW has not been successful in winning the prize, he has proved himself a most able draughtsman. "Palladio" has a good interior, but his street front is altogether too wild. It would make the Italian master turn in his grave to find his name associated with such a conception, presumed to be in accordance with his principles.

The competitors for the Grissell Gold Medal have mostly forgotten that this prize is for design and construction, and the winner, Mr. DOUGLAS W. DAY, is practically the only one who has, first, made a decent design; secondly, introduced into it a real constructive problem; and thirdly, adequately grappled with and solved the problem. Mr. DAY'S central feature has a double dome, the construction and stresses in which he has carefully and fully worked out in a very able manner, whilst his design is entirely suitable for the subject set for the prize. "Xopher Gubbins, C.E.," is the only other set of drawings that makes any attempt at the solution of special constructive problems, but is not equal either in this direction or in design to that which has obtained the prize.

The valuable Owen Jones Studentship of 100*l.* has practically gone begging. Mr. MAW, whose name we have already mentioned above, is the only applicant, and although he has sent in some painstaking work from the Scala d'Oro of the Ducal Palace at Venice and the Corsini Chapel in the church of St. John Lateran at Rome, receives only an award of honour of twenty guineas instead of the full Studentship. We know from his drawings for the Tite Prize that Mr. MAW is capable of winning the Studentship, and we should advise him, on the authority of a former unsuccessful competitor, who made the same mistake that he has made, to send in some coloured sketches of work as it is to-day, not merely measured drawings of the work as it was when it was executed. This always looks and is considered hard and unsympathetic, and if Mr. MAW had made, what he is capable of making, coloured perspectives of the Scala and the Chapel, with accidentals of playing light, as well as the measured drawings, we think he would have won. Mosaic especially wants very careful rendering to avoid hardness.

ARCHITECTURE: ITS TRUE PRINCIPLES.—II.

By R. OWEN ALLSOP.

THE ELEMENTS OF DESIGN.

TO study architectural form depleted of all ornamental accessories broadens our conception of the nature of our art. Such study necessarily throws us back on first principles. This is greatly to be desired, inasmuch as to work on principle—under laws—entails restraint. Too often we see unbridled license in design passing muster on the plea of originality. If it is necessary that true design must be novel, we must inquire wherein the opportunity for such novelty best presents itself under the peculiar position of modern architecture. One might at the outset of such inquiry very reasonably ask, "Why novel?" We have had much sighing after a novel style of architecture during past years. The necessity for the new style is not apparent. One might as reasonably desire a new type of human form, sky, and landscape, or complain that there was a wearying sameness in the normal tongue, and that we required all these, and more, made anew as a change. The fact is, and it is doubtless by this time understood, the cry for a new style is misleading and based on false premises.

Now in the novel combination of old forms to produce new scenes we find that there is in nature scope for illimitable variation of effect. We desire no new heavens because the face of such continually varies by rearrangement of components leading to novel aspects of the whole. What time the present-day architect can outdo the efforts of the old architects in their several modes of building, we may have some reasonable excuse for clamouring for a new style of architecture. It seems more nearly true to say that there are too many styles of architecture in the present day. Every originally-minded architect is himself the founder of a new style—good or bad. The bald truth is we are, generally, ignorant of—have never grasped—the true principles of graceful building. At the best the average modern work of architecture is a patchwork—a conglomeration of old forms. Our répertoire of architectural detail is more extensive than heretofore, our minds overburdened with peculiarities of buildings from all parts of the world, what with cheap travelling and the ubiquitous camera. If style details and peculiarities are architecture we have a plethora of such, a plenitude of power undreamt of by the ancient designers. Any defective quality of the architecture of to-day cannot be referred to lack of knowledge, or difficulty in obtaining a knowledge of details of style. Yet in spite of photography and world-wide railway and steamship facilities, we are wearied by superficial miles of hackneyed columns and mouldings and whole groups of architectural device in set proportions.

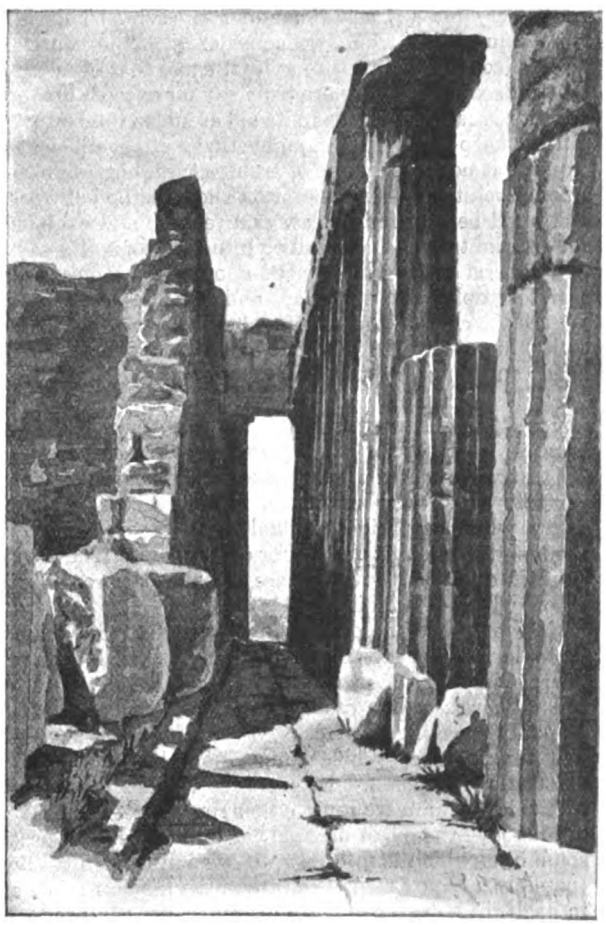


FIG. 6.—IN THE PARTHENON.

We are compilers generally, composers seldom. A harmony in stone geometry was composed years back—we copy *ad nauseam*. What would be thought of our musical composers if they gave us nothing but more or less true excerpts of some old school of music, or of an author if he rendered to us eternally whole set phrases of bygone writers? Yet we never hear of an author or musician complaining of the want of a new style of writing or composition. The reason is doubtless because the true writer and the true musician concentrate on the subject, the theory, the theme, and throw false "style" to the winds.

Yet we, with our boundless storehouse of facts and liberty of action, copy, while they, with their simpler material and rigid methods produce living work. This seems incomprehensible. We have suggested that the root cause of the evil that we all see and deplore is the habit of copying and patching that so largely represents modern

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architectural design, whereas, as we further suggested, design to be truly such must be novel—the work of reason.

That there is as a rule really little or no such reason may be ascertained by demanding the why and wherefore of every line and form in a composition. In the introspection of science the question asked is "How?" Let the architect rather inquire of himself "Why?" If he can at all times give a logical answer, he is working on principle; if not, the process is at the best rule of thumb. The "principles" employed may have many unsound planks; but the honest effort to work on some base—from data—is commendable.

If now we contrast the work of the musical composer we find that all such are working under strict rule—fundamental truths that cannot possibly be ignored, except perhaps momentarily, as in a designed discord. All novel compositions of the musician are necessarily based on law, which, while preventing the production of an abortion, do not stand in the way of variety and the impress of individuality. To the inquiry "Why?" such a designer of sound harmonies has always a ready answer.

We do not know that there has ever been in any other art the cry for a "new" manner or style. This is the more remarkable when we consider that the sources of novel effects in architecture at least equal that of any other art—indeed, we ought more truly say far exceeds any other art—for it calls in all arts to its aid as added interest. We cannot keep back the thought that, after all, what is required is not a new style of architecture, but a new spirit among architects—a regeneration and a method of working that shall be founded on law and reason, and exclude all ape-like imitation. We call to mind NAPOLEON'S saying, "A general always has troops enough if he only knows how to employ those he has, and bivouacs with them." We see clearly that the architect has abundance of material with which to work, if he but looks around him, close at hand, and far afield through the eye of photography.

It is desirable to realise the true significance of the saying, "There is nothing new under the sun." It bids us cease to worry for novelty for its own sake, resting in the assurance that the words are particularly applicable to our art. It warns us of the futility of seeking a new entity, while a sufficient originality can be produced by recombination of old forms. For one apparent true novelty, myriads of virtual novelties are produced by recombining of that which of itself is old.

We may give a concrete illustration. Suppose, for example, that a certain architectural pillar is not to be improved by any effort or study we can devote to its form and features. We must, therefore, accept such as, humanly speaking, perfect. We are far from suggesting that this is a reasonable supposition, but it will do for illustration purposes. In every use, then, made of this particular column we must either reproduce—as by a pair of mirrors—the exact original, or by amendment produce something which is inferior. If we call this an x column (possibly a happy suggestion) then the x column is a style in itself, in however minor a degree. We can produce no novel effect from it except what is inferior to the perfect type itself. But it is at once evident that in dealing with a number of x columns a practically infinite variety is open to us by new spacing, new grouping, both in plan and elevation, and in their combination with other forms. The column is little more than a single note in the harmony and whoever heard of anyone declaring himself weary of a certain pitch of musical sound, if it be the true voice of nature, and not a crack-pot, like Big Ben? From this line of reasoning we quickly perceive that the composer may produce beautiful effects and novel by recombining old entities.

In taking the above line of argument, it would seem necessary to define the meaning of the expression "architectural form." It is unnecessary, for the moment, to do this. It may be noted in passing, however, that in chemical combination no new substance can be formed unless the old is first broken up into its elemental atoms, or at least into molecules. It would be a great gain if we could arrive at some definite understanding as to what constitute the atoms of architecture. Old details certainly do not. These may be practically destroyed and yet architectural effect remain. In the scene in the ruined Parthenon (fig. 6) it cannot be said that any detail is visible. Yet there is effect, and an effect of architecture. It would seem that in Order and Arrangement and Perpendicularity—with its complement, Horizontality—may be discovered the genesis of architectural effect.

(To be continued.)

THE WORKMEN'S COMPENSATION ACT (1906) IN OPERATION.—II.

By W. S. HOLDSWORTH, D.C.L.

Questions Relating to the Amount of Compensation payable.

THE scale and conditions of compensation are contained in the first and second sections of the first schedule to the Act. The various rules for ascertaining the sums payable are not altogether easy to apply in all instances, and several cases have been needed to put an authoritative intepretation upon them. The most important of these cases are a group of four, judgment in which was given together in December 1907.* In the judgments of Cozens-Hardy, M.R., and Fletcher Moulton, L.J., the rules are carefully and lucidly explained.

In one case (schedule 1, section 1 (*a*) (i.)), the compensation payable is based upon the actual wages received by the workman. That is the case where a workman meets with a fatal accident, who has for the three years preceding the accident been in the employment of the same employer. In such a case, if he leaves dependants wholly dependent upon him, he is entitled to a sum equal to the whole of his earnings during the preceding three years, or 150*l*., whichever is the larger, but not exceeding in any case 300*l*. As Fletcher Moulton, L.J., put it, the Legislature seems to have thought that, when there has been three years' uninterrupted employment, the most satisfactory solution of the question of the amount of compensation was to take the facts as they stand, and let the amount be the reproduction of the actual earnings during the three years.

But in all other cases the amount of compensation is based upon average weekly earnings. If a man who has not served the same employer for three years is killed and leaves dependants, the amount of his earnings is to be deemed to be 156 times his average weekly earnings during the period of his employment. If any workman is totally or partially injured he is entitled to a weekly payment not exceeding 50 per cent. of his average weekly earnings during the preceding twelve months if he has been so long employed, or, if not, for any less period during which he has been in the employ of the same employer, such payment not to exceed 1*l*. Section 2 of the schedule then lays down certain rules for the computation of these average weekly earnings. The guiding idea is contained in the first sentence of sub-section (*a*)—"average weekly earnings shall be computed in such manner as is best calculated to give the rate per week at which the workman was being remunerated." † Therefore we cannot simply take the amount per week at which the workman was being paid at the time of the accident. So to do might be unfair in some cases to the employer, in other cases to the workman. We must take into consideration the circumstances prevailing before, as well as at the time of the accident. "The term average weekly earnings signifies broadly the average earnings which the workman would make in a normal week if employed on the terms prevailing before and up to the time of the accident." ‡

It is clear that the question at once arises whether to ascertain an average we are to divide the earnings by the total number of weeks in a given period, or by the total number of weeks in which work was done during that period. The Court of Appeal has clearly held that in the normal case, when the employment is continuous, the divisor must be the number of weeks worked. It might be otherwise when the employment was discontinuous. Thus if a man was employed to assist to do certain jobs on certain days occurring at irregular intervals, and was paid by the day, his average

* Perry *v.* Wright; Cain *v.* Frederick Leyland & Co.; Bailey *v.* Kenworthy, Ltd.; Gough *v.* Crawshay Bros., Cyfarthfa, Ltd., 1908 1 K.B. 441; 24 T. L. R. 166.

† Schedule 1, section 2 (*a*).

‡ 1908 1 K.B. at p. 456, *per* Fletcher Moulton, L.J.

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weekly earnings would be the sum of his earnings during the period, divided by the total number of weeks in that period. But in the normal case of continuous employment the weeks worked can alone be regarded; thus, if a man earns 2*l.* a week in works which are regularly stopped for holidays two weeks in the year, the yearly wage is represented by 2*l.* multiplied by fifty and not by fifty-two; and the average weekly wage would be 100*l.* divided by fifty-two. In arriving at this average weekly wage it would not be allowable in the case of a particular workman to take into consideration the fact that a larger or smaller amount of these holidays had occurred in the period over which the average was taken. Two workmen in the same employ at the same wage would be entitled to have their average weekly earnings estimated at the same figure, though the fortnight's holiday had occurred during the engagement of the one, and not during the engagement of the other. An illustration of the working of this principle is contained in the case of Bailey *v.* Kenworthy, Ltd. In this case the man was injured, and it became necessary to compute his average weekly earnings during the preceding twelve months. He was continuously employed except in certain holiday seasons, such as Wakes Week, Bank Holidays, &c., amounting to two weeks in the year, and except for interruptions due to accident and other causes amounting to one week in the year. His yearly earnings were 83*l.* 2*s.* 1*d.*, earned in forty-nine weeks of work. That sum divided by forty-nine, gives the average weekly wage in a week of full work. But there are only fifty weeks of full work in the year, not fifty-two, therefore we must deduct from the average weekly wage, ascertained by dividing 83*l.* 2*s.* 1*d.* by forty-nine, one twenty-sixth part. "In other words, the earnings in a week of full work are to that extent higher than the average weekly earnings of the employment, because there is incident to it an enforced idleness of two weeks in the year." *

The schedule (section 2 (*a*)) recognises that, "by reason of the shortness of the time during which the workman has been in the employment of his employer, or by reason of the casual nature of the employment, or the terms of the employment," it may be impracticable at the time of the accident to compute the rate of remuneration. In that case, "regard may be had to the average weekly amount which, during the twelve months previous to the accident, was being earned by a person in the same grade, employed at the same work by the same employer, or, if there is no person so employed, by a person in the same grade employed in the same class of employment and in the same district." The schedule does not contain any definition of the term "grade." Cozens-Hardy, M.R., says, "I think it refers to the particular rank in the industrial hierarchy occupied by the workman, such as shepherd, carter or common labourer on a farm, or mason, bricklayer or bricklayer's labourer in the building trade, and not to his greater or less excellence in that rank." The question whether there is any grade, and the question what is the average weekly wage earned in that grade, is an abstract question of fact to be determined by the Court or the arbitrator, without reference to the merits or demerits of the applicant. When these two points have been settled the Court must then consider the personal merits or demerits of the applicant; and evidence of such matters as his skill or efficiency is relevant to determine whether he is above or below the average. An illustration of the working of this clause is afforded by the case of Perry *v.* Wright. † In that case the applicant was a casual dock labourer. As there was no person "in the same grade employed at the same work by the same employer," the Court was obliged to consider the average wage of "a person in the same grade employed in the same class of employment and in the same district." The County Court Judge had found that there were two grades of casual dock labourers—the good and the bad; that the former earned on an average 30*s.* and the latter 15*s.* a week; and that the applicant fell into the latter class. The Court of Appeal held that this mode of settling the matter was wrong. Casual dock labourers formed one grade—"so that it is an error to talk about a class of good workmen and a class of bad workmen as constituting different grades." The County Court Judge should first have determined the average wage of a man whose grade was that of a casual dock labourer, and then have considered how far he fell below that average.

In sub-section (*c*) of section 2 of the schedule a definition is given of the phrase "employment by the same employer." "Employment by the same employer shall be taken to mean employment by the same employer in the grade in which the workman was employed at the time of the accident, uninterrupted by absence from work due to illness or any other unavoidable cause." This definition, taken in connection with the provisions of sub-section (*a*) cited above, makes it clear, as Fletcher Moulton, L.J., points out, "that in taking the average we are restricted to the period during which the workman has been employed in the same grade."* So that if at the time of the accident he has been promoted to a higher grade or come down to a lower grade, his earnings during the time he was in the lower or the higher grade cannot be regarded. The working of this principle is illustrated by the case of Gough *v.* Crawshay Bros., Cyfarthfa, Ltd. In that case a collier had had a previous accident, and while incapacitated from work had received 15*s.* 8*d.* per week. Having partially recovered he was given light work at certain wages, and the amount of his compensation was reduced each week by half the amount earned in that week. While engaged on this light work he was killed by an accident. It was held that the compensation must be based on his average weekly earnings in his new grade, and that his former earnings as a collier could not be regarded. It was attempted to be argued that the money payable in respect of his first accident should be taken into account. But, as the Court held, such payment had no more to do with the computation of his average weekly wage than if he had been "in receipt of weekly payments left to him by a friend in his will."

It is fairly clear that a man's wage cannot be simply confined to the money received by him. The value of board or lodging or other allowances must be taken into account. Where by the nature of the employment the workman must be provided with such board and lodging by his employer, the measure of their value seems to be the cost of the employer. Thus in the case of Rosengvist *v.* Bowring & Co., Ltd.,† a seaman was paid 21*s.* a week and received board and lodging. It was held that though there might be cases in which the cost of the board and lodging to the employer might not be a fair measure of damages, in this case it clearly was. The sailor must sail on a ship which was provisioned when it started. "It was idle to consider at what cost the sailor could have purchased his salt pork . . . at the first port the vessel touched, or what he could have got it for in the middle of the ocean." ‡ It followed that "in such an employment as this there was no other practical or real test than to say that the measure of the value to the sailor was the cost to the employer." It would seem that much the same reasoning would apply to the case of domestic servants, who must by the nature of the case live in their employer's house. It would not, as this case points out, necessarily apply to a farmer who boards his labourers in his house.

It is not only board and lodging which may be an element in the wage earned. There may be in some cases other allowances sufficiently regular and recognised to be taken into consideration. In the case of Penn *v.* Spiers & Pond, Ltd.,§ it was held that in reckoning the earnings of a deceased waiter the amount of his "tips" could be taken into account. These were earnings "in the employment" in which the man was engaged; and it is notorious that there are many like cases in which an employé's earnings in the employment do not come from the employer. If the receiving of tips is a recognised and notorious incident of the employment, if they are received with the knowledge and sanction of the employer, if they are not merely casual and trivial, their amount must be brought into account in estimating the average weekly wage.

The employer is liable to pay compensation during the incapacity caused to the workman by the accident. In order to ascertain whether or no the incapacity continues, section 14 of schedule 1 provides that a workman receiving weekly payments may be required to submit himself for medical examination by a duly qualified medical practitioner; and section 16 provides that a weekly payment may be reviewed by the Court at the request of either employer or workman. In the case of Nicholson *v.* Piper,‖ decided under the 1897 Act, the schedule to which contains similar provisions, it

* 1908 1 K.B. at p. 466, *per* Fletcher Moulton, L.J.; cp. for a similar case illustrating the application of this principle of reckoning, Anslow *v.* Cannock Chase Colliery Company, Ltd., 25 T. L. R. 167.

† 1908 1 K.B. at pp. 451, 452.

* 1908 1 K.B., at p. 457.
† 1908 2 K.B. 108; 24 T. L. R. 504.
‡ 24 T. L. R. at p. 504, *per* Cozens-Hardy, M.R.
§ 1908 1 K.B. 766; 24 T. L. R. 354.
‖ 1907 A.C. 215.

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was held by the House of Lords that an award terminating the weekly payments was final, and therefore that the right to receive compensation could not revive on account of the recurrence of the incapacity. Where such recurrence is feared it is usually the practice for the judge not to terminate the payments, but to suspend them by ordering the payment of a nominal sum. The House of Lords in this case declined to express any opinion as to the legality of this practice.

Neither the Act nor the schedule thereto contain any provision for the case where a workman refuses to take ordinary remedies for ending his incapacity. The case of Warncken *v.* Richard Moreland & Son, Ltd.,* lays down a clear rule on this point. If the workman refuses to adopt a remedy, such as a surgical operation, which involves no appreciable risk, he cannot continue to claim full compensation. As Cozens-Hardy, M.R., said, in such a case it might be said that the workman's continued incapacity arose, not from the accident, but from refusal to take reasonable means to get rid of its consequences. It is clear, as was laid down in the earlier case of Rothwell *v.* Davies,† that this reasoning does not apply if the operation is attended with risk.

(*To be continued.*)

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

A MEETING of the Institute of Architects was held on Monday evening last at Conduit Street, W., Mr. Ernest George, president, in the chair.

Mr. R. STEPHEN AYLING read a paper entitled

Public Abattoirs.

From a humanitarian point of view, he said, it is our bounden duty to animals that they should be killed as painlessly and under the best conditions possible; it is a duty to ourselves that meat supplied for human consumption should be free from disease, that those places in which the work of slaughtering and dressing meat foods take place should be as hygienically perfect as possible, and it is an important matter of policy that by-products and other valuable materials should be utilised to their fullest extent. These essentials can only be achieved by the establishment of public abattoirs throughout the country, and by the elimination of private slaughter-houses.

When the public abattoir system is established as firmly here as it is to-day on the Continent, there will be a very wide field open for the English architect to design these utilitarian but certainly complex buildings, well planned and with a distinctive character.

In England and Wales to-day we have nominally about ninety-eight public abattoirs, but nearly two-thirds of the buildings are very small, or obsolete in planning; in fact, a large number cannot be really seriously considered as public abattoirs at all. Even if they were all satisfactory this number would represent one institution to about every 330,000 inhabitants. As a matter of comparison, taking one-third of the existing abattoirs as being reasonably representative buildings, we have to-day in England and Wales one public abattoir to each million of the population. It is therefore apparent that we have hardly reached the fringe of an "abattoir system." In Paris to-day there are two splendid municipal abattoirs, supplying the meat for the whole of the city, and not a single private slaughter-house. In London alone to-day we have about 294 private slaughter-houses and not a single municipal one.

The paper gave the disposition of the private slaughter-houses licensed last year by the London County Council, in the area covered by the map published in the London Directory. There are 222 private slaughter-houses in that area, and in nearly every case they are in the midst of residential property. The fact that they should exist at all, many in populous districts and surrounded by houses, is an offence to humanity, hygiene and economy. We pride ourselves on the enormous strides we have made in sanitary science during the last fifty years, but on this particular subject we are at least a century behind our Continental neighbours. Recently plans have been prepared for a public abattoir in Constantinople, and the work either has been or shortly will be commenced. When this has been accomplished, London will stand in "splendid" isolation by being the only European capital without such an institution.

The author enumerated the many defects inseparable from the system of scattered private slaughter-houses, and showed how they can be, and are, prevented in the public abattoir. Almost invariably on the Continent (and sometimes in England) these buildings are erected in the suburbs, and in close proximity to a railway, so that the necessity for driving animals through the streets does not exist. Diseased meat sold for food is practically unknown owing to the employment of fully qualified veterinary inspectors, who are continually on the spot while animals are being killed. Wanton cruelty is reduced to a minimum, as the municipal buildings are under the fierce light of publicity, the officials are continuously in attendance, and only trained men are engaged as slaughterers.

Having dealt with the question of finance, and given statistics to show that public abattoirs can be made self-supporting or even profitable, the author set out the salient points to be observed in a well-planned abattoir. The existing buildings of this kind can be, broadly, divided into two classes, those on the "block system," where all the main departments are under one roof, and the "separate system," where the main buildings are separated by roads or passages. The main buildings of a moderately-sized abattoir consist of lairs for various animals, slaughter-hall, cooling-room, administrative block, superintendent's house, cold stores and chill-rooms, destructor, buildings for the preparation of by-products and offal, workmen's mess-rooms, kitchen, bath, &c., and pathological room.

The author described the magnificent cattle market and abattoir of La Villette, Paris, designed by M. Janvier, and opened in 1867, and showed illustrations of the various markets, buildings, and slaughter-courts. The area is 105 acres, and about 2,500,000 animals are killed there per annum.

Illustrations were shown also of three typical German abattoirs, viz., those of Berlin, Leipzig and Offenbach. Some of the Continental abattoirs are among the finest buildings erected. While Birmingham spends nearly 5*s.* a head for its abattoir, the little town of Offenbach in Germany, for instance, has spent 1*l.* 13*s.* 7*d.* per head of its 60,000 inhabitants.

Turning to English abattoirs, the author considered the plan of the abattoir at the Dockyard, Chatham, most perfect, not only from the humanitarian point of view, but as regards facilities for working. The plan is the outcome of a report of the Commission appointed by the Admiralty to inquire into the question of the "humane slaughtering of animals," and the many witnesses examined were all experts engaged in those trades and professions appertaining to the subject. The main points in the report were as follows:—"That animals awaiting slaughter should be spared any contact with the signs or smell of the slaughter-house; that waiting-pens should be separated from the slaughter-chamber by sliding doors; that floors should be impervious and not slippery; that cattle should be slaughtered screened off from their fellows; that immediately the carcases have been bled they should be dressed in an adjoining chamber, screened off from view of animals entering the slaughter-house." These recommendations have been admirably carried out at Chatham. The buildings were designed in the Admiralty Office under the superintendence of Mr. J. Brookes Hunt.

Plans, elevations, and in some cases photographs of a number of public abattoirs in England, including a unique plan suggested by the Model Abattoir Society were exhibited, and points of interest called attention to.

In Scotland to-day, out of 206 burghs, 124 of them, or nearly 61 per cent., have public abattoirs and greatly added powers for closing the private slaughter-houses. The Local Government Board of Scotland is now advocating the erection of public abattoirs in or near all towns. A radius of five miles is suggested for towns with from 6,000 to 8,000 inhabitants. Scotland is much in advance of England, and is gradually approaching an "abattoir system."

As regards materials, in the erection of these buildings wood should be used only where absolutely necessary. Stability and facilities for scrupulous cleanliness must be the keynote. The floors must be of perfectly impervious material, and white glazed brickwork or tiles largely used in the interior of the buildings, so that every trace of dirt or blood may be easily detected and removed. Throughout the buildings very light paint—preferably white—should be employed.

The question for or against public abattoirs appears to the author to be a national rather than a political one. He was strongly of opinion that a general "abattoir system" would encourage the British farmer to raise home-grown

* 25 T. L. R. 129. † 19 T. L. R. 423.

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cattle, which would not only be to his pecuniary advantage, but also benefit the British consumer.

To trade opposition and vested interests the author attributed the fact that public abattoirs have not superseded private slaughter-houses in this country. Trade opposition is very strongly against the abattoir system, as under it inspection of meat would naturally be more stringent than is possible at the present time, so that diseased meat food would be condemned in a much greater proportion.

In some concluding remarks reference was made to the question of "official architecture" in connection with the subject. Abattoir buildings complying with various requirements, complex engineering work, elaborate sanitary work, considerations of humanity in stabling and slaughtering, the most efficient methods of veterinary inspection, &c., all tend to render them practically impossible to be designed by a single individual, however talented. In any large abattoir scheme the architect, engineers (constructional and municipal), medical officer of health, and veterinary surgeon should work together harmoniously.

Mr. SYDNEY PERKS said what he wished to say was more in the nature of a protest than anything else. The lecturer had carefully considered many buildings and model plans, but an inspection of the illustrations round the walls of the room did not reveal his own name among those of the architects and engineers who had made the original drawings. Mr. Ayling's name was not to be found on one single plan, and the speaker suggested that some model scheme might have been drawn up for the paper. He protested against the statement that in London alone there were about 294 private slaughter-houses, and not a single municipal one. If Mr. Ayling meant by that that there was not a single municipal slaughter-house put up out of the rates he was perhaps right, but there were very large slaughter-houses erected by the Corporation of London on which something like between 30,000*l.* and 40,000*l.* had been spent. Those buildings were at Islington, and when the erection of them was under consideration an expert committee travelled over England and Germany in order to ascertain the best and most suitable plan to be adopted. They were public slaughter-houses in every sense and under the supervision of a fully qualified veterinary surgeon and staff of assistants. The buildings at Islington were so well arranged and equipped that they had been credited to be far in advance of anything to be seen on the Continent. There was certainly not much ornament about them; in fact, the exterior might be described as hideously ugly, but inside the arrangements were perfect. He did not think it was right therefore to allow the statement to go unchallenged that London was doing nothing towards the establishment of public abattoirs. The buildings he mentioned had been erected regardless of expense and with great thought after visiting other slaughter-houses.

Mr. M. HORSFIELD proposed a vote of thanks, and said the paper appealed to him as one who had been through the Chicago stockyards and remembered with regret what he had observed there. In the subject of the paper there was little to attract them as architects, but he thought they must not disdain to do what they could to help in making abattoirs worthy of modern civilisation if the old slaughter-houses were to be replaced.

Mr. J. COULSON NICOL seconded the motion. He had had occasion to visit some slaughter-houses on the Continent, and quite agreed with Mr. Perks's reason for protesting against parts of the paper. Still the author had given them a great deal of information which was difficult to obtain. He was astonished that more reference was not made to the modern slaughter-houses erected in the provinces. Birmingham contained at least one good example. The French plan, covering a wide area and centrally placed, had many advantages, but it could not be applied either to London or the provinces, where land in the centre of the towns was too valuable to be devoted to such buildings. In the provinces there seemed to be a great desire for having public slaughter-houses close to the market-places, and those that had been erected yielded a profitable return. A continuous roof to all slaughter-houses, he thought, was the best plan to be advocated in England. The fittings in such buildings, he believed, were of greater importance than the architecture.

The vote of thanks was carried by acclamation.

DEED OF AWARD OF PRIZES AND STUDENTSHIPS FOR 1908-9.

The Institute Silver Medal and 25 *Guineas.* (Essays.) Subject:—"The Influence on Architecture of Modern Methods of Construction," Mr. Henry H. Hill, B.A., 10 Kildare Gardens, Bayswater, London; hon. mention, Mr. Horace Cubitt, 227-8 Strand, London, and Mr. J. Maclaren Ross, 11 Great James Street, Bedford Row, London.

The Institute Silver Medal and 10 *Guineas.* (Drawings.) Subject:—"Measured Drawings of Ancient Buildings in the United Kingdom or Abroad," Mr. Ernest W. Wray, 28 Scott Street, York; hon. mention, Mr. Alan G. Brace, Lapworth, Warwick.

The Soane Medallion and 100*l.* Subject:—"Design for a Casino on the Borders of a Lake," Mr. Anthony R. Barker, Sutherlands, Harrow; hon. mention and 20 guineas, Mr. Adrian Berrington, 37 Great Ormond Street, London.

Owen Jones Studentship. The prize withheld. Mr. S. Herbert Maw, The Beeches, Cottingham Road, Hull, awarded 20 guineas.

Pugin Studentship, Silver Medal and 40*l.* Mr. Sydney H. Miller; hon. mention, Mr. H. Hubert Fraser.

The Tite Prize. Subject:—"Design (according to the Principles of Palladio, Vignola, Wren, or Chambers) for a covered Arcade of Shops," Mr. R. W. M. Gunn, 2 Windsor Terrace, Glasgow; prize of 15 guineas, Mr. Bertram E. Lisle, 43 Devereux Road, Wandsworth, London; prize of 10 guineas, Mr. S. Herbert Maw, The Beeches, Cottingham Road, Hull.

The Arthur Cates Prize, 40 *Guineas.*—Mr. Leslie Wilkinson.

The Grissell Gold Medal and 10 *Guineas* (for design and construction). Subject:—"Design for a Landing Stage to a Royal Palace from a Lake," Mr. Douglas W. Day, Deanhurst, Knighton Drive, Leicester.

Godwin Bursary, Silver Medal and 65*l.*—Mr. J. A. Allan.

Ashpitel Prizeman.—Mr. Horace J. Ash, Nuneaton.

A Service will be held early in June next at the Church of the Holy Cross, Crediton, in commemoration of the millenary of the consecration of the first bishop of the ancient see of Crediton. The bishop, Eadulf, was consecrated in 909, with six other bishops, at Canterbury Cathedral by Archbishop Plegmund. The actual date of the consecration is not ascertainable. Crediton Church was a cathedral church from 909 to 1050, when, on the removal of the see to Exeter, it became a collegiate church.

The Council of the Concrete Institute held a meeting last week, at which Sir Henry Tanner presided. It was decided that all new members resident in Great Britain joining after the enrolment of the first 500 members should be subject to an annual subscription of two guineas instead of the present subscription of one guinea, which latter subscription will, however, still be retained for new colonial and foreign members. The membership of the Institute already exceeds 400. A number of appointments to the standing committees of the Institute have now been made. The committee on science, on Parliamentary matters, on mass concrete, and on tests have respectively as chairman Mr. William Dunn, Mr. A. Ross, Mr. C. H. Colson and Mr. W. T. Hatch, and the following are acting as honorary secretaries to various standing committees:—Mr. F. E. Wentworth Shields (science), Mr. J. E. Franck (Parliamentary), Mr. G. Kirkaldy (tests), and Mr. R. W. Vawdrey (reinforced concrete practice). The third general meeting of the Institute will take place at the Royal United Service Institution, Whitehall, on February 18, when Mr. L. Serraillier will read a paper on certain aspects of reinforced concrete.

At the Monthly Meeting of the Sheffield Society of Architects and Surveyors held at the University last week, a paper was contributed by Mr. J. R. Wigfull describing a visit paid to Rouen, Caudebec and St. Wandrille. The president of the society, Councillor W. C. Fenton, presided. Mr. Wigfull gave a graphic description of the magnificent cathedral at Rouen, and the various parish churches of the city, including those of St. Ouen and St. Maclou. Afterwards he dealt with the picturesque little town of Caudebec, where there is a fine church of the fifteenth century, containing a tablet to the master mason, who for thirty years directed the work. The church and the quaint streets of the town were spoken of, and, in conclusion, Mr. Wigfull dealt with the abbey of St. Wandrille, mentioning its connection in early times with the churches of Sheffield and Ecclesfield. The great tithes of Sheffield went to the monks of St. Wandrille, and Ecclesfield was a priory of the abbey until the time of Richard II., when the alien priories were confiscated. The lecture was illustrated by slides made from photographs taken by Mr. Wigfull.

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NOTES AND COMMENTS.

AT the Annual Convention of the American Institute of Architects held at Washington on December 15, 16 and 17 last were considered several matters of more than local interest. Of these the first, and perhaps we may say the most important, as it concerns the Art of Architecture rather than the profession of architects, was the organisation of a Bureau of Fine Arts as a Government department. In this country we have been occasionally, and more particularly of late, favoured in the daily Press with the vague and inchoate contention that some body should be constituted to regulate the architectural design of buildings in our chief cities, and particularly in London. Whether it is desirable to regulate the design of our street architecture, and, if so, in what direction and to what extent, is a matter open to discussion and permitting of a great variety of opinion, seeing that we here pride ourselves, and perhaps justifiably, upon the infinite variety of our architectural treatment in the latter nineteenth and early twentieth century. This, however, does not preclude the establishment of a Bureau of Fine Arts, and Senator NEWLANDS, of Nevada, in his address to the Convention of American Architects, rightly emphasised the economic and the commercial value of art. If this be so in a country necessarily mainly self-contained, such as is the United States, still more so is it in our own.

WHAT Senator NEWLANDS said of the American House of Congress is equally true of our own House of Commons. "Congress rarely leads in public opinion; you may say it never leads in public opinion." "Congress simply records public opinion in the statutes." He therefore, as a practical and experienced legislator, gave sound advice to the American architects as to how they must organise and educate public opinion if they wished for any action on the part of Congress. And we over here might well learn the lesson that he taught.

THE establishment of a Bureau of Fine Arts in this country would, if properly constituted and subsidised, be of incalculable advantage not only to architecture but to art generally. First, however, the public has to be educated to recognise that art is not a useless and expensive luxury, but a national asset of economic and commercial value.

THE latest news is that President ROOSEVELT has consented to appoint an Advisory Council on Fine Arts, to assist the Government on all questions of public works in which art plays a part.

THE next subject of interest was that of professional charges, and the American Institute of Architects resolved to raise the minimum remuneration which they would regard as the standard to 6 per cent. instead of 5 per cent. hitherto recognised, the reason for this being the increased responsibilities of the architect and the greater skill and efficiency now required from him as compared with those of the time when the 5 per cent. basis was established. Amongst the many matters in the affairs of the Royal Institute of British Architects requiring readjustment on the reception of the new charter is that of the schedule of charges, and the line taken by our transatlantic confrères is worthy of consideration in this connection, for here as there both the responsibilities and the requisite knowledge of a modern architect have enormously increased during the last half-century.

THE third matter of interest is expressed in the resolution, "That it is the sense of the Convention that the various chapters should prepare codes of ethics, as these may be determined by local conditions, submitting these codes to the Board of Directors of the American Institute of Architects for criticism, and to aid it in preparing a general code." This, translated into English, is analogous to a request that the Allied Societies should express their views on questions of professional etiquette and transmit them to the Council of the Royal Institute for that body to prepare a code. It is high time that such a step was taken here, for the present position is simply ludicrous. A professional member of the Royal Institute signs a declaration that he will not accept illicit commissions, a thing he is forbidden to do by the statutes of the realm. He is told that it is bad form to put his name on a board to announce that he is architect of a building in course of erection, but that he may put it on the building when it is finished, a thing he is bound to do by the law of the land if he desires to reap its full advantage. He is also told that he must not style himself otherwise than "architect" or "architect and surveyor," which, taken literally, precludes him—and many members seem to read the prohibition thus and act up to it—from using the letters F.R.I.B.A. or A.R.I.B.A. after his name, a thing he is empowered to do by the Charter!

THESE puerile restrictions constitute all the guidance that the Royal Institute gives its members on the many debatable or questionable practices that are or may be adopted by some architects, and as to which many a well-meaning practitioner finds himself unable to decide the right course. We sadly need here a code of professional etiquette, or, we prefer the American term, ethics. We believe the Practice Standing Committee of the Royal Institute are considering the question of professional advertising, but they are a terribly long time over it.

ILLUSTRATIONS.

ST. LUKE'S CHURCH, EDINBURGH.—EXTERIOR—INTERIOR.

THIS new church has been erected on a splendid site in East Fettes Avenue, Edinburgh West, from the designs of Mr. P. MACGREGOR CHALMERS, architect, Glasgow. It is designed in the Norman style, and is finished in stone internally as well as externally. The principal stone is taken from Dullatur quarry, the rubble is from Hailles quarry. There are three aisles, divided by arcades of stone pillars and arches. The design of the arcades has been modelled on the Norman work at Jedburgh Abbey and its prototype at Romsey Abbey. The communion table is placed in a large semicircular apse decorated with arcading and vaulted with stone ribs and concrete panels prepared for mosaic decoration. A smaller apse is provided at the end of the chapel for the font. The choir and organ occupy a small transept. All the furniture of the church is of Austrian oak specially designed by the architect. An interesting feature of the interior is the great variety of the sculpture decoration. No two capitals are carved alike, and the corbels supporting the ribs of the apse vault are carved with scenes from the Life of CHRIST, from the Annunciation to the Ascension. The accompanying plan shows the vestries and halls adjoining. The church accommodates about 950 persons, and has cost about 7,000*l*.

HOLBORN TOWN HALL.—PORTION OF FRONT ELEVATION—THE COURT-ROOM.

WE give two further illustrations this week of these additions, which have been erected at the junction of High Holborn and Broad Street. The Court-room is on the first floor, and will be used for licensing, rating, and other business. Convenient inquiry and waiting rooms are provided. The new buildings correspond in their elevations with the adjoining Holborn Public Library. In our previous issue we showed the principal entrance and the council chamber. The architects are Messrs. WARWICK & HALL, of 13 South Square, Gray's Inn, W.C., whose design was chosen after a limited competition.

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PHOTO BY ANNAN.

ST. LUKE'S CHURCH, EDINBURGH: INTERIOR.

P. MACGREGOR CHALMERS, Architect.

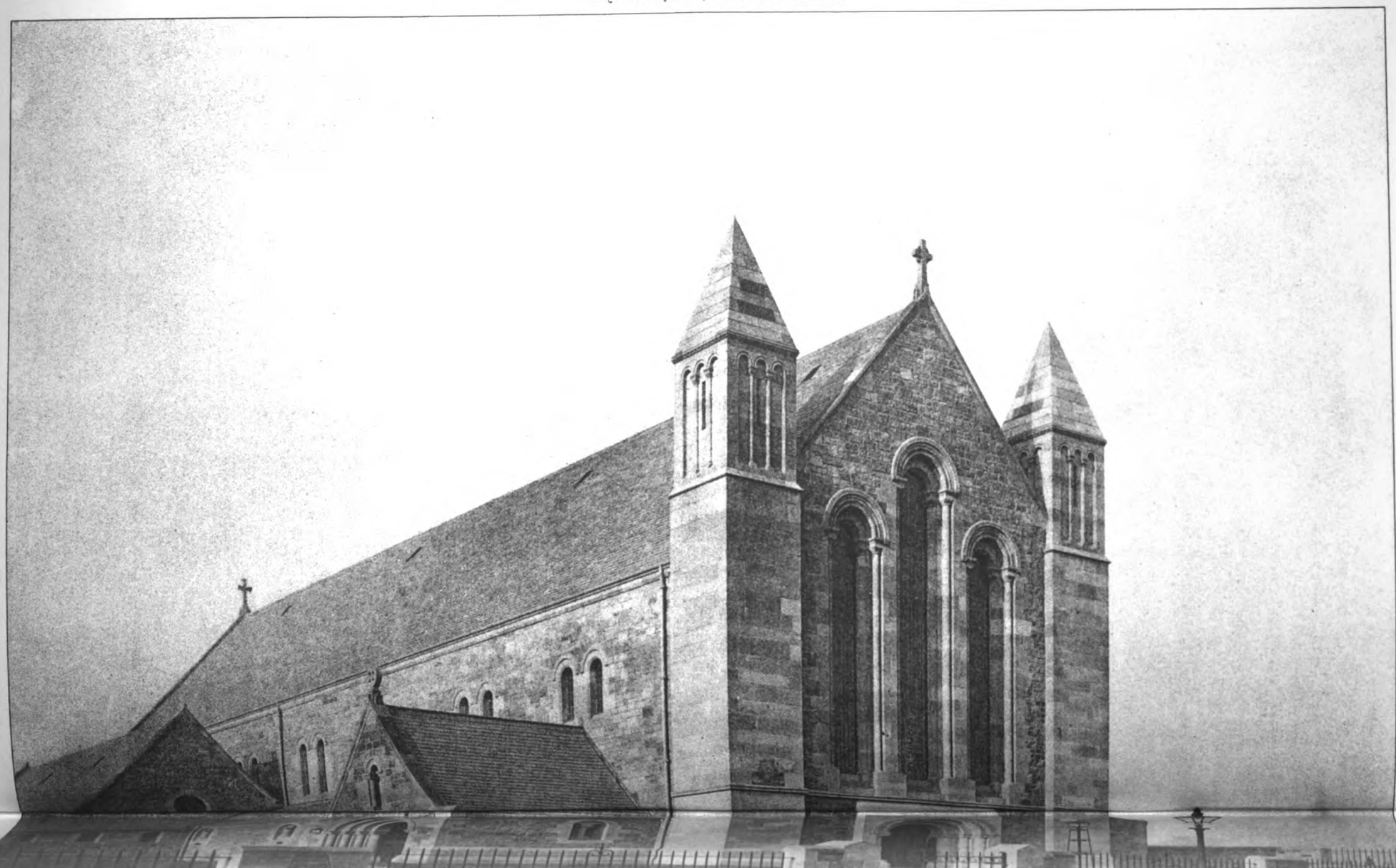
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PHOTO BY ANNAN.

ST. LUKE'S CHURCH, EDINBURGH: EXTERIOR.

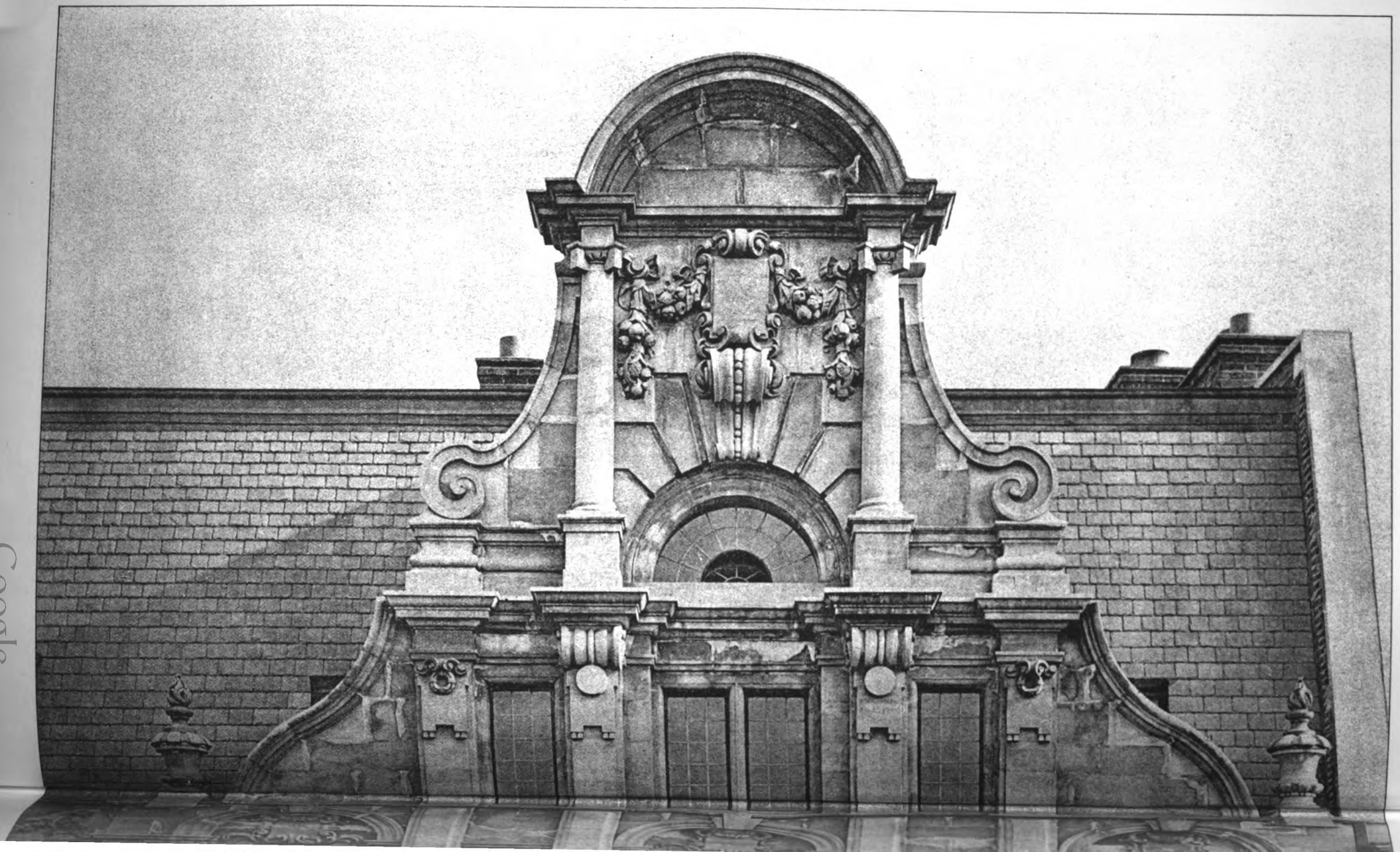
P. MACGREGOR CHALMERS, Architect.

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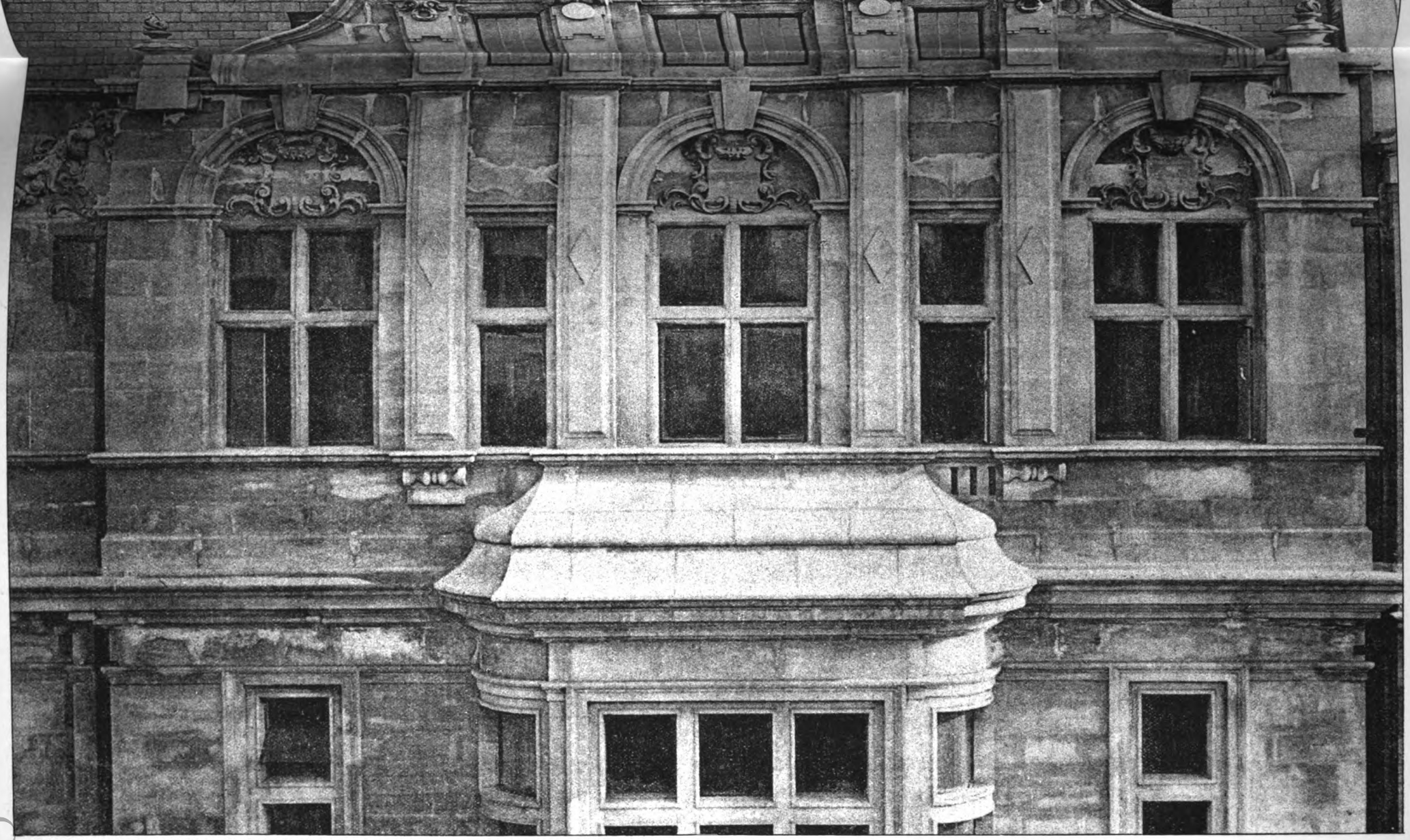


PHOTO BY CYRIL ELLIS, 231 VICTORIA ROAD, ALEXANDRA PARK, N.

HOLBORN TOWN HALL: PORTION OF FRONT ELEVATION.

Messrs. WARWICK & HALL, Architects

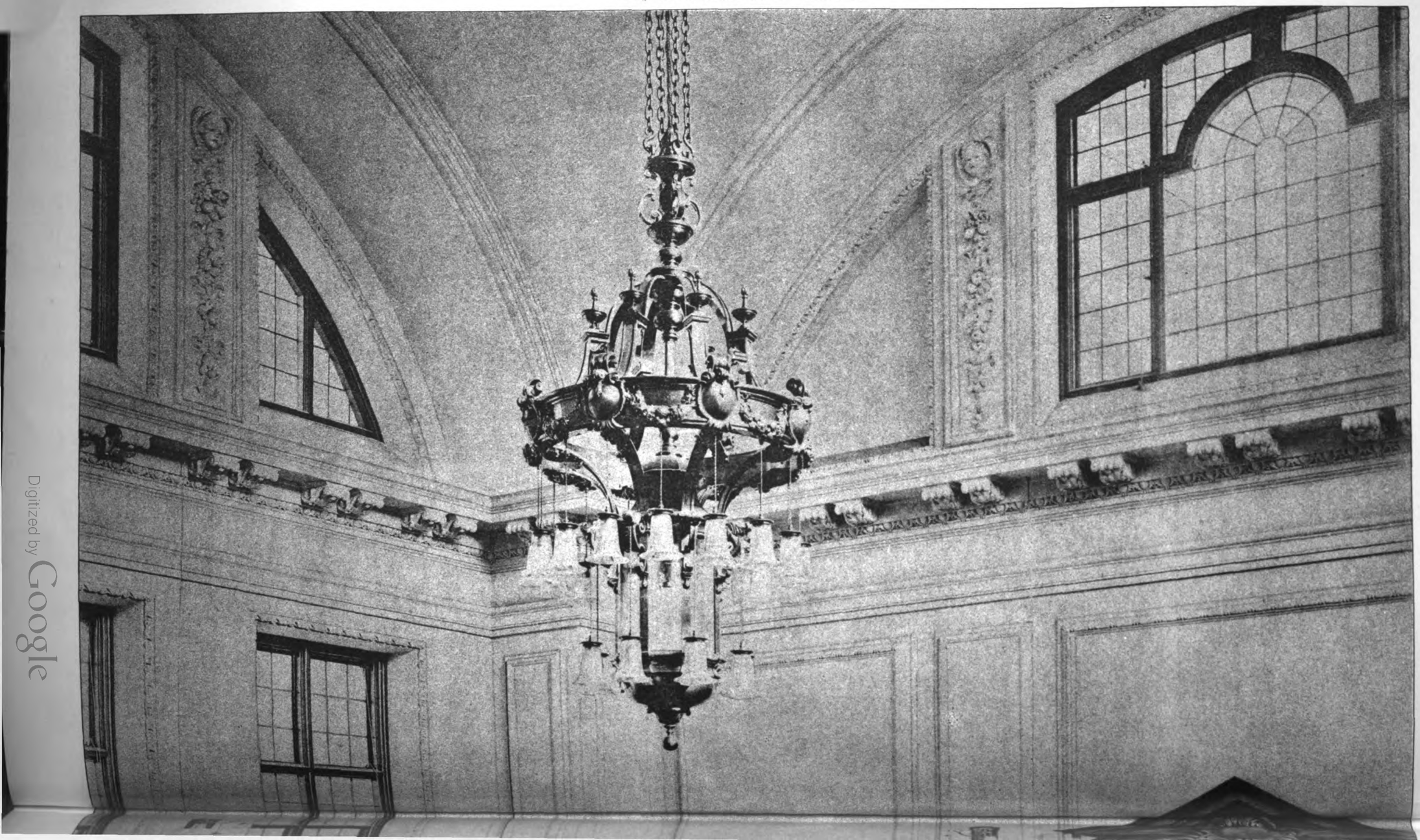
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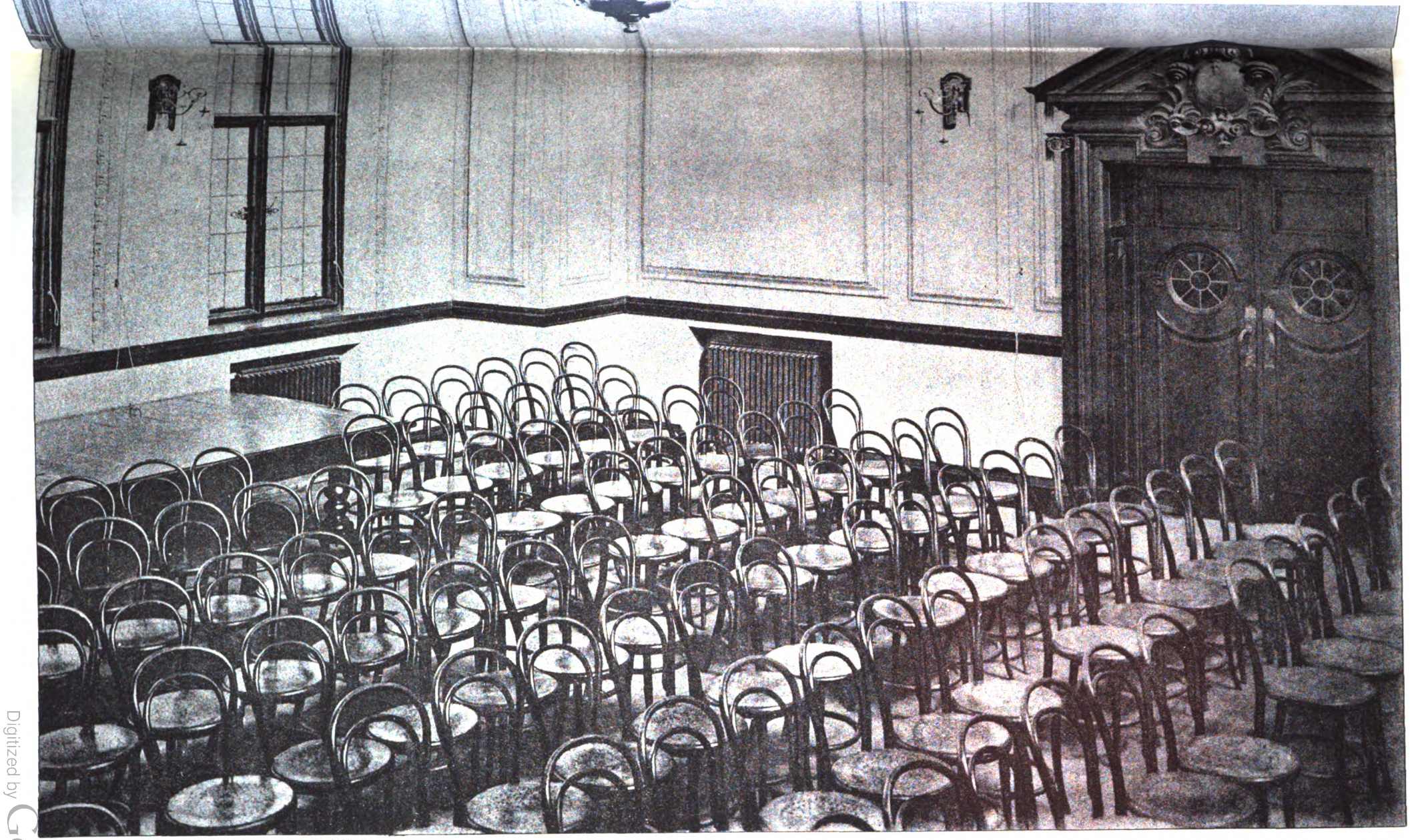


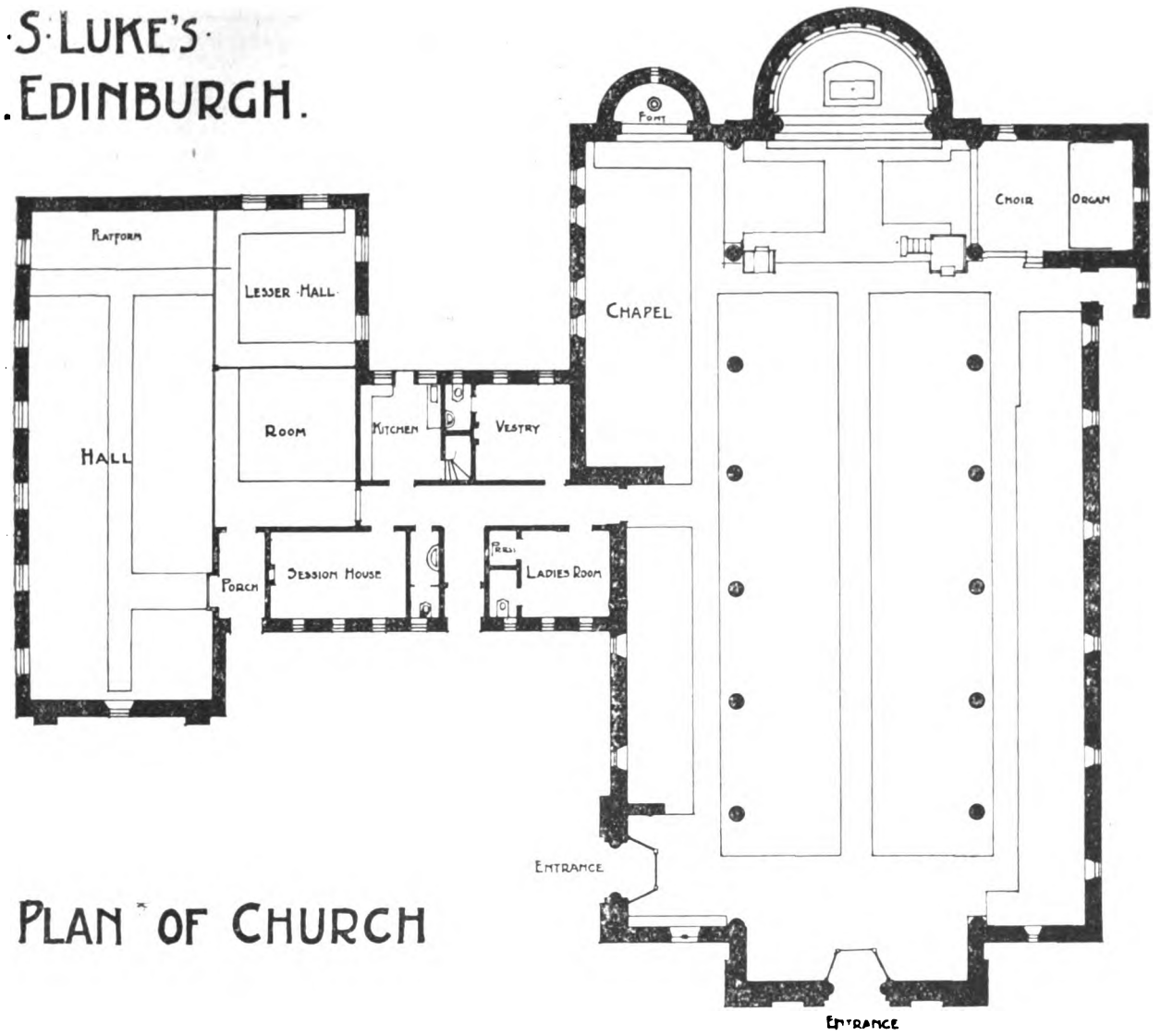
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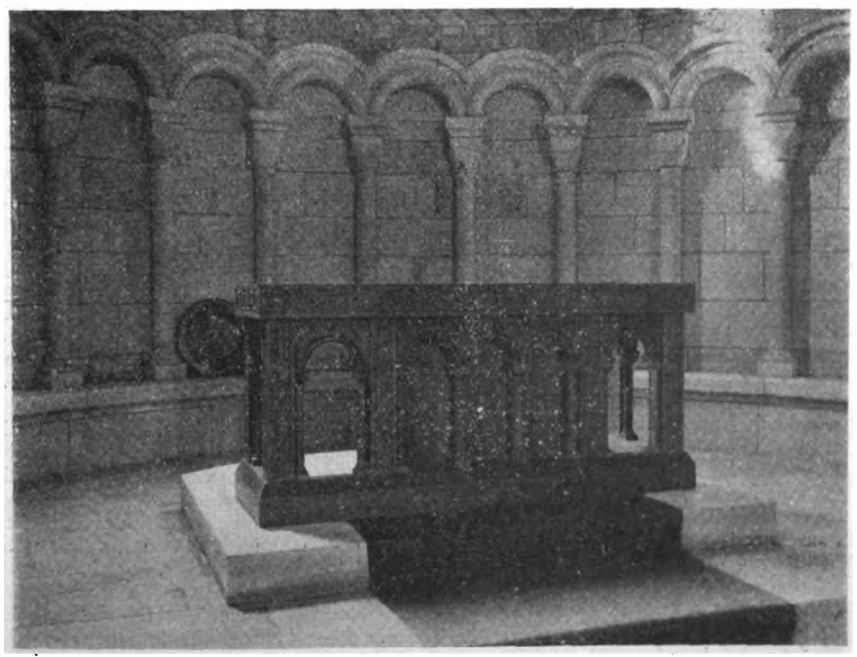
HOLBORN TOWN HALL: THE COURT ROOM.

Messrs. WARWICK & HALL, Architects.

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ST. LUKE'S CHURCH, EDINBURGH.—THE COMMUNION TABLE.

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ROYAL ACADEMY LECTURES—PAINTING.

THE fourth and last lecture of the course given by Sir Hubert von Herkomer before the students of the Royal Academy was delivered on January 14, and was entitled "Some Personal Experiences." He said that he must confess that he long had a desire to give a lecture on purely autobiographical lines and to tell of experiences in his own career. He was only held back by the thought that it would be a serious violation of tradition. He knew that he was courting danger, as it is considered extremely bad taste to talk of oneself and one's own work. Moreover, it would create a bad precedent. But it had been a very disagreeable effort in preparing those lectures to always be asking oneself if the artist to whom reference might be advantageously made was dead yet. If they inquired of a living artist, "What were the circumstances that led you to start in the style that made your name?" they would get a serviceable answer. The successful artist built his bridges in his early years. The non-successful artist either failed to do so, or built them badly. It should be useful to the student to hear how the successful worker had built his bridges, of what material, and at what period in his life. And no man could tell them this better than the builder himself.

Most artists at the opening of their career had been obsessed by some particular master, whom they had gradually, and sometimes even suddenly, dropped. There were few more interesting studies than such a revolt. Again, most artists when they talk together take delight in hearing personal experiences and exchanging notes about their difficulties. The artistic temperament is rarely secretive. The secretive man will not talk of his difficulties because it is bad form, and also because it is bad business. But what a paltry thing was such a holding back!

In former days the student naturally drifted into the manner of the master in whose studio he was working, not from a desire of flattering, but because he had to do so, or his work would not have harmonised. There was a great difference between imitation that was the result of an obsession and imitation that was the result of a deliberate apprenticeship. The merest accident will often establish an obsession, but it needs far more to get rid of it. An influence could enter a young artist's nature by an unconscious self-inoculation, and not from personal pressure. He himself had been obsessed by Walker's art while he was still a student at Kensington. One contributory cause probably was that Walker's art struck a new note. It never occurred to him (Sir Hubert) to try and create an art that belonged to his own self. He fostered that type until he could or would look at no other painter's work, ancient or modern. Yet he never spoke to Walker in his life. Needless to say, he might have fallen under the spell of a far less satisfactory artist. But he could see most clearly now how the obsession of Walker's art had kept him back from the discovery of his own identity, and had disadvantages in no way commensurate with what he had gained. But youthful enthusiasm must always come before prudence. He at that time considered that the very defects of Walker had to be imitated at all hazards. The works of Titian, Rembrandt, and the other great masters were literally non-existent to him. But the obsession conferred the inestimable boon of making him look for truth in sentiment, and insist on sentiment in truth.

At the age of fourteen he was allowed to join the Southampton School of Art, where he fell under the influence of a student who attended evening classes. At that time he himself had read no art books, for his parents were too poor to buy them. But his fellow-student spent every penny he could get in purchasing such works, and, what was more important, he read them. Sir Hubert listened to him as if he were a god. More than half he could not understand (especially when he came to Ruskin's "Modern Painters"), but he thought it all wonderful, and drank eagerly at the fountain. His fellow-student showed him the landscapes he had painted. The shadows were purple. On his remarking on the extraordinary colours, he was told that Ruskin considered purple a healthy colour. That settled the question. Henceforth all his own shadows were to be purple. He was stricken with purpleitis. Seeing seventeen years afterwards a picture that he had painted while under that influence, he felt so mad with it that he asked the owner to allow him to exchange it for one that he had just finished and which he thought a good one. He brought the picture home, cut out one head for which a relative had sat, and then with infinite relish burnt the rest. Walker's art still influenced him when he came to the South Kensington schools, which were divided into two camps on the question It was pleasant in after years to let memory linger on the untrammelled enthusiasm of early days, but probably such students did not exist nowadays. In those days his iron will did him a bad turn.

The Walker influence was strong upon him when, in 1871, he visited the Bavarian Alps and prepared to paint his first Academy picture, *After the Toil of the Day*. On the day of his arrival with his father he was too impetuous to wait in the inn until the mists had rolled away from the mountains, and at once set out to explore. As he was walking down the village street a rift in the mist revealed the uppermost peak aglow with the rays of the setting sun—nothing but the peak, the rest being shrouded in vapour. It was a glory framed in grey with nothing to suggest its possible connection with the world. Next day when the peak was deprived of its mystery he felt the pain of his first disillusionment. In 1873 his first contribution to the Academy was hung on the line. At a glance many people took the picture for a Walker, so closely did he follow him.

He then resolved to make a large painting in oils of a picture he had drawn some years before for the *Graphic*—*Chelsea Pensioners in Church*. His friends declared that no painter could make anything of the mass of red coats, and that the public were not interested in old men. But such opposition rather strengthened his resolution. Probably no picture on an important scale ever proceeded in such a crazy and haphazard way. At Christmas 1874 the canvas had not been stretched, but he was determined that come what might it would be finished in time for the Academy. He had built a sort of studio in the back garden of his Chelsea lodgings, which measured 24 feet by 8 feet. Here he was handicapped by a near light; so near was it that once, when he was raising the picture up the easel in order to paint the boots of the men, the corner crashed through the skylight and sent a shower of glass on his head. All the architectural background had to be done with the help of a water-colour sketch, for he was not allowed to work on his canvas inside the chapel. He had to guess at the relative distances of the men as they sat in rows. The perspective of the black and white pavement slabs was likewise only arrived at by experiment. Towards the end of February it was still far from finished. By that time he found he could scarcely stand at his work, and a perpetual drowsy feeling came over him which he knew to be the forerunner of a breakdown. He was a total abstainer, and would not have recourse to stimulants. The picture must at all hazards be finished for that year's Academy—but how? Someone told him that he needed exercise; he had neither the time nor the strength for that. However, it struck him that there was something in the remark, and he luckily heard of a machine invented by an American that was said to have saved many overworked brains. It was called the "Health Lift." Some levers and two handles were arranged with a device which registered the precise weight one was lifting when pulling. He used it in every pause in his work. In eight days he felt a marked improvement, and in three weeks he was quite cured and able to lift 900 lb. The time was so short in which he had to complete his work that he unconsciously threw off the Walker influence. But when it was finished he hated it for that very reason. Shortly after sending it to the Academy he received letters of warm congratulation from Lord Leighton and Mr. George Richmond. The former, though unknown to him, gave kindly criticism; while the latter said that when the picture came before the selection committee they clapped their hands enthusiastically. Congratulations were showered down on him from every side. Three years later it obtained even greater success. At the International Exhibition of 1878 in Paris the jury awarded it the first of the ten gold medals of honour that were given to art. His name stood first on the list, having received more votes than any other painter, English or foreign. At the distribution of medals to the representatives of the different countries he and Millais received the two awarded to England. The *Last Muster* was exhibited at many exhibitions all over the world, and everywhere met with the greatest success. It was bought before it was sent to the Academy by the same person who had purchased his first work. The picture belonged to genre painting.

In 1882 he exhibited his portrait, *Archibald Forbes*, which met with considerable success. For the next two or three years he was chiefly represented by portraits of men who more or less resembled the massive war correspondent. Then it got noised abroad somehow that "Herkomer could not paint women." This was somewhat absurd, because no one had ever seen him try. However it had the effect of making him determine to do so. He chose as his sitter

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Miss Katherine Grant, who was English and not an American as had been often said, with whose type of beauty he was much in sympathy. However, he found that on a dark background her face seemed somewhat insipid. One day he chanced to put a light canvas behind her head. The effect was such that he determined to so represent her in the portrait. The novelty of it created something of a sensation both in this country and on the Continent. On one occasion when he was in Munich he was discussing a programme for the day with a guide to whom he was quite unknown. The guide said that he must see the portrait painted by an Englishman. They went to the gallery shortly after it was opened, and found that in front of the picture were grouped a lot of chairs for the use of the people who would be discussing it. On the merits of that portrait he still received commissions for other portraits in Germany.

In conclusion, Sir Hubert said it was a very daring thing he had done in lecturing on his personal experiences, but he begged that he would be absolved from any breach of good taste. The storm and stress of his life had enabled him to differentiate between self-laudation and a statement of facts, and it was only a statement of facts that he had given them.

MATERIALS.*

(*Concluded from last week.*)

BRICKS are made of burnt or baked argillaceous or clayey earth, and the quality of the bricks depends upon (*a*) the chemical properties of the earth; (*b*) the preparation of the earth; and (*c*) the different degrees of burning or baking.

The following is approximately the chemical composition of a good brick earth:—Silica, ⅔ths; alumina, ⅛th; free lime, magnesia, manganese, soda and potash, ⅛th. Clay or silicate of alumina forms the bulk of brick earths. It possesses the property of plasticity when damp, but upon the application of sufficient heat it gives off its water, losing its plasticity and becoming permanently rigid; by no known process can its plasticity be restored. It contracts and warps during burning. Silica is present either chemically combined with alumina and water, or free in the form of flint and sand. Its presence in clays produces hardness, resistance to heat, durability, and it prevents shrinkage and warping. According to Dr. Rideal, refractory fire-clays are of two classes:—(1) The silicate of alumina class, in which the alumina is about half the silicate, and the silica mostly in combined form; (2) the silicious class in which silica predominates up to about 90 per cent., mostly in the free state, and the alumina is low.

Lime, when present in brick earths, acts chemically on burning as a flux, causing the particles of the bricks to unite, producing greater molecular strength, and in small quantities diminishing contraction. An excess of lime causes the bricks in burning to melt and lose their shape.

Magnesia and iron influence the colour of bricks. Clays often contain various salts, and those containing a quantity of common salt when it is in excess acts as a flux, causing the bricks to warp and twist, in addition to which such bricks absorb atmospheric moisture for a considerable time.

Very few brick earths are found in such a condition as to allow of their being used without some special preparation. They are practically classed as plastic or strong clays, loamy clays, and marly clays.

Plastic clays contain silica and alumina, but very little lime, magnesia, soda or other salts, and are known as pure clays. For the manufacture of bricks these clays require the addition of silica and lime.

Loamy or mild clays contain quantities of free silica, and are known as sandy clays. To these lime is frequently added. Marls or calcareous clays contain a large proportion of lime, make good bricks, and are frequently used without the addition of other substances.

The treatment of brick earths may be performed by hand or machine, and is:—1st, the preparation of the brick earth; 2nd, the moulding; 3rd, the drying; 4th, the burning.

The chief methods of brick-making are (1) hand-moulded clump-burnt bricks, commonly called stocks; (2) the machine-made wire-cut kiln-burnt; (3) machine-made pressed or hand-moulded kiln-burnt bricks. The ordinary process of brick making is so well known I will not describe it, but Messrs. Eastwood & Co. have recently set up a process for making what are known as slop bricks by machinery, which may be of interest.

The brick earth, which is a thin superficial layer of natural clay, is dug and mixed with water until the mixture is of the consistency of cream; it is then run down iron pipes a distance of more than a mile, and is run into set-backs or shallow tanks formed in the ground, where it is mixed with the ashes or fuel with which it is burnt. After remaining there until the moisture is the consistency of dough, it is conveyed to a machine, in which it is forced into a mould the shape of a brick only larger, to allow for shrinkage. (The clay generally shrinks about one-tenth in all directions.) From this machine the brick is placed in an iron trolley and run into a kiln, which is 180 feet long, and by means of machinery the trolley passes slowly through the kiln; in twenty-four hours coming out at the other end of the kiln dried, and cool enough to handle. It is placed on a second iron trolley and enters another kiln, 180 feet long, in which the brick is raised to a red heat, and slowly allowed to cool as it passes in twenty-four hours to the other end of the kiln, when it is again cool enough to handle, and is taken and stacked ready to be carried away. This process does in forty-eight hours what takes by air-drying under hacks and burning in clamps four months, and the percentage of waste in the first case is not more than 3 per cent., and in the clamp-burnt bricks 25 per cent. to 30 per cent. Machine-made bricks on the Fletton system:—The operation consists in clay-getting, drying, grinding, sifting, pressing and burning. The clay, which is obtained from the Oxford clay formation and is a dense bluish-grey shale, is dug, dried on a drying-floor to expel superfluous moisture, and ground in a mill similar to a mortar mill, the receiver revolving and carrying the clay under the rollers. The bottom of the receiver is perforated, which allows the material when sufficiently ground to fall through as a coarse powder into a pit beneath. It is then elevated and shot into a revolving circular sieve; the material that is sufficiently fine passes through, the remainder is conveyed back to the grinding mill. The sifted powder falls into a hopper, from whence it is passed to the pressing machine, where by an ingenious arrangement it is measured off and passed under the die, when it is pressed into the form of a brick and removed automatically from the mould. The bricks are then placed on barrows, and slacked in the kiln, which is of the Hoffmann type, and then burnt. The time from digging the clay to the slacking in the kiln need not occupy more than fifteen minutes; the time taken to burn the bricks usually occupies about three weeks. Bricks made by this process are being sold in the brickfields at 9*s.* per 1,000, though it is said that they cost 12*s.* 6*d.* per 1,000 to make. The danger of the process is that the Oxford clays contain many fossils, such as ammonites, billimites, &c., and the men who dig the clay are paid 1*s.* 6*d.* per bushel to pick out the fossils; those that are not thus taken out pass into the mill and are ground up with the clay, and on burning are made into free lime. When bricks containing these small particles of lime are built in walls the moisture from the mortar slacks the lime, and it expands and blows the bricks to pieces.

Sand-faced bricks are of a beautiful red colour and texture, often made by hand and pressed by machinery; they are kiln-burnt, and in selecting them great care has to be taken to see that they are sufficiently burnt; the rough test is to sound them—the well-burnt ones have a ring, while the slack-burnt ones sound dull.

Rubbers are similar bricks only always hand-made and of a uniform colour and texture throughout; they can be moulded by cutting with a steel-twisted wire saw and filing; also they can be carved. They are made red and white, but the red ones are the more satisfactory.

Pressed bricks as a rule are made from stiff plastic clay, if white from gault; the red colour is due to oxide of iron, the white to lime, usually in the form of chalk. A new form of white brick is now being made by mixing lime and white sand and pressing the mixture in a mould; they are known as Acme bricks.

Glazed bricks are usually made from stoneware clays, and are either salt-glazed—that is, salt is thrown into the kiln to produce the glaze—or are dipped in a slip of specially prepared clay when half-burnt, which produces a smooth china face.

The various forms of paving-tiles are made of stoneware pressed in moulds, and either coloured by various oxides, or the tiles are what is called enamelled or glazed when they are dipped in slip exactly like the glazed bricks. Encaustic tiles have a pattern sunk in them in which various slips are placed, and when fired these change to permanent colours;

* A paper by Mr. H. D. Searles-Wood, read at the meeting of the Architectural Association on January 8.

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and beautiful examples are to be seen, especially in old Spanish buildings.

Of late years glass tiles have been largely used for wall surfaces and there are many varieties on the market; the only difference in them consists in the method of preparing the backing by which they adhere to the cement which secures them to the wall, the great difficulty being to overcome the difference of expansion between the glass and the wall in varying temperatures. If this is not overcome the glass cracks and comes away from the wall, and many unfortunate examples can be seen in London; on the other hand, the Central London Railway stations are splendid examples of this class of work.

The science committee of the Royal Institute of British Architects carried out some experiments on the strength of brickwork, and the results, which have been given from time to time in papers read at the Royal Institute, have now been collected in book form and can be obtained at the Institute. The bricks experimented on were London stocks, gaults, Leicester red, Staffordshire blue and Fletton. Single bricks, and in some cases half-bricks, of each kind were tested, and also the lime mortar and Portland cement mortar, and similar bricks built in piers or walls were tested, and at the end of the book you will find a table of averages giving the rates between the crushing weight of the brick and the crushing weight of the pier or wall. The book contains all the facts connected with the experiments and illustrations of the piers and walls under pressure and after failure, so that anyone can work out for himself the different ratios that he may want in connection with his own work; and the book is a very valuable record of an interesting series of experiments. I may mention that the building of the piers for series I. and II. was executed under the supervision at intervals of two members of the science committee, and a record of progress was kept, so that the age of each pier at the time of testing could be ascertained. The piers were built by a large firm of contractors at daywork prices, and it is with regret that the committee have to state that during the absence of the members the bricklayers, finding the Leicester red and Staffordshire blue bricks very hard to cut, filled in a great portion of some piers with closers of London stocks. This for experimental purposes destroyed the value of these piers, and the committee were obliged to have fresh piers built, but it incidentally affords a sample of jerry work which goes on under conditions when it would appear impossible. A comparison between these faulty piers and those built under the clerk of works affords some useful information, as it may be taken that similar scamping work occurs every day.

The subject of the standard size of bricks was taken up by the science committee in 1897, and a conference with representatives of the Institute of Civil Engineers and the Brickmakers' Association was held.

Now that the Royal Institute of British Architects has fixed the standard size of bricks it may be of interest to say a word or two on the subject. The standard size is:—1. The length of the brick should be double the width, plus the thickness of one vertical joint. 2. Brickwork should measure four courses of bricks and four joints to a foot. Joints should be ½ inch thick, and an extra $\frac{1}{8}$ inch, making $\frac{5}{8}$ inch for the bed joints to cover irregularities in the bricks. This gives a standard length of 9¼ inches centre to centre of joints.

The bricks, laid dry, to be measured in the following manner:—

A. Eight stretchers laid square end and splay end in contact in a straight line to measure 72 inches.

B. Eight headers laid side by side, frog upwards, in a straight line, to measure 35 inches.

C. Eight bricks, the first brick frog downwards and then alternately frog to frog and back to back, to measure 21½ inches.

A margin of 1 inch less will be allowed as to *A*, and ½ inch less as to *B* and *C*.

This is to apply to all classes of walling bricks, both machine and hand-made.

The size has been arrived at after a careful consideration of long lists of different sizes of bricks from all over the United Kingdom and Ireland, and, as will be seen, it is about the average size of London stocks. It is hoped that the brick users in the North will come into line, although no doubt it will take some time for the builders who have been accustomed to the larger bricks to take up this smaller size.

On the other hand, many architects object to the standard of four bricks and four courses measuring 1 foot, and say that, although they agree with the proportion of length to width, because that is the only way that good sectional bond can be made, the height of the four courses does not affect the question of bonding, and they would like this left open, so that those who want five courses of bricks and five joints to the foot can have them. I think that it is obvious that the standard must fix all the dimensions of a brick, and that it would be very undesirable to leave the height out of the standard, but there is no reason that I can see why architects who want the thin bricks should not have them in spite of the standard if there was sufficient demand for fancy sizes. Brickmakers would, I presume, always be willing to make them to order, and in fixing the standard we have pointed out that it applies to walling bricks only, as we thought it would be unwise to try and standardise facing bricks, at all events for the present.

The margin in the measurements is intended to allow for the difference between the walling and ordinary facing bricks. Most builders want the full bricks that measure 9 inches by 4⅜ inches by 2$\frac{1}{8}$ inches, with the $\frac{5}{8}$ inch bed joint, and the minimum brick that measures 8⅞ inches by 4$\frac{5}{8}$ inches by 2⅜ inches with the ½ inch bed joint would suit nearly all the usual stock-sized facing bricks.

The value of the standard to those brickmakers who have been making their bricks of the London stock size, and who have felt the unfair competition of those makers who have reduced the brick to lessen the cost of the carriage, will be that the bricks against which they have found it so hard to compete will now be brought up to a definite test, and will not be used where the standard is inserted in the specification.

There is another question that will have to be settled sooner or later, and that is the size of the frog. In some of the glazed bricks the frog has been so exaggerated that a section of the brick looks like the letter H; it is obvious that the strength of the brick is seriously reduced, and when used where there is much weight or exposed to the effects of fire the face flies off. In order to meet this it was suggested to try a brick with three 1-inch diameter holes; this would give 1$\frac{1}{8}$ inch bearing on each side, and 1½ inch between the holes; these holes would be also excellent for grouting up perpends and help the bricklayer in cutting closers.

Whether this would be open to the same objection as the perforated bricks with the smaller sized but greater number of holes I am unable to say, but these bricks are apt to fly when exposed to the effect of fire and water. The size of the frog is a serious item also, now that so much brickwork is carried out with cement. The best form of frogs are the two square shallow sinkings, but for brickwork in cement bricks are often specially made without frogs.

It would be interesting to know what amount of success attends the various fancy forms of bricks that are brought out, a fresh one almost every year; the only place that I have ever seen them has been at the Building Trades Exhibition. It seems hard that so much ingenuity and time should be wasted—or perhaps not wasted, but at all events lost.

Some few years ago Mr. Alan Munby drew up a very useful list of questions on building stones, and architects were invited to return the form filled up, with a view to procuring reliable reference on the subject of building stones, and the result was the presentation by Mr. Scorer of an interesting collection of building stones and information on the subject to the Architectural Association. The matter has not been carried on, but it is a pity that it should not have been worked out, as there is undoubtedly a great need for such information.

Structure can only be studied by microscopic sections, of which there are a good many at the Geological Museum, and a scheme to form a students' collection of building stones, giving all the information set out on this form, is in course of formation.

Strength Under Cross Strain.—Stone is a weight carrier with little transverse and less tensile strength. Use it, therefore, freely in compression, with caution in lintels and never in tension. Bring pressure upon it at right angles to its natural bed, or in the case of slate to its line of cleavage.

Uses.—A careful study of stone is necessary to know what are the purposes each is best suited for. In London Portland stone is considered the best, and other limestones, such as Bath, &c., are frequently used. The sandstones of Yorkshire and Forest of Dean are mostly used for landings and steps.

Chemical Analysis.—The value of this is the indication it gives of the lasting properties of the sample in sand-

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stones; the nature of the cementing material which holds together the particles of silica is of all importance.

The sulphuric acid found in the atmosphere of large towns, the carbonic acid in the country atmosphere, will ultimately decompose any stone containing a large part of either carbonate of lime or carbonate of magnesia.

The oxygen of ordinary air will act on stone containing much iron. The average humidity of the neighbourhood in which the stone is to be used is another point, as the destructive acids penetrate more deeply into a wet than a dry stone and the frost has a greater effect. The position of the stone also has a bearing on the question; stones that are always in the shade and never dried by the sun decay most rapidly.

Any stone exposed to very different degrees of heat on its different surfaces is liable to crush from unequal expansion and contraction, and for this reason stone buildings are not so fire-resisting as brick buildings, and in the tariff regulations for insurance are charged for accordingly.

The readiness with which stone can be converted into the various shapes in which it is required for different kinds of work will depend in some cases upon its hardness, but will also be influenced by the soundness of its nature, by its freedom from flaws and also by its natural cleavage. A soft stone of even grain and without distinct beds would naturally be selected for carved work, while a hard stone in thin layers easily separated would be well adapted for building good and economical rubble masonry.

The pediments to the new Government offices recently built in Parliament Street were intended to be carved, in order to keep the joints in such position as they may interfere least with the carving blocks of stone, weighing 7 tons, which had to be hoisted 120 feet into the air and moved about on the scaffolding. When these are fixed in their places it is reckoned that the sculptor will cut away 50 tons of stone to produce the carving.

Hardness.—The hardness of stone is often of importance, but it does not follow because a stone is hard that it will weather well. Many hard stones are more liable to atmospheric influence than those of softer texture, whose chemical composition is of more durable nature.

The structure of wood affords the only reliable means of distinguishing the different kinds. Colour, weight, smell and other appearances which are often direct or indirect results of structure may be helpful in this distinction, but cannot be relied upon entirely.

Structure underlies nearly all the technical properties of timber, and furnishes an explanation why one piece differs as to these properties from another.

Structure explains why oak is heavier, stronger and tougher than pine, why it is harder to saw and plane, and why it is much more difficult to season without injury. From its less porous structure alone it is evident that a piece of a young and healthy oak is stronger than the porous wood of an old or stunted tree, or that Georgian or long-leaf pine excels white pine in weight and strength. Keeping especially in mind the arrangement and direction of the fibres of wood, it is clear at once why knots and cross grains interfere with the strength of timber.

Timber is furnished by two well-defined classes of trees—the needle-leaved, naked, seeded conifers (pines, cedars, &c.) and the broad-leaved trees (oak, poplar, &c.). The first are commonly called evergreens; the latter are known as deciduous trees. In the timber trade the woods of broad-leaved trees are known as hard woods, and the needle-leaved trees as soft woods.

In the manner of growth both conifer and broad-leaved trees behave alike, adding each year a new layer of wood, which covers the old wood in all parts of the stem and limbs. Thus the trunk continues to grow in thickness throughout the life of the tree by additions (annual rings), which in temperate climates are, barring accidents, accurate records of the tree.

Examining a smooth cross section or end face of a well-grown log of Georgian pine, you can see an envelope of reddish scaly bark, a small whitish pith at the centre, and between this the wood in a great number of concentric rings. A zone of wood next to the bark one to three or more inches wide and containing 30 to 50 or more annual rings is of lighter colour; this is the sap wood, the inner or darker part of the log being the heart wood. In the former many cells are active, and store up starch and otherwise assist in the life processes of the tree, although only the last or outer layer of cells (the cambium layer) forms the growing part and the true life of the tree. In the heart wood all cells are lifeless cases, and serve only the mechanical function of keeping the tree from breaking under its own great weight or from being broken by the wind. The darker colour of the heart wood is due to infiltration of chemical substances into the cell walls, but the cavities of the cells in pine are not filled up as is sometimes believed. Sap wood varies in width and in the number of rings which it contains; even in different parts of the same tree the same year's growth which is sap wood in one part of a disc may be heart wood in another. In a pine 250 years old a layer of wood or annual ring does not change from sap wood to heart wood until seventy or eighty years after it is formed, while in a tree 100 years old or less it remains sap wood only from thirty to sixty years, occupying the peripheral part of the trunk. The proportion which sap wood forms of the entire mass of the stem is always great. Thus even in old trees of long-leaf pine the sap wood forms about 40 per cent. of the merchantable log, while in young trees the bulk of the wood is sap wood. Holding a well-smoothed disc $\frac{1}{8}$ inch thick towards the light it is readily seen that pine wood is a very porous structure. If viewed with a strong magnifier the little tubes, especially in the spring wood of the rings, are easily seen, and their arrangement in regular, straight radial rows is apparent. Scattered through the summer wood portions of the rings numerous irregular greyish dots (the resin ducts) disturb the uniformity and regularity of the structure. The total length of the fibres is $\frac{1}{10}$ inch to $\frac{1}{4}$ inch, being smallest near the pith and is 50 to 100 as great as their width. They are tapered and closed in at their ends and thin walled with a large cavity or internal space in the spring wood, while they are thick walled and flattened radially with the internal space much reduced in the summer wood. The flattening together with the thicker walls of the cells produces greater firmness and darker colour; that is to say, there is more material in the same volume.

The dark lines on the side of the smaller piece appear when magnified as tiers of eight or ten rows of cell lying in vertical radial planes and are seen as bands in the radial face. These bands are the "medullary rays," and are common to all timber woods. In the pines they are quite small, but they can be readily seen even without a magnifier if a radial surface of split wood (not smooth) is examined. The entire radial face will be seen almost covered with these tiny structures, which appear as fine but conspicuous cross lines. The cells of the medullary rays are smaller and very much shorter than the wood fibres, and their long axis is at right angles to that of the fibres.

The large vertical resin-ducts are best observed on the removal of the bark from a fresh piece of white pine cut in winter, when they appear as white lines. Neither the horizontal nor the vertical resin-ducts are vessels or cells, but are openings between cells; that is, intercellular spaces in which the resin accumulates, freely oozing out when the ducts of a fresh piece of sap wood are cut. They are present only in coniferous woods.

The Anatomical Structure of Broad-leaved Trees.—On a cross section of oak the same arrangement of pith and bark, sap wood and heart wood may be seen, and the same disposition of the wood in well-defined concentric rings, but the rings are marked by lines or rows of conspicuous form or openings which occupy the greater part of the spring wood, and are, in fact, the openings through the vessels cut by the section. On the radial section the several layers appear as so many parallel stripes in the tangential face; patterns similar to those mentioned for pines are seen. But while the patterns in hard pines are marked by the darker summer wood and are composed of plain alternating stripes of darker and lighter wood, the figures on oak are due chiefly to the vessels, those of the spring wood being the most conspicuous, so that the darker shaded parts are the spring wood, the lighter parts the summer wood. Scattered through the radiating grey patches of porous wood are vessels similar to those of the spring wood, but decidedly smaller. These vessels are usually fewer and larger near the spring wood, and smaller and more numerous in the outer portion of the ring. Their number and size can be used to distinguish the oaks classed as white oaks from those classed as black and red oaks. The summer wood, except for these radial greyish patches, is dark coloured and finer. This finer portion, divided into bodies or strands by thin patches of porous wood and also by fine wavy concentric lines of short, thin-walled cells, consists of thick-walled fibres and is the chief element of strength in oak wood. In good white oak it forms one-half and more of the wood; it cuts like horn, and the cut surface is shiny and of a deep chocolate-brown colour. The large medullary rays in oak are often twenty and more cells thick and several hundred cells in height.

Mr. W. H. WHITE, who proposed a vote of thanks to the

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author for his paper, said the question of materials was perhaps not so fascinating to the younger members of the profession as that of design, but it was of great importance to them and to their clients. It was upon their practical knowledge of materials that they would be able in practice to steer clear of the pitfalls which increased year by year for the architect. Every opportunity should therefore be taken by them to collect data, and in making such tests as they could upon materials in actual practice, because cases of litigation were becoming more and more frequent upon the question, and even experienced architects found it necessary to pay special attention to it. The speaker thought that the students in their visits to buildings in course of erection should carefully note and examine all materials that came under their notice, and if possible make experiments for themselves. He quoted a case in which some plastering on a job was found to be defective, and the surveyor, after examining the work, said the fault was due to bad sand. The speaker was able to prove, however, by a simple experiment on the spot, that the materials used were good and sound, and the defect was merely accidental. That was a practical illustration of the value of experiments which all of them could carry out. The difficulty was in knowing when they must and ought to condemn materials. It was easy to pass the best, but occasions arose which tested their knowledge in the other direction. In the course of a lecture of the kind they had heard that evening, it was quite impossible to touch upon more than a certain number of materials. Mr. Searles-Wood had, however, given them a lot of information which would serve as well as text-books. In conclusion, he said he wished to emphasise the point that the subject of the examination of materials was often left too late, until they had got into practice. Even before that stage they should have such knowledge as would enable them to give a decision quickly and with such precision that it would carry weight and show they understood their business. That could only be done by handling the materials and making experiments, and ascertaining what was best by notes and careful observations.

Mr. MATT GARBUTT seconded the motion, and said the author in his paper seemed to deal chiefly with concrete and its constituents and principally with concrete in relation to ferro-concrete structures. He noticed that when speaking of the aggregates to be used in concrete, Mr. Searles-Wood naturally referred to the point which to the ferro-concrete man was most important, namely, the strength of the aggregate, but he did not say that some of the materials mentioned, such as cinder, coke breeze, &c., were extremely dangerous. The paper referred also to the desirable test load as being not more than one and a half times the accidental load. He believed that that was sometimes put into specifications, but it appeared to him important that some general statement ought to be made as to the factor of safety which modified some of the rules of the accidental load. If they allowed a structure to be loaded beyond its elastic limit for any great length of time it would fail, a fact illustrated in many old buildings, especially in brickwork. As to the use of cement to the exclusion of lime in concrete, there again Mr. Searles-Wood had looked at the question from the point of view of the ferro-concrete man who wished to know what would happen to a structure during its first years of life with as much precision as possible. Of course they could not prophesy quite so well what would happen to a structure in which lime formed a constitutional part. On the other hand, in structures where concrete was wanted in mass, and they were not ferro-concrete structures, lime had advantages. He agreed with the author of the paper that for ferro-concrete work Portland cement only should be employed to the exclusion of cheaper and less reliable materials, but he did not know whether chemists were at present absolutely satisfied with the permanent stability of Portland cement as compared with materials in which hydraulic lime of some sort was used. In speaking of the preservation of iron in concrete, old illustrations were sometimes safe, though it was not always mentioned that in such instances the lime used was hydraulic lime of some kind, but still it was not Portland cement. The chain round the cone of St. Paul's was a popular example. The point which was made about particles of lime in certain bricks was important to the young architect, and he could not attach too much responsibility to the refusal of such bricks. If they noticed white specks on bricks the safe policy was to reject them; they might be harmless, but if the spots were lime, caused from ground fossils, the particles would in time cause the bricks to swell, and so loosen the structure and cause grave trouble.

Mr. HAMPDEN W. PRATT said he was more specially interested in the part of the paper which dealt with brickwork. One seemed to have to do with bricks in every building, and the difficulties to be surmounted could hardly be realised until one came to deal with them in actual practice. As to the standardising of bricks they had heard a great deal about it, but so far as he could judge nothing had been carried out. Manufacturers had been approached and requested to put on the market the dimensions definitely specified, but they had met the proposal only to a very limited extent. The principal difficulty he found in dealing with bricks of different sizes was when work had to be faced on both sides. It was mostly in the thickness of the brick that the difficulty lay. Standardisation would be an advantage, but in hand-made bricks it was almost impossible to work to a size, and the only hopeful solution was in a machine-made brick. With regard to pressed bricks and those machine-made, he would have liked to have heard some comparison drawn between them as to the various qualities and advantages. Machine-made bricks seemed now to imitate the hand-made, and sometimes it was difficult to distinguish between the two. He wondered whether Mr. Searles-Wood had come across a brick he, the speaker, had used in a small quantity. It was a brick made in this country under a German patent, and the process of manufacture was by boiling instead of baking. It had exceedingly good texture, good shape, and was made in several colours. In the Reading district this brick had been largely used, and was said to be a good weather material.

Mr. H. A. SATCHELL agreed that the study of materials was more important to the architectural student than designs, for when starting practice they should be conversant with the pros and cons of all building materials, and knowledge of that kind was only acquired by careful preparation and study. It was difficult to understand why certain bricks had lost their reputations, and he concluded the cause was mainly due to the introduction of new makes. It was disconcerting to hear that in the experiments carried out under the very eyes of the Institute irregularities had been discovered in the bricklayers' work. When the science standing committee of the Institute found it difficult to get honest workmanship in their tests, it became hopeless for the architect in practice to expect better treatment. He wished Mr. White would take them into his confidence and explain the rough and ready test he applied to ascertain the character of the plaster which proved to be unjustly condemned.

Mr. W. H. WHITE in response to the last speaker, and at the President's request, said they would find that by taking a piece of old lime plaster, pounding it up, and putting it in a glass of water and shaking it the sand would settle on the bottom, and in due proportion to the specific gravity the lime would float on the top, and the hair, if there was any, above it.

The vote of thanks was carried by acclamation, and Mr. Searles-Wood briefly replied.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.

AT a meeting of the above Society on the 14th inst., Mr. H. Phillips Fletcher, F.R.I.B.A., F.S.I., A.M.I.C.E., read a paper on "Georgian Domestic Architecture."

Mr. Fletcher explained that Georgian architecture was the name given to the architectural style principally in vogue in the eighteenth century, and noted that it was the English expression of the great Renaissance movement.

He traced the influence of Inigo Jones and the effect of his visits to Italy in the middle of the seventeenth century. He also pointed out how Wren nurtured the style with his borrowings from the architecture of the Netherlands, producing buildings so peculiar to this period. The lecturer attributed the decay of Georgian work to the age of the succession of revivals and pointed out its reintroduction some twenty years ago under the name of Queen Anne.

A house in the Close at Salisbury was taken as typical of the smaller house, and the well-proportioned sash windows and stout wooden bars were noted, the most predominant feature being perhaps the central doorway with its consoles and the boldly projecting consoled cornice.

The lecturer then analysed the characteristic features of the style and remarked that Wren popularised red brick walls, although in suitable districts stone was much employed. The Swan House in Chichester was quoted as a good example of rubbed brickwork with the employment of raised blocks at the angles.

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A doorway at West Wycombe was taken as being a simple and satisfactory example in which fluted pilasters and a simple cornice were used. It was pointed out that doorways were finely executed in wood, and formed a strong contrast to the Italian marble doorways of the same period. The doorway at Mr. Seymour Lucas's house with its typical shell hood was also shown on the screen.

The windows of the sash type set flush with the wall were taken as being typical of the style, and it was noted that such windows were considerably smaller than those of the Jacobean period.

The introduction of external shutters from Italy was also borne in mind and their effect upon the scale and appearance of the buildings was also considered. It was pointed out that the cornices projected boldly and formed special features, and it was also shown that they were frequently of wood and often carried right round the house. The method of roofing was then dealt with, and that at Tyttenhanger, Herts, was taken as being characteristic. The effect of its reposeful skyline and the dignity and unity of design were contrasted with the numerous gables so frequent in many modern houses. The feature that Georgian architects made of chimney stacks and their symmetrical grouping was also dwelt upon.

The lecturer then dealt with the treatment of internal work. Commencing with the walls, he pointed out the frequent division of the same into three, viz. the low dado, the large panel and the cornice, which gave a certain breadth to the whole which was sometimes wanting in Jacobean work. The framing of the doorway in one of the Classical orders was also noticed. Examples of the rich treatment of the fireplaces were also placed upon the screen.

The lecturer also described the bold and effective Georgian staircases and the geometrical treatment of the ceilings.

Mr. Fletcher then dealt with the grouping of smaller houses together, which produced such fine designs, and took the terraced houses at Stamford as characteristic of the style. He then showed an example of another house in Salisbury Close, showing the plain simple treatment for a detached town house.

Eltham House, Kent, was treated as a good example of the simple block plan for a country house, and Groombridge Place, Kent, was shown with its H shaped plan.

Houses having a centre block with wings were then dealt with, and many slides of Stoke Park, Northants, Blenheim Palace and many other buildings were shown upon the screen. The town mansion was then dealt with, and Marlborough House, London, and Kensington Palace were shown.

In conclusion, Mr. Fletcher pointed out the appropriateness of the different buildings to their special requirements, and the homely comfort of the smaller buildings contrasting with the stateliness and grandeur of the large buildings. He also noted the tendency in certain directions towards simplicity in design at the present time, and hoped that the study of Georgian architecture would assist in this direction, and specially pointed out that the motif of much of the Georgian work was suitable for houses of the present day. He said that he thought the successful results of the period were due to a very large extent to the very extensive and diverse attainments of so many of the Georgian architects, which gave them the facility of grasping at once the measures that in each individual case would be appropriate. He considered that the versatility and refinement in Georgian design was due largely to the liberal education of the architects, who did not confine themselves to the study of their profession alone, but many were in addition either skilled mathematicians, astronomers, dramatists, and even, so it is rumoured, not indifferent performers with the rapier. The lecturer thanked his brother, Mr. Banister Fletcher, for having placed his collection of slides at his disposal, and he mentioned the fact that this marvellous collection contains over 7,000 slides, a very large number of which were made from photographs specially taken in various parts of the world by Mr. Banister Fletcher.

Mr. R. B. Preston, architect, South King Street, Manchester, and Disley, has been successful in a competition for a library at New Mills, Lancashire.

Mr. Banister Fletcher will deliver an illustrated lecture on Monday next at the University of London, South Kensington, on "The Belgian and Dutch Renaissance."

The Louth Antiquarian Society have arranged, subject to satisfactory terms, to lease a site for a museum in Enginegate for seventy-five years from the Town Council at 5*s.* a year.

Correspondence

[The Editor will not be responsible for the opinions expressed by Correspondents.]

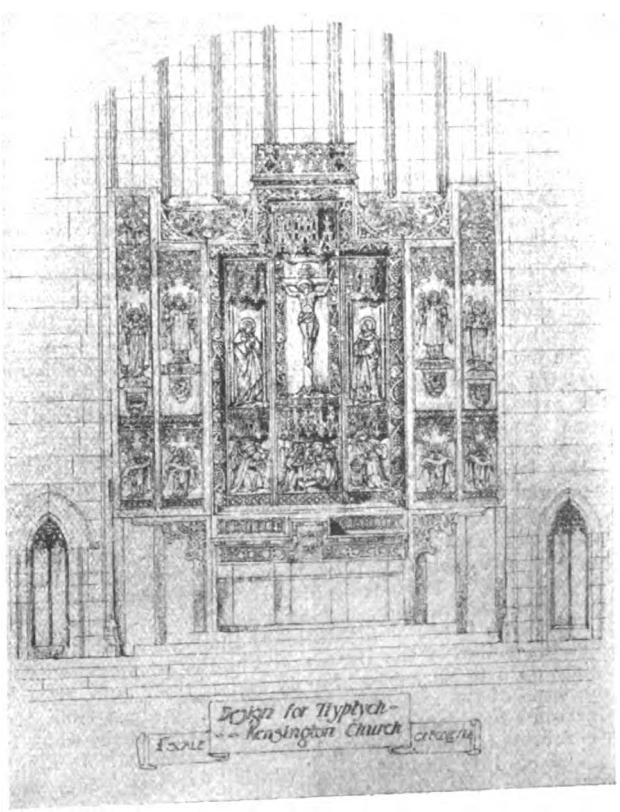
Architects Beware!

UNDER this heading we inadvertently published two letters signed "F.R.I.B.A." and "Another F.R.I.B.A.", on November 27 and December 4 last. The first letter, by way of warning architects, cast aspersions upon a highly respectable stone-cleaning private company recently incorporated, though its name was not actually mentioned, stating or implying that the directors were unfairly exploiting the names of well-known architects in order to obtain capital for the company. The second letter echoed the sentiments of the first. The architects alluded to had been invited to witness a small demonstration of stone cleaning, but no use has been made by the directors of the fact that some of them attended, and the company has never appealed to the public for financial support, being as before mentioned a private company with the necessary capital already subscribed. We find that the statements of fact in the letters are quite untrue, and we regret that we allowed them to be published.

Memorial to the late George Frederick Bodley, R.A., D.C.L.

SIR,—A desire has been widely expressed among the personal friends of the late Mr. G. F. Bodley that a suitable memorial should be erected to record his eminent services to the cause of art and architecture.

A representative committee has been formed to carry out



this object and invite subscriptions for the purpose. At a meeting of the committee held in the parish room of the Church of the Holy Trinity, Kensington Gore, on Wednesday, December 9, 1908, it was unanimously resolved:—(1) That a suitable memorial should be erected in the Church of the Holy Trinity, Prince Consort Road, Kensington Gore, one of the most recent and most beautiful churches built by Mr. Bodley; (2) that it should take the form, if funds permit, of erecting the noble reredos which he himself had designed and so much desired to see carried out; (3) that a commemorative tablet, with a portrait of Mr. Bodley and suitable inscription, should also be erected in some other part of the church.

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The committee feel assured that there are many friends and admirers of the late Mr. Bodley who would like to associate themselves with this memorial, but whose addresses being unknown, can only be reached through the public Press.

An account has been opened at the London and County Bank, Knightsbridge, S.W., into which cheques may be paid, made payable to the "Bodley Memorial Fund," or they may be sent to the hon. treasurer, the Rev. H. B. Coward, M.A., Church of the Holy Trinity, Prince Consort Road, Kensington Gore, S.W., by whom they will be acknowledged.

Signed on behalf of the committee, HALIFAX.

Plumbing and Plumbers.

SIR,—I am directed by my committee to state in reference to the letter from Mr. W. Challoner appearing in your issue of January 8, that this Association repudiates Mr. Challoner's apparent assumption that he is the only person entitled to speak authoritatively on behalf of plumbers generally in this country.—Your obedient servant,

A. A. ADAMS, Secretary.

The Associated Master Plumbers, 16-17 Devonshire Square, Bishopsgate, London, E.C.: January 15, 1909.

Winchester Cathedral.

SIR,—I am pleased to see in your current issue the letter from Mr. T. G. Jackson, as it relieves my mind of some doubts that have troubled me, as an architect and an Englishman, with reference to Winchester Cathedral. I am glad to learn that when paragraphs go the round of the Press announcing that further donations are required from the public in consequence of the "discovery" of further defects, we are to understand the word "discovery" in the limited technical sense in which it is employed by lawyers, and for which in ordinary parlance we should say "disclosure."

In the appeal printed and circulated on behalf of the Winchester Cathedral Fabric Fund, and containing a list of donations to April 26, 1906, amounting to close on 16,000*l.*, reports by Mr. Jackson and the late Mr. Colson are given, but "extracts" only from Mr. Jackson's report of July 3, 1905. Appeal is made for a further sum of 12,000*l.*, and the public might justifiably understand that the works mentioned by Mr. Jackson and Mr. Colson, when carried out at the cost of 28,000*l.* or within a reasonable margin of that amount, would make the fabric of Winchester Cathedral safe. But in the year 1907 further defects were disclosed to the public, and appeal was made for contributions to the amount of 86,000*l.* In 1908 a yet further appeal for 7,000*l.* was made, and as a justification were disclosed the works to the north transept and the buttresses of the north aisle, not a word about which is mentioned in the appeal to which I have first referred.

In my own practice as an architect I have always found that the Philistine, whom Sir Hubert Herkomer defines as the average man of average intellect, when disturbed by some untoward manifestation in his building, requires a complete examination and report upon the whole building, and I advance on behalf of the Philistine, to whom the Dean and Chapter must look for the funds they require, that he is justified in supposing that such an examination and report on the whole fabric of Winchester Cathedral has been made by Mr. Jackson. Why, then, these belated discoveries, disclosed, as we learn from Mr. Jackson's letter, long after they have been made?

Criticism is one of the duties of the Press, and I submit that the policy of the Dean and Chapter of Winchester is fairly open to criticism. Surely it was their duty prior to the issue of the appeal in 1906 to have obtained from Mr. Jackson a complete report as to the condition of the whole of the fabric of Winchester Cathedral. Possibly Mr. Jackson's report of July 3, 1905, from which "extracts" only were given, was such a complete report.

Surely it would have been wise to disclose then the whole situation, and to have appealed for 100,000*l.* or a quarter of a million, or whatever amount Mr. Jackson might have advised as necessary to put into a safe condition the whole fabric.

The Philistine, who in response to an appeal for 28,000*l.* has given 100*l.*, might then, if his means permitted, have subscribed 500*l.* Now he has probably bestowed his charity on some other deserving object.

I regret that my somewhat loose use of the words "the east end of the church" has apparently misled Mr. Jackson as to the buttresses to which I referred. If I had said "eastern part of the church," he might perhaps have inferred that I meant the buttresses to the south aisle of de Lucy's building, which are mentioned in the report of the late Mr. Colson as having a similar influence to that of the buttresses to the north aisle.

I still think that my suggestion as to the penetration of cement grout to the peat is not unfounded. The fissures in the walls extended to the foundations, as may be seen from the photographs in the appeal of 1906, and below the foundations was merely a very thin stratum of soft chalky marl above the peat, easily penetrated by a bar, as is described in Mr. Jackson's own report. Mr. Francis Fox, in his lecture at the Institute, told us that twenty-five tons of cement were injected into one hole. Who can say where this enormous quantity went? The effectiveness of the repairs to Winchester Cathedral must to a large extent depend upon the absolute infallibility of the grouting machine, and I submit that it is perfectly legitimate criticism, and in no sense "captious," to call attention to facts, the knowledge of which is public property, that apparently discredit that infallibility.

THE AUTHOR OF THE ARTICLE "ARCHITECTURE IN 1908."

GENERAL.

Mr. Edwin T. Hall, V.-P.R.I.B.A., will open to-day, the 22nd inst., a discussion in the Municipal School of Technology, Manchester, on "The Manchester Royal Infirmary from the Hygienic, Sanitary and Æsthetic Points of View" in connection with the Royal Sanitary Institute. Mr. E. T. Hall will be followed by Mr. John Brooke, F.R.I.B.A.

John W. Beatty, director of Fine Arts, Carnegie Institute, Pittsburg, announces the dates for the thirteenth annual international exhibition of paintings in oil at the Carnegie Institute. Entry blanks must be received from Europe on or before February 25 next.

Mr. W. Kaye Parry, M.A. Dublin University, M.Inst.C.E., F.R.S.I., has been appointed external examiner in sanitary engineering in the Faculty of Technology in the Victoria University of Manchester.

Mr. James Neale, F.S.A. and F.R.I.B.A., who was Pugin Student in 1875, died on the 18th inst. very suddenly at 10 Bloomsbury Square, W.C.

A Meeting of the Architectural Association of Ireland was held last week in the Leinster Lecture Hall, Molesworth Street, Dublin. The president, Mr. Edwin Bradbury, M.R.I.A.I., occupied the chair. The principal speaker was Sir Aston Webb, R.A., F.R.I.B.A., whose subject was "A Talk to Students."

Mr. Francis Griffiths has added to his series, "The Library of First Principles," a new illustrated volume entitled "English Church Architecture," by Mr. G. A. T. Middleton, A.R.I.B.A.

The Special General Meeting of the R.I.B.A., announced for the 25th inst. to hear a paper by Mr. W. Dunn on the "Amendment of the London Building Acts," has been indefinitely postponed.

The Council of the Surveyors' Institution have decided that after the election of members to be held in October 1913 no examination candidate shall be eligible for election as a Professional Associate unless he has passed both the intermediate and final examination of the Institution. As a consequence of this change, after the present year candidates for the intermediate examination will be allowed to sit at the age of nineteen and for the final examination on completing their twenty-first year.

The Sum of 20,347*l.* is still required for the completion of the works at Winchester Cathedral. The estimated total expenditure is 86,806*l.*, and of this 66,458*l.* 11*s.* 5*d.* has been received or promised.

Messrs. Briggs & Wolstenholme, architects, of Liverpool and Blackburn, have been commissioned, it is reported, to draw plans for the erection of big works at Flint, on the Cheshire border of Wales, for the manufacture by a German firm of a patent lustre silk. The cost of building will be about 50,000*l.*

The Board of Directors of the American Institute of Architects recommends that the gold medal of the Institute be awarded biennially, alternately to a foreigner and to an American: that the recipient be nominated by the board; that, subject to the ratification of the convention and his attendance in person, it be conferred at the following convention. This year the board of directors recommends that the gold medal of the A.I.A., the first to be conferred upon an American, be awarded to one whom it thinks preeminently worthy to be honoured, one who has set a standard for high achievement in architecture, who has generously and wisely advanced the cause of architectural education, and who, as shown in the Washington plan, has grasped and expressed the need of civic beauty, Charles Follen McKim.

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The Architect.

THE WEEK.

THE dangers of petrol are still being enforced on the attention of the public, and Colonel N. WILLOUGHBY WALLACE, in lecturing to the members of the Royal Automobile Club, emphasised the peculiar danger of the partially-filled or empty receptacle, and pointed out that in Germany, Austria, and Hungary the law already provides, and in Italy, Norway, and Russia is about to make provision, that petrol and other inflammable liquids may be transported and stored only in receptacles fitted with a safety device that will prevent explosion from fire and heat. Such devices are therefore possible, and are in use on the Continent; and the adoption of them would go far to reduce the danger that is so imminent in Britain. We do not suppose that any such device can be made, as the Americans say, fool-proof; and carelessness always seems to be the accompaniment of familiarity with danger.

THE art of the late GEORGE FREDERICK WATTS, though it may not meet with universal admiration, appeals so generally to architects that we are glad to know that coloured photogravures, which faithfully translate his oil-paintings, are now being published, and those of his pictures, *Endymion*, *Love Triumphant*, *Hope*, and *The Man who had Great Possessions* have already been issued.

WHEN the results of the dangerous and laborious travels of Dr. M. A. STEIN in Eastern Turkestan and the desert lands between that country and China have been fully made public, we shall probably have before us some highly interesting data as to the life of Central Asia in the earlier centuries of the Christian era and the centuries immediately preceding. Particularly there appears to have been collected an immense amount of early Buddhist literature which may prove especially informing. The translation of these must, however, necessarily occupy considerable time, as the number of competent masters of Central Asiatic languages prior to the tenth century of our era is not large.

ONE can well understand the dismay of the Children of Israel when they first viewed the walls of Jericho in the light of the discoveries made by German explorers during the past year. Walls 20 feet high, built of masonry whose method of construction reminds us of Pelasgic work, are surmounted with 8 feet of clay-brick, which was probably at one time considerably higher. On the northern side there is a considerable breach, which may have been that by which the Israelites entered. By what means this breach was formed and how far it accords with the traditional account in Scripture, still remains to be proved.

HOLY TRINITY CHURCH, KINGSWAY, has been condemned as a dangerous structure and will have to be rebuilt. The cause of the subsidences that have brought about the catastrophe is stated to have been the construction of Kingsway and the tunnelling of the Great Northern, Piccadilly and Brompton Tube Railway. To avoid litigation the sum of 1,500*l.* has been accepted by the vicar and churchwardens as compensation, but the expense of rebuilding will far exceed this amount.

THE New Year number of *The Architectural Record* (New York) contains an interesting series of illustrations of recent bank buildings of the United States, and furnishes a capital epitome of modern American architecture, affording convincing proof of its eclecticism in the matter of style, ranging from the New Art of the National Farmers' Bank at Owatonna, Minn., the work of Mr. LOUIS H. SULLIVAN, to the pure Greek Doric of Mr. CASS GILBERT, the present president of the American Institute of Architects. Mr. GILBERT is not the only American architect who considers that pure Greek detail is a suitable clothing for the architectural expression of a modern bank, and there is something to be said for the idea when we remember that the earliest buildings used as banks of which we have any remains were Greek temples, which seem to have safeguarded the moneys of individuals as well as of the State and the hierarchy. The universal rule of low interest with high security obtained, for as the sacred character of the temples gave, to all intents, absolute security, the interest was nil. It is possible but scarcely probable that such structures as the Tholos or Treasury of ATREUS at Mycenæ may have served as banks rather than as store-houses of single individuals. Next to Greek, Roman Classic work has formed the basis of many American designs for banks and with equal archæological warranty, for banking amongst the Romans was highly systematised. We do not wish, however, to be understood to imply that pure Greek and Roman Classic detail monopolise the field of modern American architecture in bank building; there are plenty of other modes, even to the New Art example we have already mentioned, a building that must in fairness be admitted a very capable work.

WE can scarcely be expected to agree entirely with Sir HUBERT VON HERKOMER in his strictures on journalistic criticisms of art. No doubt if the man in the street, the Philistine, as Professor HERKOMER calls him, possesses the critical faculty, that faculty may be warped by too great reliance on the opinion of others, but very few have the time and opportunity to so train their critical faculty as to enable them to form a correct judgment in matters of Art, where personal predilection or taste plays so large a part in the estimate formed by most people. The man who knows what he likes but does not know why is the most likely to be caught by the clap-trap productions of the soi-disant artist who plays to the gallery, and Professor HERKOMER would hardly maintain that this is ideal. Undoubtedly, if professional criticism were abolished and individual preference substituted, the maker of the pretty picture, the selector of the alluring title and the apt quotation would score heavily, to the detriment of the skilful craftsman and the high-minded thinker. The real critic must subject himself to a severe course of self-discipline, he must never allow himself to form an opinion without excellent reason, he must make sure that his judgment is trained by a well-directed course of study, and the laborious attainment of adequate knowledge. Then his criticism is valuable and informing.

PROFESSOR HERKOMER seems to feel most the injury that may be done to painters by the "slating" of journalistic critics, but real criticism is not all "slating." It is the duty, and we think we may also say the pleasure, of the genuine critic to point out what in his trained judgment appear to be merits, and not only to stigmatise defects or weakness. The expert critic knows that it is impossible to please everybody, and hence that it is easy to find fault. We are forcibly reminded of these facts by the criticism of Mr. SYDNEY PERKS, at the last meeting of the Royal Institute, on the very excellent paper read by Mr. R. STEPHEN AYLING on Public Abattoirs. Mr. PERKS found fault with Mr. AYLING because the latter did not exhibit amongst the plans illustrating his lecture any of his own designs, wherein we think he showed good taste, as it has been rather justly remarked that many readers of papers at the Institute on specialised subjects have taken advantage of the occasion to advertise their own works or to show what they could do if they had the chance. All the more praise therefore is, we think, due to Mr. AYLING for having collected a great deal of valuable information and modestly effacing his own personality. Fault, however, is found with him for avoiding that for which others have been blamed. This is not criticism.

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THE ETHICS OF COMPETITIONS.—I.

ARE architectural competitions moral or immoral? Are they right or wrong? In the first place, in the abstract, and, secondly, in the manner in which they are conducted.

In the abstract. Is it right that a number of architects should be called upon to prepare designs for the same building, one only of which can be carried into execution, and for which one designer only can receive the due reward of his time, labour, and ability? Do the unsuccessful ones reap any advantage, or are their efforts entirely wasted?

To answer these questions we must first inquire to what category of affairs architectural competitions rightly belong. Whether they are purely gambling or whether they are of the nature of legitimate speculation. We may take it as generally accepted that unmitigated gambling is wrong, but that legitimate speculation is right. The man who risks his money on an event of which the circumstances are beyond his control or his prescience is a gambler. To back a certain horse, of which one knows little or nothing and over which one has no control, to win a certain race, of which the precise conditions cannot possibly be foretold, is gambling; and so also is the hazard of property on the throw of a dice, the motion of a roulette ball, the turn of a card. But all betting is not gambling; the owner and the trainer of a horse know sufficient of his capabilities, not necessarily to absolutely and infallibly predict the result of his performance, but to arrive at a reasonably accurate forecast. For them betting is not gambling, but legitimate speculation. They are on the same plane with the farmer who sows his seed, ignorant of how the extent of his crop may be influenced by the weather; with the merchant who buys and sells, imports and exports, without being able to predict with absolute certainty the turn of the market or the accidents of transit. Despite the element of chance, their procedure, like that in many other walks of life, is rightly regarded as legitimate speculation, and without legitimate speculation the world—or, at least, the civilised world—could not exist.

In every architectural competition there must admittedly be an element of chance. An architect may do all he knows to produce the best design of which he is capable; he may spare no pains to acquire the best information, give his highest thought to evolve his design, and may illustrate his scheme by the best draughtsmanship that he or his assistants can execute. There is still the possibility that some other competitor may send in a better design. But, presuming that he knows that the competition will be fairly decided, the element of chance does not remove the competition from the field of legitimate speculation. If, on the other hand, there is a doubt as to whether fair treatment will or will not be accorded to all competitors, then we may rightly class this particular competition as a gamble. There is also the possibility—less probable in the present than in the past—that our imaginary competitor may know that the competition will be unfairly decided, but in his favour. Then he is on a level with the trickster who plays against gamblers with loaded dice or marked cards. He is a blackguard, and the competition a swindle.

There is yet another aspect in which we may view an architectural competition. Amongst all men, and particularly—we perhaps flatter ourselves in our insularity—among Britons, there is a passion for emulation, for endeavouring to do something better than other men, which finds its expression in all forms of athletic exercises and games of skill. In these the chief incentive is not the hope of reward, but the pleasure of victory. The laurel wreath or the bronze tripod of the Greeks, the bronze, silver, or even gold medal of our own times, is intrinsically no adequate recompense for the expenditure of effort by which it is obtained. It is only a prize by virtue of its symbolism and evidence of superiority. This is sport, and in architectural competitions the element of sport undoubtedly largely enters, particularly amongst younger men, in whom the love of sport is the most active. There is another concomitant of sport. The effort to win leads a man to train for a race, to practise assiduously for a billiard match, and thereby he improves his physical powers or his skill.

Architectural competitions then belong to the categories of legitimate speculation and sport, and as such are, in the abstract, right and not wrong, moral and not immoral. As legitimate speculation they are right for the business man, as sport they are beneficial not only to the one who wins but also to those whose attempts have not been successful, since they have by their attempts improved their powers of design, their ability as architects, their development as artists.

We have still another question of high importance. Are competitions, in the abstract, beneficial to the art of architecture? The ideal of architectural competitions is the production of the best design for any particular building and the discovery and encouragement of unrecognised talent and ability. As regards the latter point there can be no question that the ideal is realised. In the two most important competitions of recent times, those for the Liverpool Cathedral and the London County Hall, the best designs, in the opinion of the assessors, were those of young and unknown men, Mr. GILBERT SCOTT and Mr RALPH KNOTT. These are not isolated instances but are sufficient to prove that open architectural competitions do result in the discovery and encouragement of unrecognised talent and ability.

Now we must consider whether competitions lead to the production of the best design. The alternative to a competition is the selection of an individual architect to whom is entrusted the task of preparing the best design. Will he accomplish the task? It must be assumed that he is selected on the ground of his recognised ability as proved by his executed work, and on this ground alone. This necessarily excludes the unknown genius. Can we be sure that the architect of proved ability will indubitably evolve the best design of which any man is capable? Is there any guarantee that because he has done excellent work in the past he will in any particular instance do equally good work, still more that he will do the best possible?

What do we find in all departments of mental activity? In literature the "one book man" is a well recognised individuality; in painting, in sculpture, in music we constantly find that an artist reaches the high-water mark of his powers in some great creation to which his subsequent productions never attain. It is almost a truism that when an artist is elected a Royal Academician the excellence of his work declines. There are many reasons for this; the relaxation of effort after success, age, health, worry, all depress a man's capability. With an architect especially the success that has brought him work brings also cares and worries in the carrying out of that work, and these diminish his artistic power. The level of an artist's achievement is never constant. It may, if he does not live too long, be constantly on an ascending plane; it may have reached the zenith and ever afterwards decline to a greater or lesser extent; it may fluctuate up and down the scale of excellence.

There is therefore no guarantee that because an architect has in the past designed a building, superlatively excellent in its artistic power, that he will do so in the future, or that in any particular instance he will give us the best possible design.

Again, an architect who has won his spurs has done so by the use of opportunity obtained either by competition or by direct commission. The possibility of lesser achievement in the future applies equally in either case, but in the latter there is a still further possibility. Many of the architects of our own time, whose artistic powers are rightly recognised, have made their reputation in the carrying out of direct commissions. Under favourable circumstances of site, funds, and other conditions, with clients who have given them free scope, they have produced admirable buildings. There is no assurance that other architects, under similar circumstances, would not have done better. Indeed it would seem that the pro-

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bability is that they would, for it has almost invariably happened that when architects of great reputation, built solely upon work obtained by direct commission, have been induced to enter into competitions, they have failed to sustain their reputations in comparison with their fellows, and have proved their inferiority to those who have made a reputation in the arena of competitions as well as to hitherto unknown men. The competition for the London County Hall particularly emphasised this truth.

On the other hand, we have had repeated evidence that architects who have made their reputation by work obtained in competition have subsequently, as the result of direct commission and under favourable circumstances, produced some of the best work of our time.

We are forced therefore to the conclusion that, in the abstract, competitions lead to the production of the best design, to the recognition of latent ability, and to the benefit of the art of architecture.

(To be continued.)

STEELWORK.—III.*

By C. V. CHILDS, A.M.I.C.E.

THE steel-frame building in its up-to-date American practice is comparatively new to London. Several examples, however, have lately been erected, such as the Ritz Hotel and the *Morning Post* building.

It seems strange that the American practice, if adaptable to English buildings, should have taken so long in establishing itself in this country. Is it because English engineers are not conversant with, and are behind the times in regard to steel structural work?

This can hardly be the case. Perhaps the writer may be excused giving an example of his own experience in order to prove that this is not so. Just before leaving America in the year 1893 the last work he was engaged on was the design of the steel framework for the fourteen-storeyed "Carnegie Building," now the head offices of the Steel Trust in Pittsburg; and yet in the last fifteen years' practice of designing the steelwork for English buildings in no single instance could the American methods be adopted with any degree of economy.

The conditions in the building regulations † of the two countries are entirely different. The very origin of the steel frame was to evolve a scheme by which the thickness of the walls could be reduced to a minimum—that is to say, however many storeys might be built, the thickness of the walls need be no more than for a one or two storeyed building.

The building laws of the large American cities at once recognised the new order of things, and this fact alone made it possible, as well as profitable, to construct the so-called "skyscraper."

Here a very different state of affairs exists. Our Building Acts, framed to regulate building construction before steel became such an important factor as a structural material, still require that the thickness of the walls shall be proportioned according to the height they are to be carried up.

What such a thickness should be at the ground level of, say, the new "Singer Building" in New York, passes beyond the comprehension of even the framers of the Acts.

The laws are certainly obsolete, but they have been the means of effectually squashing any tendency on the part of our buildings to soar skywards. The general expectation is that the building laws will soon be modified more out of deference to the wishes of the erectors of ferro-concrete buildings than to those of the steel constructors; if this is done the constructional steelwork manufacturers should certainly see that their interests are safeguarded and that they are put on at least an equal footing with the ferro-concrete contractors. Walls carried on steel girders are certainly, for many reasons, more to be depended upon than those that rely on the composite strength of the concrete and a few small steel rods embedded in it. So that any alteration likely to be made in favour of the latter mode of construction should apply also to the former, which has stood the test of being in actual use for a much longer period.

The effect of the thickness of the walls being proportioned according to the height they are to be carried up is that the walls are not only capable of supporting their own weight, but also a considerable amount in excess, which, of course, was the primary object in framing such a regulation.

The steelwork designer has to be careful in calculating the pressure due to wall and floor loads that the brick piers sustain; if this pressure should be excessive, then the load or a portion of it must be transferred to a steel stanchion; but any stanchion which is inserted where the brickwork is capable of carrying the load is only so much waste material. The value of the unnecessary steel stanchion is not only thrown away, but a good deal of extra expense may be incurred in having to cut chases in the stonework to fit the flanges of the stanchion; the brickwork, too, has to be built in and around it, and the bonding is to a great extent spoilt thereby.

This extra cost of labour is also incurred where the walls are carried at each floor level and is frequently the cause of trouble and delay, especially where chases have to be cut in granite cornices and clamped and bolted back to the steel girders. All work of such description should be reduced to a minimum for the sake of economy; the cost of this does not appear in the price of the steelwork, but it may mean a considerable item in the masonry account.

One advantage claimed for the steel framed design is the rapidity with which the building can be erected; certainly some of the American buildings have been built in marvellously quick time. When in Pittsburg at the end of October, 1902, the writer had a photograph taken of the "Farmers' Bank," a twenty-four storeyed building, showing the steelwork of the roof completed, the floors all in, and the walls built up to within three storeys of the top; and yet no steel had been delivered at the site till after the first week in July.

The reason that such rapid construction is possible is entirely due to organisation in arranging and timing for the delivery of the materials at the site at the exact moment they are required. The building is half built before it is begun on the site. The secret of this depends on one drawing, and that is an accurately dimensioned plan of the site, from which all trades can obtain any desired measurements they may require, not by scaling, but by calculations; then the positions of all stanchions, walls, &c., can be exactly determined. It is the lack of this that causes so much trouble and delay in English buildings; each trade is generally expected to take their own measurements from the site, with the result that the steel contractor is frequently almost vainly endeavouring to obtain measurements over piles of rubbish and stacks of bricks, when the steelwork is urgently wanted at the site. How simple it all becomes when once the dimensions are obtained and settled; what is wanted is that the steel tape and theodolite should displace the use of the ten-foot rod and roll of string, and that, if possible, before the old building is cleared away to make way for the new.

Broadly speaking the difference between the steel-frame building or American practice and the semi-steel frame or English practice is that in the former each storey is dealt with separately; all the loads on the girders of any one storey, whether from external as well as internal walls, chimney-flues or floors, are supported on girders at the floor level of that storey. In the latter the practice is to carry the main walls at as low a level as practicable, e.g. over the shop fronts, at the first-floor level, or at that floor level above which the wall is capable of sustaining the pressure due to its own weight, as well as any other superimposed loads bearing on it. The supported wall in this case is carried up as one solid bonded piece of brickwork, and not cut up into rectangular sections as in a steel-frame building; horizontally by girders at each floor level, and vertically by the steel stanchions in the piers between the windows, the only steelwork required being small lintels over the window heads.

Supposing a case such as the front wall of a shop, in all probability the wall above the first-floor level is sufficiently

* Previous articles appeared on January 8 and January 15.

† Since the above was written the proposed alterations to the London Building Act have been published, dealing with the steel skeleton framework for buildings. If these become law it will be an evenly balanced question whether any substantial economy will be effected by employing the steel-framed structure (even though the walls may be reduced in thickness) in place of the ordinary method, which is governed by the original Building Act. The restrictions, especially that one relating to the deposit of the plans and details a month previous to the commencement of the building, are likely to nullify any advantages that this system possesses. Moreover, but slight advantage is obtained until the number of storeys runs into double figures, and apparently the limit in this respect has not been covered by the proposed new portion of the Act. Consequently "the old order changeth, giving place to new," may not apply to any great extent.

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strong of itself to carry its own weight and any floor girders that may rest upon it. The English practice would be to carry that wall on one large girder at the first-floor level, supported on stanchions extending from the basement to that floor level. In the case of a steel frame these stanchions would extend up to the girders carrying the roof; in either case the loads, and therefore the sectional areas of the stanchions in the basement and ground floors would be the same; but the upper stanchions may be said to be worse than useless.

Again, one large girder or bressummer is far more economical than several smaller ones; a small amount of steel area in the flanges of the large girder would accomplish what would require a considerable amount in rolled steel joist sections.

The same argument applies even more forcibly to internal walls; it is perfectly absurd to carry the enormous masses of brickwork on a steel framework of stanchions and girders at each floor level when these walls are amply sufficient to carry all that is required of them from the top to the footing courses at the foundations.

There is one feature that is very important in English, and rarely met with in American, large buildings. The Englishman must have his fire and fireplace, whereas the American requires steam heating and radiators. Chimney-stacks are immensely heavy; in fact, unnecessarily so; and something might be done in the way of lightening their construction, especially, as often happens, in cases where the stacks are carried on girders. The steel-frame designer is inclined to carry his theory too far in placing the steel girders that carry the chimneys at each floor level; this is surely most undesirable. Apart from the fact that one large girder is more economical than many smaller ones, the splitting up of the chimney-stack into sections destroys its uniformity of structure, and any slight shrinkage or settlement may result in cracks opening in the brickwork of the flues, which may be, and indeed have been, the cause of annoyance from the smoke leaking through them.

In some cases this has occurred, and the fault attributed to the deflection of the supporting steel girders, whereas undoubtedly this was due to the mortar, in which the cement had been too "hot"—i.e. fresh from the kilns—or had been mixed with lime, the result being that the mortar in the 9-inch internal wall between the two sets of flues had set and expanded after that in the 4½-inch external walls, causing by its lifting action horizontal cracks to open on the face of the chimney-breast.

Another instance may be cited to show that the steelwork is often made the scapegoat for the sins of other materials. A certain building was erected on a steel framework at the first-floor level, the ground floor being a yard, entirely open except for the columns supporting the building over it. For a year or more after the building was finished the walls of the upper storeys seemed to be alive; cracks were appearing and closing up in an extraordinary manner. Of course, the steelwork was considered to blame, and experts were called in to solve the mystery. Girders were tested for deflection, but evidently this was not the cause of the movements that were still going on. Then some inquiries were made in regard to the mortar, which discovered the fact that a large quantity of plasterers' refuse had been ground up in the mortar mill, and so the culprit was revealed.

(To be continued.)

The Trustees of the National Galleries of Scotland, in order to increase their usefulness, have decided to lend certain works of art, of more recent acquirement, to the art galleries in Glasgow, Aberdeen and Dundee for a period of three months.

Mr. J. W. Allen, M.A., will give a course of six lectures on "English Mediæval Architecture" on Fridays, at 4.30, at Bedford College for Women, York Place, Baker Street, W., beginning on Friday, February 5. The course will be illustrated by plans and photographs. The course will be free to students of the University and to teachers on application to the Principal.

The Carpenters' Company have arranged for a series of lectures on the following subjects:—"February 11, "The National Gallery," by Mr. M. H. Spielmann; February 18, "Armour," by Lord Dillon; February 25, "Design and Craft in English Woodwork," by Professor Beresford Pite; March 4, "Architecture of Hampton Court," by Mr. Ernest Law; March 11, "Ancient Buildings and their Influence on Modern Architecture," by Mr. Thackeray Turner; March 18: "Timbers of Commerce: their Present and Possible Future Sources of Supply," by Mr. H. J. Elwes.

THE WORKMEN'S COMPENSATION ACT (1906) IN OPERATION.—III.

By W. S. HOLDSWORTH, D.C.L.

Questions Relating to the Rights of Dependants.

DEPENDANTS are defined in section 13 of the Act to mean "such of the members of the workman's family as were wholly or in part dependent upon the earnings of the workman at the time of his death, or would but for the incapacity due to the accident have been so dependent." Moreover, it includes illegitimate children or grandchildren, or the parents or grandparents of such illegitimate children or grandchildren. Under the provisions of schedule 1, section 1, these dependants have a definite right to compensation which is distinct from the right of the deceased workman. Thus their right cannot be waived or abandoned by him; and if the dependant die before the amount of the compensation is ascertained the right to receive it passes to his or her representatives. These consequences of the rights given by the Act have been clearly laid down by the Court of Appeal in the two following cases.

In the case of Williams *v.* Vauxhall Colliery Company, Ltd.,* the facts were as follows:—Williams was a collier in the employ of the defendant company. He received an injury in the course of his employment, and made an arrangement with the defendants as to the amount of the compensation due from them. After a year's illness he went back to work, nothing having been said as to the continuance or cessation of the compensation. He was still suffering from the effects of the accident, and some time after died from acute mania brought on by it. The Court of Appeal held that there was no evidence of any agreement to abandon all further rights to compensation. Moreover, even if there had been such an abandonment on the part of the workman, it could not affect the rights of his dependants. They had a separate and distinct right of which the workman could not deprive them, subject, however, to this, that the employer from first to last could not be bound to pay more than the maximum provided by the Act. Thus the employer can take credit for all sums actually paid to his deceased workman, and is liable only for the balance due to his dependants in case of his death. In the case of Darlington *v.* Roscoe & Sons† the deceased workman left one dependant—a widow. She made a claim for compensation, but before the case had been arbitrated upon she died. Her daughter as her administratrix then began proceedings for arbitration under the Act, and the Court of Appeal held that she was entitled to do so, and to claim the sum to which her mother was entitled. The Act gives a personal right to the dependant to receive the sum mentioned in the schedule. That right descends, like any other property, to her representatives. But it should be noted that the right in question depends upon the fact that the claim has been made. Therefore if a dependant dies before a claim is made there is no right to be transmitted.

No doubt these cases are sound constructions of the words of the Act. But, looking at the last-mentioned case, it is perhaps arguable that the Act has gone rather too far. It may be just that a workman shall be compensated. It may be just that certain persons who can be shown to be dependent on him shall be compensated. It is a little difficult to see why the employer should be obliged to pay a sum of money to persons who are not dependent. If the dependant had lived to enjoy the money, that money would have been doubtless spent in maintenance; it would be very unlikely that any considerable sum would have come to the personal representative. It would be more just and more in accord with the general scheme of the Act if the law were changed in this case, and if it were provided that compensation money not actually ascertained and paid over to a dependant should cease to be payable if that dependant died.

Questions have arisen as to the meaning of the terms "total and partial dependency," and as to the circumstances in which the *primâ facie* presumption of a wife's dependency on her husband may be rebutted. In both these cases the Court has laid down rules which seem to give a very wide, perhaps some would say an unduly wide, meaning to the terms of the Act.

In the case of Senior *v.* Fountains & Burnley, Ltd.,‡ the

* 1907 2 K B. 433; 23 T. L. R. 591.
† 1907 1 K.B. 219; 23 T. L. R. 167.
‡ 1907 2 K.B. 563; 23 T. L. R. 634.

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widow of a workman who had met with a fatal accident claimed compensation on behalf of herself and three children, aged six, ten, and thirteen. The deceased at the time of his death was also receiving the wages of other children, aged nineteen, seventeen, and fifteen. The father boarded, lodged and clothed these wage-earning children, and gave them pocket-money. The County Court Judge found that this arrangement was a source of profit to the father, so that at his death the family was supported partly by the father's, partly by these children's earnings. He considered that the income derived from the sons could not be considered to be the father's earnings, and he therefore decided that the wife and children were not wholly dependent on the father's earnings. The Court of Appeal reversed this decision, holding that a wife and children are not the less wholly dependent upon the earnings of a father because the father has been able from other sources to augment the fund from which he maintains his family. It is true that the House of Lords has decided * that where a wage-earning son, who contributed to the support of his father, was killed in an accident, the father could maintain a claim for compensation as being in part dependent on his son's earnings. The Court of Appeal held that this case was distinguishable on the ground that, whether or no the father got money from other sources, his family were still wholly dependent on him. In fact, the only case in which it could be said that his family were not wholly dependent upon him was the case where wife or child had a separate income apart from the father. It seems to us that the fallacy in the judgment of the Court of Appeal consists in a confusion between the legal dependency of the family on the father and dependency on the earnings of the father. The Act talks of total or partial dependency, not on the father, but on his earnings; and if the father partly maintains his family from his earnings and partly from other sources, it would seem that the family cannot be considered to be wholly dependent on his earnings.

In the case of Williams *v.* Ocean Coal Company, Ltd.,† a widow claimed compensation in respect of herself and a child *en ventre sa mère* at the time of the accident to her husband. Her deceased husband had deserted her, and throughout their married life she had seen very little of him, living for some short time with his parents, but for the greater part of the time with her own parents. The County Court Judge held that the wife was not dependent on her husband's earnings. The Court of Appeal overruled this decision. They held that in the case of husband and wife there was always a presumption of dependency. It might be rebutted, but it was not rebutted by the mere fact of desertion, or by the fact that the husband was not contributing to his wife's maintenance. It would seem to follow that if a husband deserts and neglects to maintain his wife the best chance the wife has of getting anything from the conjugal relationship is the chance that her husband may get himself killed by a fatal accident while in the service of a solvent employer. As a matter of law the decision is doubtless right; but it would seem that the Court has been compelled to decide in accordance with technical legal doctrines in such a manner that the spirit of the Act has been lost. Dependency in fact, and not dependency deduced from legal presumption, should give rise to compensation; and no doubt if the hardship weighed on the workman rather than the employer an amending Act could be passed to remove it.

In general the Act, as interpreted by the Courts, has effected what it was intended that it should effect. The Courts have decided in accordance with the plain sense of words and the underlying intentions of the Legislature. They have not allowed themselves to be fettered by presumptions and technicalities. But in some of those cases relating to dependants the Act, as interpreted, seems to go a little beyond its proper scope, to give greater benefits to the workman, and to put a greater burden on the employer than is consistent with its scheme of compensation.

Liability for Certain Diseases.

We have seen that in general a workman who is killed by a disease, even though that disease was contracted in the course of his employment, cannot be said to have been killed as the result of an accident.‡ But, as is well known, certain diseases are incident to certain trades. The Act, section 8, provides for this contingency by enacting that if a workman is incapacitated from work, or dies, owing to having contracted any of the diseases mentioned in the third schedule of the Act, or others to be added by the Secretary of State, he or his dependants shall be entitled to compensation as if the disease were a personal injury by accident arising out of and in the course of his employment. The effects of this section have been discussed in the case of Haylett *v.* Vigor & Co.* In this case the deceased workman was a painter who died of granular kidney. This disease is a sequela of lead poisoning, but it is also a sequela of other diseases, such as gout or alcoholism. As the claimants could not prove that the man died of lead poisoning, but only that he died of a disease which might or might not be a consequence of lead poisoning, it was held that their claim failed. The onus of proving death by a scheduled disease is on the claimant. If death by the scheduled disease of lead poisoning had been clearly proved, then, in accordance with section 8, sub-section 2, of the Act, the onus of proving that the disease was not due to the nature of the employment is on the employer, unless the certifying surgeon certifies that it was not so due.

(To be concluded.)

* Main Colliery Company *v.* Davies, 1900 A.C. 358; 16 T. L. R. 460.

† 1907 2 K.B. 422; 23 T. L. R. 584.

‡ *The Architect*, January 8, 1909, p. 25.

THE ARCHITECTURAL ASSOCIATION.

A MEETING of the Association was held on Friday evening last at Tufton Street, Westminster, Mr. Walter Cave, president, in the chair.

The following gentlemen were elected members:—Messrs. E. L. Apperly, O. Newbold, H. Boyd-Walker, C. J. Newberry, B. H. B. Symons-Jeune, T. H. Chalkley, A. C. Newman, J. B. L. Tolhurst and A. Thorpe.

Mr. J. H. MARKHAM read a paper entitled—

Reinforced Concrete.

You are probably aware, he said, that when I was first asked to read a paper on reinforced concrete it was to have been more especially with reference to design—that is, I presume, the character of artistic expression suited to this method of construction. I rashly undertook to do this; but in attempting to get together matter for illustration and example I found the question of the proper artistic treatment had very seldom been fairly tackled in building work of a kind usually within an architect's practice. A good deal of simple straightforward engineering work has been done which, I think, is often of pleasing appearance when not spoilt by any pretence to be other than it is. But when buildings such as an architect is accustomed to deal with have been undertaken in this method of construction, the front has generally been built of brick or stone and the reinforced concrete part all been hidden, as would have been the case with a steel frame. This has compelled me to take up the chief features and principles of this method of construction, and try to deduce therefrom some ideas for the right treatment of it.

To get out of my difficulty I have decided to assume you know nothing about reinforced concrete; so that I shall deal briefly with the subject in a general way, and I must apologise if I go over what will be familiar ground to many. I will begin by briefly describing the materials used, viz. concrete and steel.

Taking concrete first, concrete is composed of a matrix or cementing material and an aggregate.

The matrix used in reinforced concrete work is Portland cement, and must be of the best possible quality. Limes are not suitable, as they are at best of imperfect hydraulicity—that is, their power of setting when air is excluded is but small and variable, and they are of less ultimate strength than cement. The cement should be frequently tested, as so much depends on its quality. Portland cement is an artificial compound, obtained by calcining lime and clay in proper proportions and grinding the resulting clinker. After much experience and experiment it can now be obtained of very high quality, and on no account should limes, or natural cements, or an inferior Portland cement be substituted.

It is essential that the aggregate be composed of a material which does not contain acids capable of corroding the metal, and for this reason coke breeze and furnace slag must be used with caution, if at all. The best materials are crushed ballast, broken brick, granite chippings and broken stone, though limestone cannot be recommended where great fire-resisting qualities are required. No particles should exceed ¾ inch in diameter unless where the reinforcement

* 24 T. L. R. 885.

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is spaced further apart than usual, otherwise they will not be able to pass easily between the reinforcements, so that there may occur voids in the finished work; and it is desirable that particles be not all of the same size, but varying from ¼ inch to ¾ inch, so that the smaller particles may fill up the interstices between the larger. Material having grains less than ¼ inch diameter is known as sand, and a certain proportion of clean sharp sand, free from loamy or organic matter, is used to form with the cement a mortar which shall surround each particle of the ballast or stone, and so unite all the particles and as far as possible fill up all the voids so that the whole may be a solid compact mass.

A good proportion in which to mix the ingredients of the concrete is one part of cement to two of sand to four of ¾ inch ballast measured by bulk. This does not mean one of cement to six of aggregate, because when the sand and ballast are mixed the sand fills up some of the interstices in the ballast, and the whole comes to about one of cement to four and a half of aggregate. This should be carefully noted, because at first one is inclined to think one of cement to two of sand and four of ballast is equivalent to one of cement to six of aggregate, but it is in reality a good deal richer.

It is essential that the ingredients be in such proportions that the sand and cement fill up the voids in the ballast so that the smallest possible percentage of air spaces may exist in the resulting concrete. Concrete cannot be obtained absolutely free from air spaces.

The steel used is mild steel of good quality. The specification of it I need not repeat; it is to be found in the report of the Committee on Reinforced Concrete, published by the R.I.B.A. It is usually employed in the form of round rods from 2-inch or sometimes 2½-inch diameter down to wire; and some systems use also a flat section like hoop iron, as in the Hennebique shear stirrup. Other systems have special deformed bars—but of that more later.

I need scarcely point out that a great advantage of reinforced concrete is that in almost any district suitable materials can be found near at hand. Cement is made in all parts of the country; and Mr. Kahn pays a very high tribute to the quality of British cements in a paper read before the Institution of Engineers and Shipbuilders in Scotland, in which he says they are probably the best in the world, fully 100 per cent. better than American and many times better than Belgian.

A suitable aggregate should not be far to seek anywhere, and even if the steel has to be brought some distance it is only about 20 per cent. of what would be necessary in a steel-frame building, and would always be of small section and easily handled.

Having briefly described the materials employed, it remains for me to say a few words as to the reasons for combining two materials so essentially different. Concrete, as you know, is a comparatively inexpensive building material, and, when well made of suitable ingredients, capable of withstanding considerable compressive stress and offering resistance to fire. Steel and wrought iron, on the other hand, are expensive and of great strength in both compression and tension. Well, now, the notion arose of combining the two, so that steel might be used to resist all tensile stresses and the cheaper concrete might be used to resist all compressive stresses and provide a protecting covering for the metal.

So far so good; but now a difficulty arises in one's mind. We all know the disastrous effects of iron cramps used in stonework when insufficiently protected from the action of the weather, so that it is essential that all metal used be absolutely covered to prevent the action of the atmosphere thereon. But will the moisture of the concrete and the acids of the cement corrode the metal? This is a point of all importance, and there are many interesting facts and tests which are too numerous to recount, but which in the main go to prove that, so far from the cement having any harmful effect on the metal, it not only preserves it from rust, but if the metal have a little rust on the surface when inserted in the concrete, the rust is removed, and the metal, if afterwards withdrawn, will be found bright and clean, and moreover less liable to rust than a piece of metal which had not been in contact with cement. The explanation of all this is an interesting question for chemists, but the facts serve to show that no better preservative can be found for steel than cement. It is of course known that the steel is not painted or otherwise treated before being used. No loose scales of rust must be allowed, but a slightly rusted surface is rather an advantage, as it assists the adhesion between the metal and concrete.

I should add that if from any cause cracks occur in the concrete, then water may get in and the metal become oxidised.

If there is any fear of small quantities of water penetrating the concrete and coming in contact with the metal, then it would be advisable to cover the bars before use with a coating of cement grout, so that they would be completely covered by cement even if the concrete should prove a little porous. It should also be mentioned that a few cases have been cited of metal corroding without any apparent cause, but such cases are few and probably could all be accounted for by some causes other than the failure of concrete, when properly made and not cracked, to preserve the metal. The general inference from all the information I have come across is pretty much what I have stated.

I will now come more particularly to my professed subject, viz. design. And in dealing with design I shall divide my remarks into three main heads:—

1. What I shall call "internal" design.
2. Main structural lines and forms.
3. Decorative design and finish.

A great peculiarity of reinforced concrete is that not only, as with other better-known materials, is it necessary to decide on the size a member must be, but it is also necessary to design the internal structure of the member itself. In fact, it is necessary to design the material as well as the building.

In using steel or wood, a member of certain size and section is found necessary, and it consists throughout of the same steel or wood of known, and practically uniform, strength; and all members of the same size and section will be approximately of the same strength. However, the strength of reinforced concrete members of any given size and section may vary within very wide limits, according to the percentage and disposition of the metal, even where the strength of the concrete and steel may be constant. It would be possible to introduce, say, 1 per cent. of metal into a concrete beam without in any way strengthening it; and it would also be possible to introduce 1 per cent. of metal in such a way as to very materially raise the moment of resistance the beam could offer. It is not quite my province tonight to deal with this question of internal design, which is a very large subject, as there are many systems, some of them covered by patents, which make it somewhat awkward for a designer to make use of the method of reinforcement he may consider most suited in each particular kind of member. However, I propose to briefly go over the principles.

As I have already stated, the general principle is to use steel to resist all tensile stresses, and to provide against the tendency to shear, whereas concrete is used as far as possible to take all purely compressive stress. That means to say that, in the case of beams, metal reinforcement will be found imbedded in the lower part, whereas the upper portion will be of concrete. If, however, as is usually the case in reinforced concrete buildings, beams are continuous over two or more spans, then a reverse bending moment occurs over the supports causing the upper side to be in tension, and the lower in compression, so that here the reinforcement comes in the upper part of the beam. It may, of course, be advisable to introduce reinforcement in the compression area of a beam as well; but I will not speak further of that, as I am only giving a very general statement of principles, leaving all matters of detail, and description of peculiar cases, for lack of time. I would only say as to this before passing that, if compressive reinforcement is introduced, it is a departure from the ideal that all metal should be always and only in tension, and all concrete always and only in compression. But this ideal has to be often departed from, and for practical reasons it is often necessary to put metal in the compressive area. M. Coignet does so regularly. The concrete occurring in the portion subject to tensile stress is ignored in calculation, as it is not permissible to rely on concrete for resisting tensile stress even in the smallest degree.

Tendency to shear is resisted by steel members, loose in the form of hoop steel or round section stirrups, or rigidly attached to the tensile reinforcement, placed either vertically or obliquely.

For tension members, in a truss form, to conform to our ideal no concrete should be used. However, concrete must be used to cover and protect the metal, no more being introduced than is necessary for this purpose; and it must not be reckoned in the calculation. In the same way, it would seem at first that no steel should be used in compression members, but on consideration we shall see that it may be to advantage without any serious infringement of our ideal. Suppose a compression member—say a column—of concrete supporting a load. The tendency of the load is to produce a reduction

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in the length of the column; and, as matter is only slightly compressible, there will be a tendency for the material to find compensation for this shortening by enlarging in another direction This enlarging will take place where it meets with least resistance, that *is*, in planes at right angles to the direction of pressure; in the case of a column, horizontally. This tendency to enlarge horizontally, that is to spread, will tax the cohesive strength of the outer portion of the column; in other words, there will be a circumferential or hoop tension. But it is not desirable to submit concrete to tensile stress, and as it would seem that some small hoop tension will always be produced in a compression member, because there will always be at least a tendency to diminish in length under the applied load, some form of metal case seems called for, which shall be capable of taking up the circumferential tension, and so prevent lateral spread. Assuming this to be done, we have a member in which our ideal is satisfied. The hypothesis that concrete must not be relied on to resist tension, traced to its logical end, is tantamount to an assumption that concrete is possessed of no cohesion; so that our ideal column becomes analogous to a steel sylinder filled with some such material as fine sand. In such a member, the sand obviously could not be crushed, and after taking such slight reduction in volume as the pressure could produce, its power to resist unlimited pressure would seem to depend only on the capability of the containing cylinder to resist the hoop tension, and the shearing stress. Now, to return to our concrete column; as concrete does possess cohesion, the cylinder may be replaced by hoops at frequent intervals, or by a spiral binding, and to further prevent the tendency to spread, by bulging between the hoops or spirals, let us introduce a few longitudinal bars just inside the hoops to form with the hoops a sort of containing network. These longitudinal bars can also be relied on to resist the shearing stress which accompanies compression and tension stresses on planes oblique to the axis of the main stress. This method of reinforcement, which seems to me theoretically ideal for compression members, has been mainly developed, and several remarkable properties thereof discovered by M. Considere However, the other systems of reinforcement follow much the same principle in column design.

I would only just further mention on this question of internal design, that the patent systems just referred to are of two main kinds:—

1. Those in which the patent is for a particular arrangement of reinforcement.

2. Those in which the patent is for a special form of reinforcing bar.

This second class, again, has two sub-divisions:—

(*a*) Those bars which are of peculiar form to lessen the tendency for the metal to slide in the concrete.

(*b*) Those bars which have rigid or loose attachments to resist shear.

As to adhesion between metal and concrete, it has been stated—based, I suppose, on experiment—that a bar immersed in concrete for a length equal to fifteen times its diameter, will, if it be attempted to drag it out, break rather than slide out. If so, it would scarcely seem necessary to have recourse to any special deformation which must slightly increase the cost, unless there is some influence specially likely to produce rupture of the adhesion. In the Hennebique system, bars are fish-tailed at their ends in case there should be any tendency to slide.

Among bars deformed to resist sliding may be mentioned Ransome's twisted bar, a square section twisted; and the indented bar. The Ransome bar, which, so far as I know, has only been used in America, is twisted cold, and it is claimed by those who use it, that it is of much greater strength than a round bar of similar steel, which has not been twisted, so that less metal has to be used. The indented bar is now in use in this country, as well as America, and is sold by the Patent Indented Steel Bar Company, of Westminster. The system of reinforcement with these bars is the same in principle as that where round rods are used, as, of course, all systems meet with, and are controlled by, the same dynamic laws.

Of the bars with shear members attached, the best known is the Kahn bar; and mention must also be made of the Wells bar used by Stuart's Granolithic Company; it is of a section somewhat resembling two round bars connected by a very small web, shear members being of hoop metal threaded through a slit in the web. But I must leave this part of my subject.

(*To be concluded.*)

ARCHITECTURAL REFINEMENTS.*

UNDER the term widening refinement is understood a hitherto unnoticed but widespread system of mediæval church and cathedral construction in which the vertical lines of the nave diverge in the upward direction. The announcement of such a system of intentional construction has been met by the denial of its existence on the part of many distinguished experts, especially in France. Such experts presume the facts to exist but attribute them to accident, and more especially and exactly to accidents caused by the thrust of the nave vaulting. The proofs of an intentional construction are however many and serious. They are presumed by Mr. Goodyear to be conclusive, and have been so recognised by the architect in charge of repairs in Rheims Cathedral, by the master-mason of the same repairs, by the architect in charge of the repairs of Amiens Cathedral, and by many distinguished experts in construction, among whom may be mentioned Professor A. D. F. Hamlin, of the Columbia University Architectural School. The monuments examined, and supposed to offer these conclusive proofs, include a large number in Italy, a large number in Northern France and other churches in Constantinople. The demonstrations from these buildings are universally and without exception submitted in the form of enlarged photographs which are exhibited in the Museum of the Brooklyn Institute of Arts and Sciences. These photographs are presumed not only to illustrate the facts of widening, which they undoubtedly do, but they are also presumed to offer such a choice of facts as to negative the theory of accident. The widening refinement includes many cases of widening in straight lines, and these cases are more easily shown to be constructive than those in which the widening occurs in vertical curves. The demonstration of the present paper does not debate the vertical curves. It is confined to the cases of widening in straight lines.

There are two phases of widening in straight lines, piers which incline outwards from the pavement up, and piers which are perpendicular to the capitals; with vaulting-shafts which diverge in straight lines, beginning at the capitals. To the former class belong, among other churches, St. Alpin at Chalons, St. Loup at Chalons, St. Ouen at Rouen, and the cathedral of Rouen. To the latter class belong, among other churches, the cathedral of Rheims, the cathedral of Amiens, the cathedral of Laon, and St. Remi at Rheims.

If the widening refinement were due to thrust, in the case of churches with piers which lean out from the pavement up or with shafts which lean out directly above the capitals the lines would bend or curve above the counter-thrust and weight of the side aisles. Since resistance to the nave thrust decreases in the upward direction, accidental widening in straight lines against the weight and counter-thrust of the side aisles is not to be assumed as likely or possible, even in a single instance. The possibility of a subsidence of the exterior lower walls of the churches appears to be the only one which even in theory could explain an accidental widening of the kind described and observed. If such subsidence had taken place at Rheims or at Amiens it would be known to the experts in charge of repairs.

Constructive stability is not endangered by the system discussed. At Amiens the lean outward is less than one-seventh of the diameter of the pier, and at Rheims the piers are far heavier than at Amiens, whereas the maximum inclination is the same.

It seems probable that the counteraction of an optical narrowing in, or spindling effect, due to perspective convergence, may have been one purpose of the widening refinement. But it seems also probable that this refinement is the expression of a positive artistic preference, based on experience and on good taste, for a diverging effect in the vertical supports of an arch.

The preference, or liking, on the part of the Arab builders for the horseshoe effect in arches may be a related fact, and there is an undeniable relation to the form of the horseshoe arch in this construction, but without that inward bend at the base which, to some of us, is its disagreeable feature.

The widening refinement dates to the sixth century at Constantinople, and it disappears with the overthrow of the Gothic style by the Renaissance in the sixteenth century. This overthrow was so complete that even the existence of the refinement has been forgotten.

* A synopsis of a paper read at the Toronto meeting of the Archæological Institute of America on December 29, 1908, by Mr. Wm. H. Goodyear, "On the Recent Observations of the Widening Refinement in Amiens Cathedral."

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NOTES AND COMMENTS.

MANY of our readers, we believe, were interested in the articles on "Petrography for Architects," by Mr. E. HOWARD ADYE, that appeared in *The Architect* of January 3 and January 24, 1908. They will find in the current number of "The Engineering Magazine" an equally interesting account by Professor JACQUES BOYER of Microscopic Metallography and its employment in French industries. In this are described some of the latest developments in microscopic analysis and examination of materials, more particularly with regard to metals, together with a description of the methods and apparatus employed. In building materials strength and durability depend largely upon physical structure rather than chemical composition, and microscopic analysis is a most useful method in the examination of physical structure. One must not, however, allow enthusiasm for this method to outrun sober judgment and lead us to altogether discard the old. Indeed, we cannot do better than quote Professor BOYER's conclusion:—"It must be conceded that the new processes complete most usefully the knowledge supplied by chemical analysis or by mechanical tests, but cannot supplant all the other methods of examination, either in the laboratory or in the shop."

SUPERSTITIOUS traditions die hard, luckily for novelists; but one of hoary antiquity, whose origin it is not difficult to predicate, receives a severe blow from the statistical investigations of Mr. FRANCIS GALTON. This well-known scientist, by way of amusement, has examined the veracity of the legend that possession of sequestrated Church property entails a curse on some eldest son of the sequestrator's descendants. Tracing the history of a large number of former Church properties and comparing it with that of purely secular domains, the investigator found that the succession of eldest sons was in the case of sequestrated Church properties only 1 per cent. less than in that of those not under the traditional ban. True that the former priories and their kin came into the market and changed hands three times as often as the unhallowed estates, but this is probably due to the insanitary and uncomfortable condition of ancient ecclesiastical residences, which are apt to be more picturesque than pleasant in the light of modern ideas. The moated grange, with its water supply drawn from one side of the moat, its sewage discharged into the other, and the fish for Friday's dinner swimming between, is scarcely what we nowadays consider hygienic. Damp courses in mediæval buildings are not always of adequate efficiency, with the result that rheumatism, ague, and other unpleasant afflictions are more than likely to be connoted. It would be interesting if Mr. GALTON were to compare the history, as regards change of ownership, of moated granges with that of moated manor-houses, which, as regards their relative attractiveness and disadvantages, are very much on a par.

THE latest "Red Book" issued by the British Fire Prevention Committee is a report of a test held so long ago as July 28, 1904, the issue of which "was postponed for special reasons by order of the Executive." The report deals with one of the many varieties of thin partitions formed with slabs, of which plaster of Paris is the principal ingredient. In this case, the Brunckhorst partition slabs were composed of plaster of Paris and coke breeze in equal proportions. The slabs have a peculiar form of grooved and serrated edge, and as erected into a partition by Messrs. H. GUST & Co., were strengthened by wire reinforcement in both horizontal and vertical joints. The object of the test appears to have been to ascertain if this particular partition should be classified in Class A by the B.F.P.C. as affording "partial protection." The report does not state whether the partition is so classified, but, in our opinion, the result of the test was quite satisfactory for this class of fire-resisting partition.

PART I. of the fourth volume of "Architektur-Konkurrenzen" contains illustrations of the six premiated designs submitted in competition for a new Kurhaus at the watering-place of Zoppot. With the Kurhaus are included a boarding-house with 100 rooms, concert and beer-gardens, the laying-out and equipment of which forms part of the problem. The scale of the original drawings being $\frac{1}{250}$, or rather smaller than our one-sixteenth scale, no attempt at showing detail is made, the scope of the competition being clearly limited to planning and general composition. The plans are well worked out in detail, but the elevations and even the perspectives are purely sketches. As appears to be quite common in Germany, the first and second premiums are added together and divided equally by the jury between two competing designs.

THE New Year number of *The American Architect* marks the incorporation with it of the *Inland Architect* and is remarkable for the illustrations it contains of the library of Mr. J. PIERPONT MORGAN, a laudatory article on which appeared in the *Times* of December 4 last. The building, designed by Messrs. MCKIM, MEAD & WHITE, is a fitting home for the priceless treasures collected by Mr. MORGAN. The Free Christian Church, Andover, Mass., also designed by Messrs. MCKIM, MEAD & WHITE, might have been built in the lifetime of the Countess of HUNTINGDON, so reminiscent is it of the spirit of English and therefore of "Colonial" architecture at the time when the "Connection" of that remarkable personality was founded. By the way, Mr. CHARLES FOLLEN MCKIM is to be the second recipient of the gold medal of honour of the American Institute of Architects, the first being, as our readers will remember, Sir ASTON WEBB, R.A.

ILLUSTRATIONS.

LIVING ARCHITECTS.—NO. 3, MR. JOHN BELCHER, R.A.

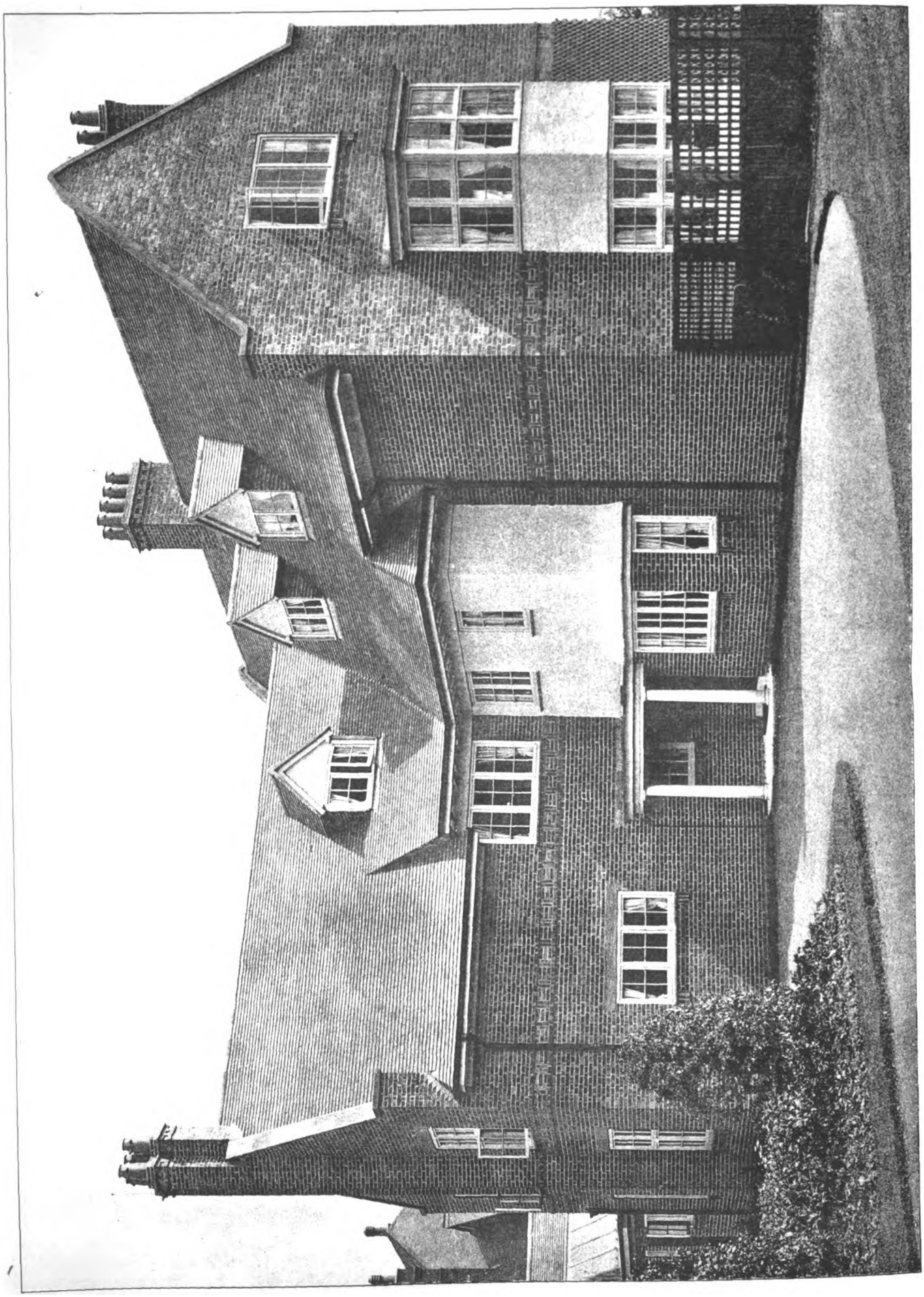
IN February 1907 it was announced at the Royal Institute of British Architects that the Council proposed to submit the name of Mr. JOHN BELCHER, A.R.A., to His MAJESTY as a fit recipient of the Royal Gold Medal. Mr. BELCHER, exactly two years afterwards, has now received the final and highest mark of approval from the world of art by his election, on Wednesday night, as a Royal Academician, after being an Associate for nine years. He will receive the congratulations of the entire body of architects, who cannot fail to be pleased at the dignity conferred on their profession in the election of one of their number to the coveted rank. Mr. BELCHER has been a student of the art from his early youth, when he was sent by his father, himself an architect, to Paris with instructions to pay particular attention to French Renaissance. His first experience was as an articled pupil, and then as a partner, to his father. During his long career Mr. BELCHER has designed many public and private buildings which have been a factor in the present position of architecture. We may mention the Institute of Chartered Accountants; Colchester Town Hall; Electra House, Moorgate Street; Lancaster Memorial; Royal London Friendly Society's Office, Finsbury Square; Royal Insurance Buildings, St. James's; Messrs. MAPPIN & WEBB's premises, Oxford Street; and among his mansions are Tapesley Park; Cornbury Park; Bearroc, in Berkshire; and Holcombe, Chatham. The dominant note in all this work may be expressed in Mr. BELCHER's own words:—"I have always aspired to do really good work, and particularly work which should embrace and include in its scope the sister arts of sculpture and painting." His election as a Royal Academician and the award of the Gold Medal are proofs of the attainment of his ideal. Literature has been another means by which he has endeavoured to educate the public, his last book, "Essentials in Architecture," being especially adapted to serve that end. Mr. BELCHER will, we hope, long continue to adorn the country with his art.

(*Continued on page* 81.)

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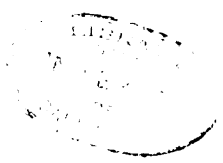


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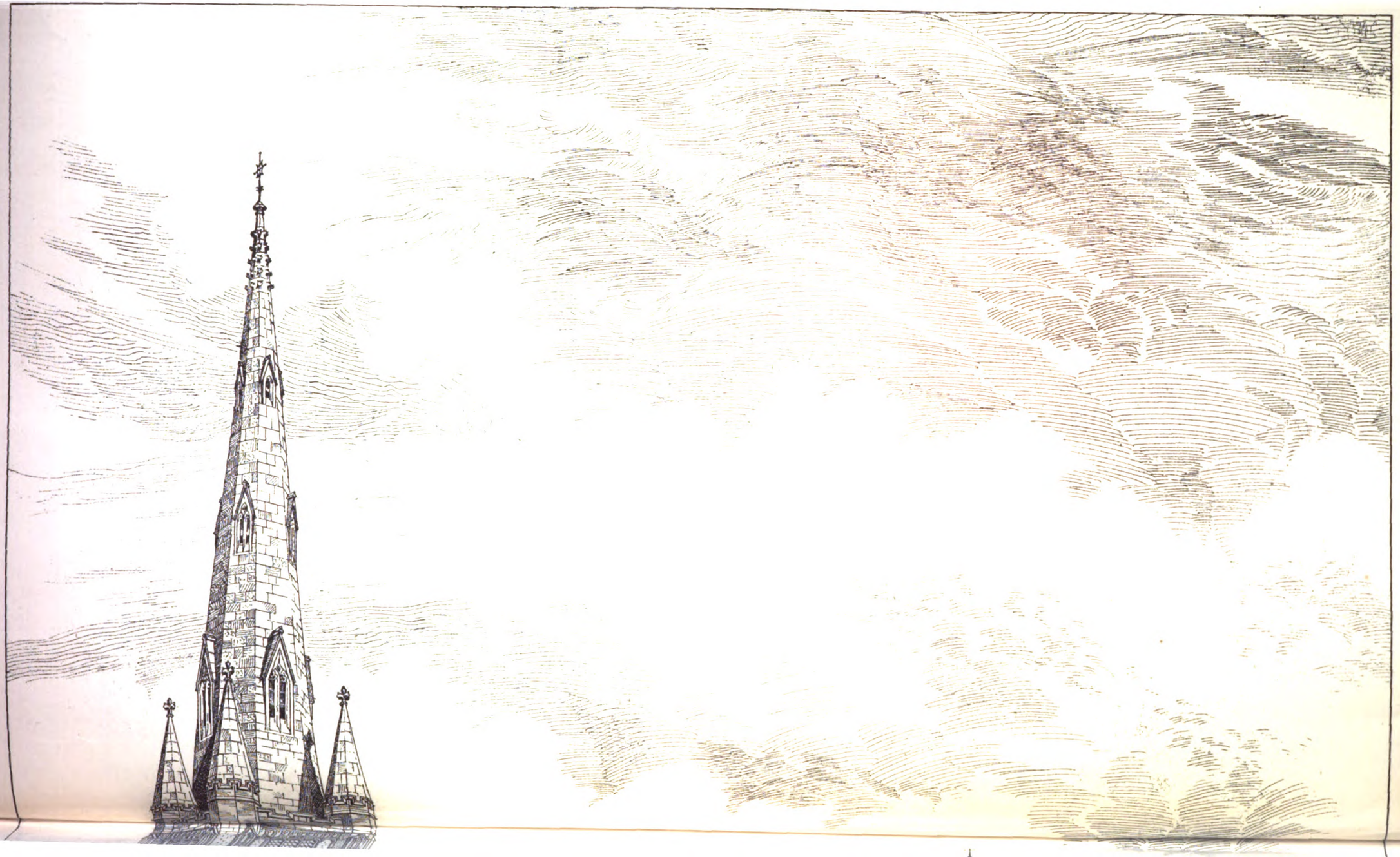


HOUSE AT EDGBASTON, BIRMINGHAM.

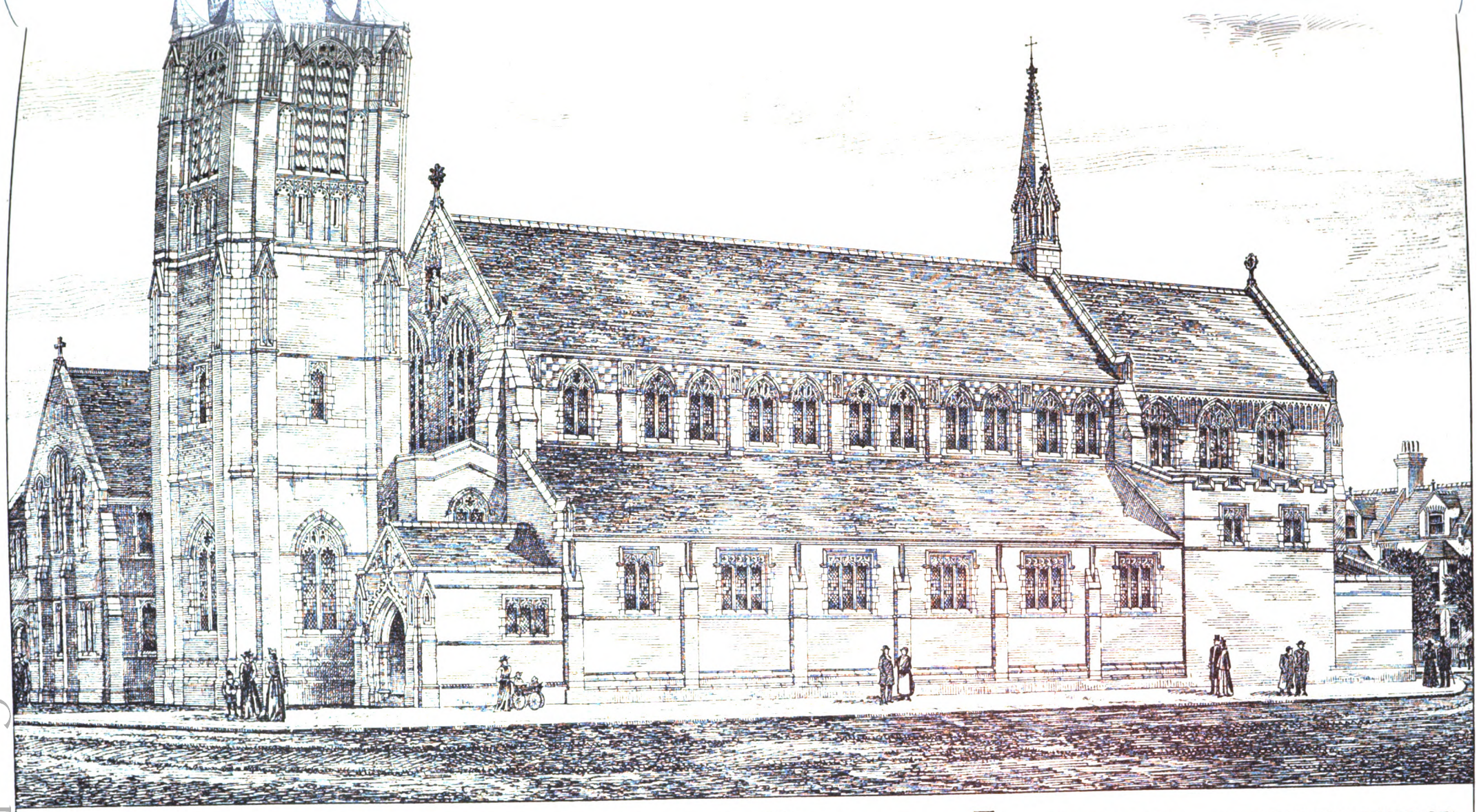
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J.E.K. & J.P. CUTTS
Architects

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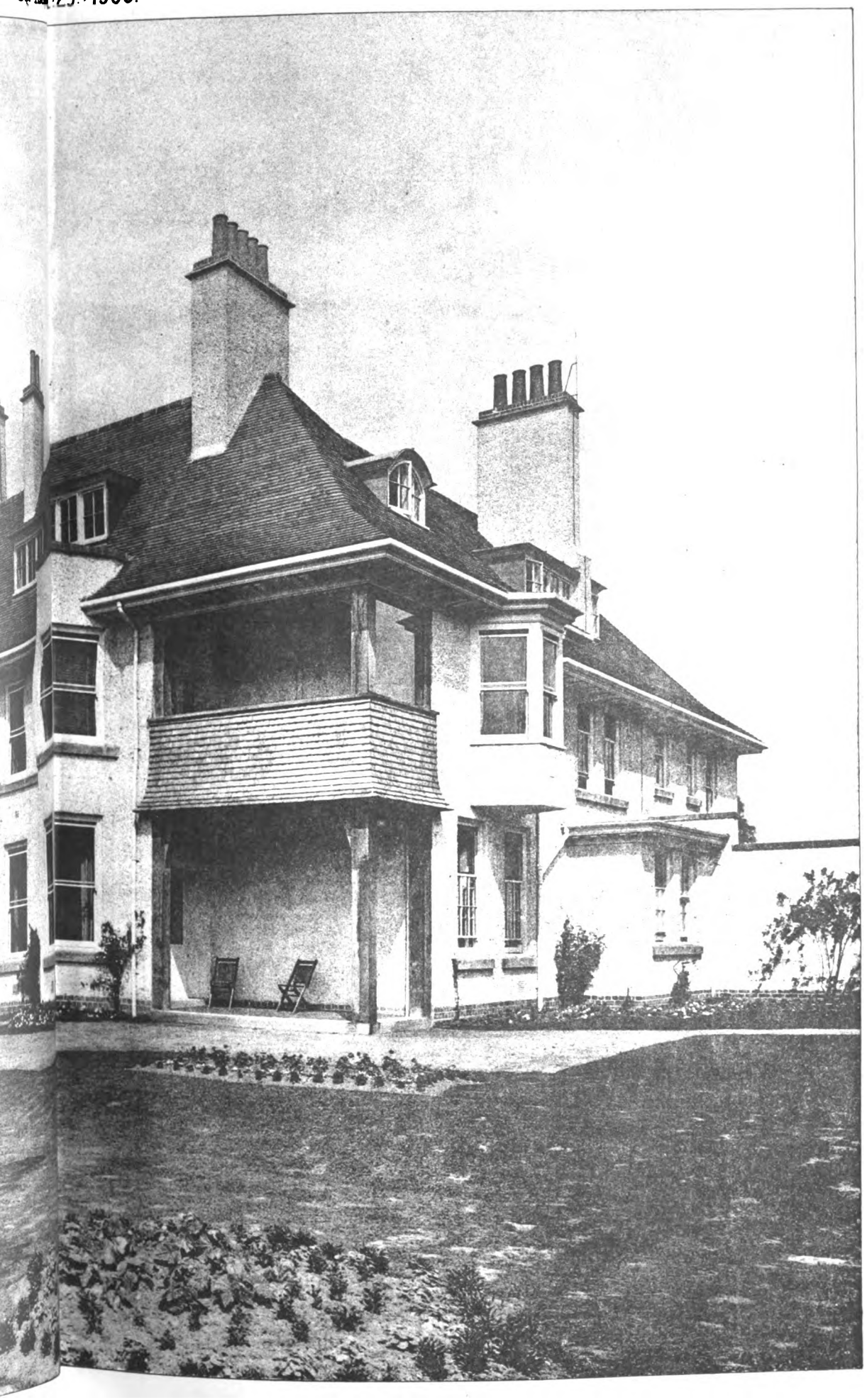


"CROPWOOD," BLACKE

Messrs. COSSINS, PEACOCK

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The Lib. 29th 1909.



CROPWOOD, [illegible]LL, WORCESTERSHIRE.
Messrs COSSINS & BEWLAY, Architects.

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LIVING ARCHITECTS. NO. 3: MR. JOHN BELCHER, R.A.

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THE TECHNICAL IN... EASTBOURNE
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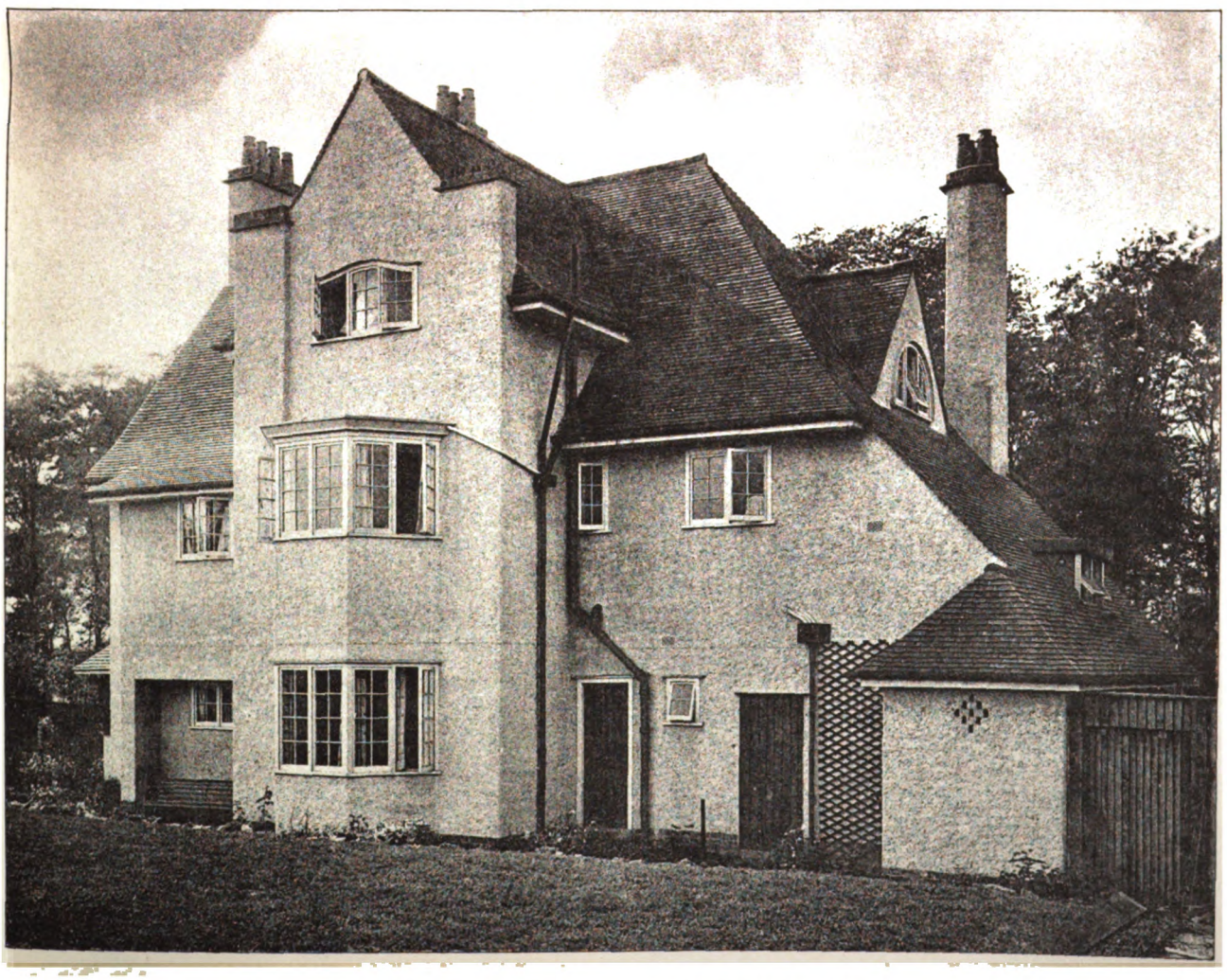
THE TECHNICAL INSTITUTE, EASTBOURNE.
PHILIP [illegible] A.R.I.B.A., Architect.

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UNIVERSITY OF CALIFORNIA

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HOUSE AT FOUR OAKS, NEAR BIRMINGHAM.

Messrs. COSSINS, PEACOCK & BEWLAY, Architects.

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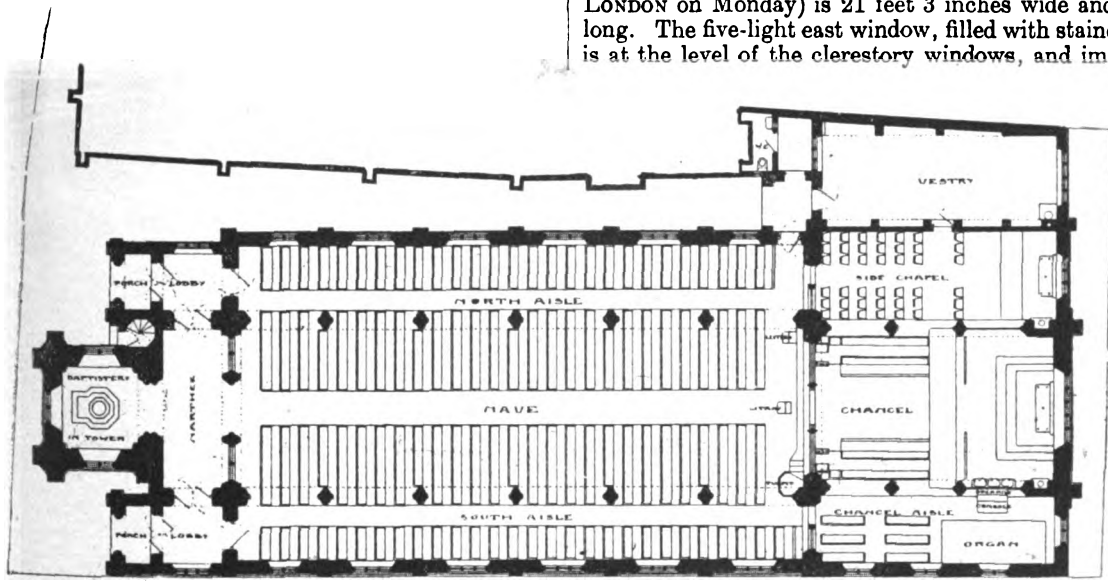
LIBRARY
OF THE
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ILLUSTRATIONS.

THE TECHNICAL INSTITUTE, EASTBOURNE.

THIS building was the outcome of an open competition, but the plans were largely altered from those placed first in the competition. This was partly due to the wishes of the donor of the site, the late Duke of DEVONSHIRE. To the town clerk, Mr. H. W. FOVARGUE, is due mainly the credit for carrying through this scheme. The floors are disposed as follows:—Ground floor, library and museum; first floor, boys' and girls' secondary schools and lecture theatre, with science rooms; second floor, art and caretaker; basement, technical work, as cookery, gymnasium, wood-carving, metal-work, bookbinding, &c., is intended to be carried on here, but this part is not completed yet. Mr. ANDREW CARNEGIE gave 10,000*l.* towards the library, which amounted to providing it. The contractor was Mr. F. G. MINTER, of Putney, and his tender 34,730*l.*; and the building was completed for rather less than this sum. The external materials are Whitbed Portland stone (worked on the site) and Keymer red bricks, and green Westmoreland slates from Tilberthwaite. The design was dominated necessarily by the size laid down by the Board of Education for art-room windows, which, of course, face north; and also by the fact that the Council rightly would not have drains on the main front, which necessitated the flanking towers containing the central manholes, in which are all the pipes. The various firms engaged were the Library Supply Company and LUCY & Co., for library fittings; Mr. BESSANT and Messrs. HENRY & Co., electric light and special fittings; the Acme Company, wood-block flooring; GEARY, WALKER & Co., mosaic terrazzo; WOOTON & Co., lead glazing; PILKINGTON & SON, ceramic work; ADAMSEY, Ltd., sanitary fittings; CHARLES SMITH & SONS, locks and gas fittings; the Bennet Furnishing Co., loose fittings; MERRYWEATHER & Co., hydrants and fire apparatus; J. & R. PEARSON, heating (low-pressure hot water); J. DAYMOND & SON, carving; J. LUCAS, lift; SMITH, WALKER & Co., steelwork; the Falkirk Iron Company, special railings. Mr. H. C. FEHR designed and modelled the charming groups on each side of the entrance, representing Science and Art and Literature. The clerks of works were Mr. HUDSON and Mr. R. HENLEY. The architect was Mr. PHILIP A. ROBSON, A.R.I.B.A., 9 Bridge Street, Westminster.



HOUSE AT EDGBASTON, BIRMINGHAM.

WALLS are faced with thin black country bricks and the roofs covered with hand-made tiles. External woodwork painted white with green doors. The work was carried out by Messrs. J. BARNSLEY & SONS, from the designs of Messrs. COSSINS, PEACOCK & BEWLAY, Birmingham.

HOUSE AT FOUR OAKS, NEAR BIRMINGHAM.

THIS house was built for Dr. LLOYD OWEN, M.D., F.R.C.S. The exterior is faced with silver-grey rough-cast, and the roof covered with hand-made tiles. The builders were Messrs. STREATHER & HILL, of Four Oaks, the architects being Messrs. COSSINS, PEACOCK & BEWLAY, of Birmingham.

CROPWOOD, BLACKWELL, WORCESTERSHIRE.

THIS house, the country residence of Mr. BARROW CADBURY, is built in an elevated position, commanding very fine views of the county of Worcestershire. The exterior is faced with silver-grey rough-cast with dressings of Guiting stone, and the roofs are covered with hand-made tiles. Balconies for sleeping out of doors have been provided to some of the bedrooms. The woodwork of the interior is chiefly oak. Messrs. J. & A. BRAZIER, of Bromsgrove, carried out the work from designs by Messrs. COSSINS, PEACOCK & BEWLAY, of Birmingham.

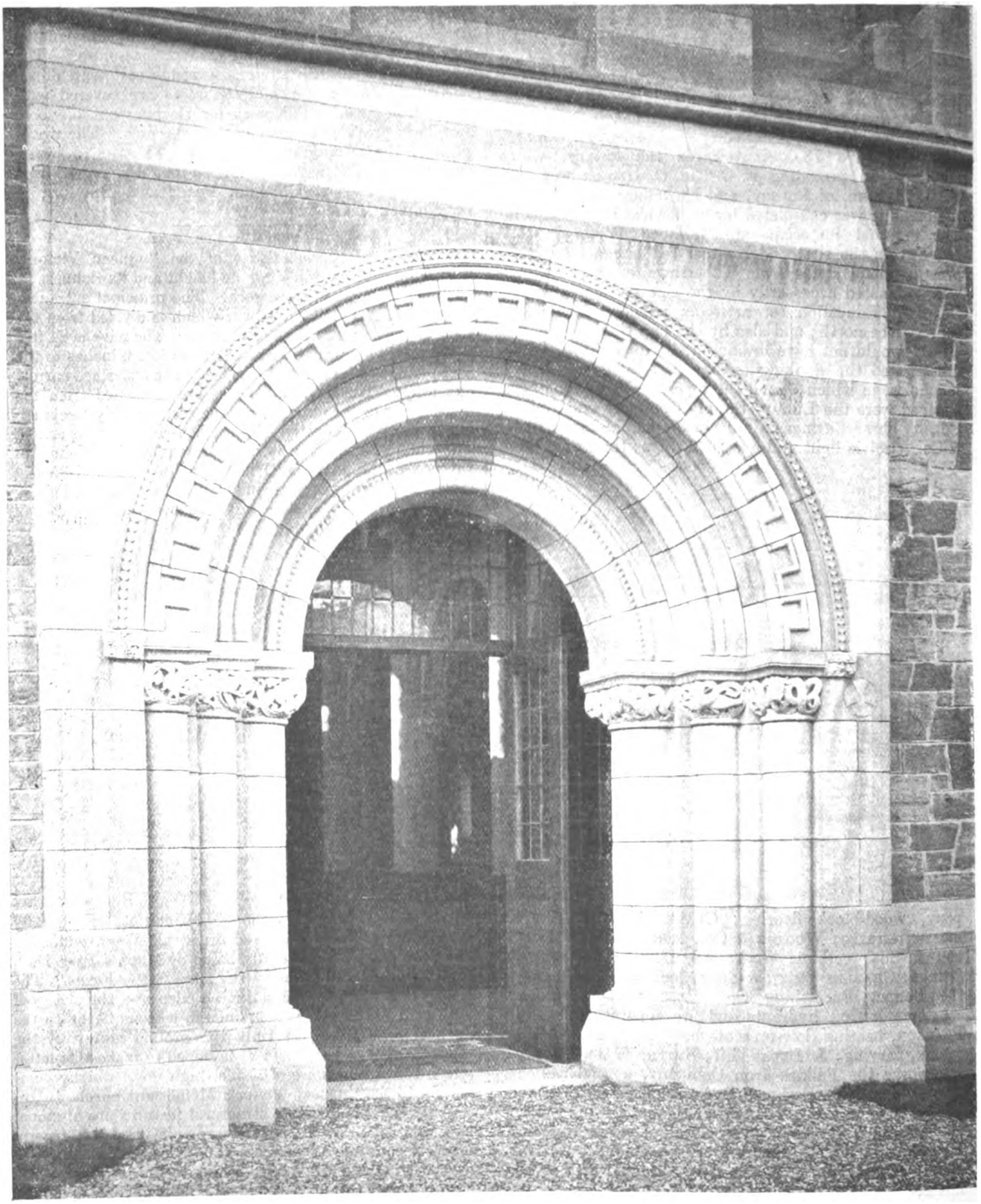
ST. AUGUSTINE'S CHURCH, FULHAM.

THE general characteristics of the "Queen Victoria Memorial Church" are its height and its richness in moulded and carved stonework. The principal entrances are at each end of the narthex, which is divided from the body of the church by a stone screen. The nave is 84 feet by 23 feet 6 inches. The height is 36 feet 6 inches to the roof-plate, and 52 feet to the ridge. The aisles are narrow and lofty. The nave and aisles are separated from the eastern end of the church by stone arches richly traceried, which give very effective views when seen in perspective. The chancel (which was consecrated by the Bishop of LONDON on Monday) is 21 feet 3 inches wide and 35 feet long. The five-light east window, filled with stained-glass, is at the level of the clerestory windows, and imparts an appearance of height to the whole interior. Externally the church is faced with red brick, all doors, windows, and moulded work generally being of Monk's Park Bath stone, worked and fixed by the Bath Stone Firms. The steep roofs are covered with red tiles and the flat roof with lead. The bell is contained in a stone flèche on the chancel arch gable, as only the ground storey of the tower is built at present. It is hoped to make this latter into a tower and spire, 160 feet high, as a worthy completion of the "Queen Victoria Memorial Church." Internally the whole of the structural features are of stone, and the plain wall spaces are plastered to receive future decoration. The roofs are of wrought timber, with arched trusses and hammer-beams to the principals, and with boarded ceilings throughout. The chancel is lighted by electricity and the nave with gas. The church is heated with two of GRUNDY's hot-air underground stoves. Accommodation is provided for 650 worshippers. The carving throughout has been done by Mr. N. HITCH, and all the handsome oakwork has been made by Mr. ROBINSON. The architects, Messrs. J. E. K. & J. P. CUTTS, supplied drawings in detail for the whole of the works and fittings.

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ST. LUKE'S CHURCH, EDINBURGH.

WE give detailed views of this church, which has been erected on an excellent site in East Fettes Avenue, Edinburgh West, from the designs of Mr. P. MACGREGOR CHALMERS, architect, Glasgow. Last week we illustrated the exterior and interior. The church is finished in stone internally and externally. The principal stone is taken from Dullatur Quarry, and the rubble from Hailles Quarry. The design of the nave arcades has been modelled on the Norman work at Jedburgh Abbey. Special attention has been taken in the carving of all the capitals; no two of them are identical.



ST. LUKE'S CHURCH, EDINBURGH.—THE MAIN ENTRANCE.

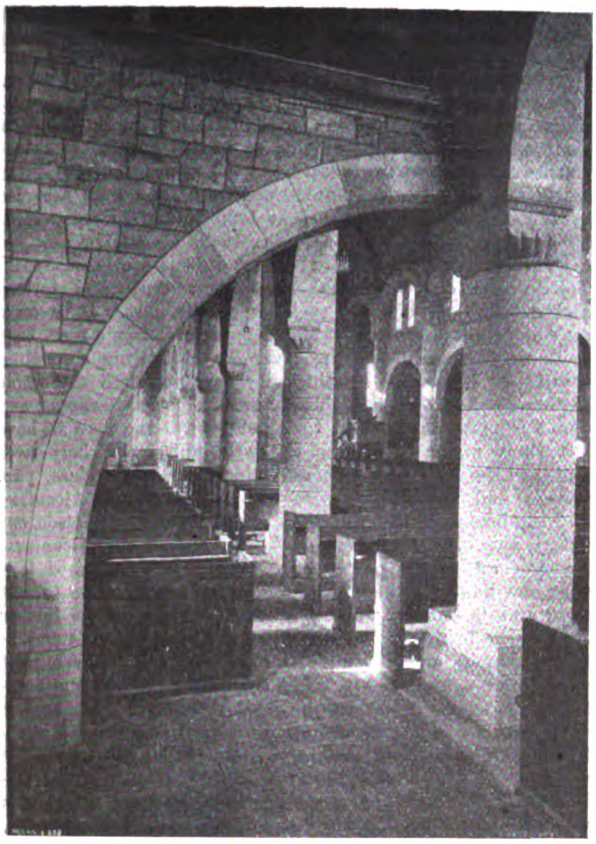
GOTHIC ART IN SPAIN.*

IN few countries has the influence of history on art been so marked as in Spain during the Middle Ages. The Moorish invasion of the greater part of the Peninsula early in the eighth century drove the Gothic races into the romantic fastnesses of the north, and there for three centuries, weakened by internal warfare, the Moors remained.

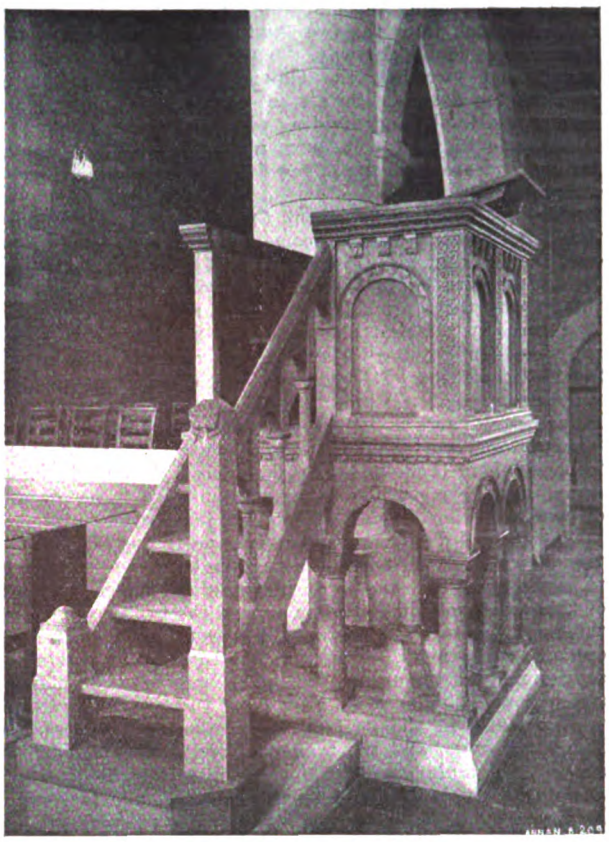
In the eleventh century the Christians, having regained their energy, reconquered Toledo and united the two Castilles. Henceforward and by degrees the Moors were driven southward, and finally, in the fifteenth century, the whole

* A paper read before the Society of Arts by Mr. Henry C. Brewer.

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ST. LUKE'S CHURCH, EDINBURGH.
INTERIOR FROM THE SOUTH PORCH.



ST. LUKE'S CHURCH, EDINBURGH.
THE PULPIT.

Peninsula was again under Christian rule. During these times the two great streams of Gothic and Saracenic art ran side by side, scarcely influencing each other, but steadily marking the advance or retrogression of each nation.

The mediæval Spaniards, born among such surroundings, and fired with that enthusiasm, the torch of which was kept burning by defending their faith and homes against a Mohammedan race, developed those national feelings for romance and drama which influenced their lives and work, so that romance and drama constitute the characteristics of their Gothic art.

The first serious attempts of Gothic art in Spain date from the end of the eleventh and beginning of the twelfth centuries, and the work is suggestive of the influence of the rich Romanesque art of the south of France, which art is a little earlier in date. It is also significant that the episcopate of the newly reconquered city of Toledo was held by a Frenchman, Bernard by name, through whose influence many French clergy were preferred to important positions in the Church in Spain.

The cathedral of Santiago in Galicia, that of Zamora, and the old cathedral of Salamanca, are the three leading churches of the first period of Gothic art in Spain. Santiago, commenced about the year 1078, is the earliest and largest. It is a noble example of a Romanesque church, cruciform in plan, with an apse surrounded by chapels and richly-carved western doorways. The fact of its completeness and general unity of style would make it most remarkable, for there is nothing in Spain of an earlier date which could lead up to such completion; but its great similarity to St. Sernin at Toulouse, which is earlier in date, makes it more than probable that the work was entirely carried out under French guidance, and although a more noble work than the other two, it is perhaps less interesting to the student of Spanish art. Zamora and Salamanca are smaller and later in date, but they have that individuality of their own which suggests that they were the cradle of Gothic art in Spain. These interesting structures were commenced early in the twelfth century; they are cruciform in plan, the crossing being covered by a dome or cupola surrounded by small windows. Internally the massive stone piers support simple unmoulded arches and the window spaces are but small apertures in the walls. A simplicity and unity of effect is obtained by the mass of light which pours in through the windows surrounding the cupolas and centres on the piers which support the crossing. This massing of light was the first suggestion of the drama of effect which stands out so conspicuously in the Gothic art of Spain.

The little old cathedral at Salamanca is now enveloped in the folds of the vast Gothic edifice which has superseded it, and it is difficult to gauge its earlier appearance. Zamora, on the other hand, is as it was 800 years ago. Rising on a rock on the northern bank of the river Douro, the time-honoured fortress and "well-walled town" retains much of its ancient warlike appearance. It is, however, no longer surrounded by all of its seven lines of walls; still it has that appearance of impregnability for which it was noted in mediæval times. Seen above the old brown walls, on the highest part of the rock, is the cathedral, strangely picturesque in outline. At the west end is a Romanesque tower of unusual proportions, and a dome at the crossing, transitional in style, but Eastern in appearance; these crown a short, massive church, which is more like some castle keep than a Gothic cathedral. This building, and that of Salamanca, were in progress during the episcopate of that warlike prelate, Geronimo, the confessor to the Cid, and well express the race and times.

The city of Avila, near Madrid, is even a more complete mediæval city than Zamora. It is surrounded by walls commenced in the year 1090, and is now the most perfect example of a walled city in existence. Mapped out on the slope of a hill, and looking much like an engraving in the *Nuremberg Chronicle*, it has stood still since the walls were the protection of its inhabitants, and is unaltered except by decay. Within these walls are three interesting examples of early Gothic art—the cathedral, St. Vincente, and St. Pedro. The date of their architecture is a little later than Salamanca and Zamora, yet in part they are coeval. The cathedral is a lofty cruciform church of the twelfth and early thirteenth centuries. The beautiful granite nave flooded with light from the lofty clerestory windows and noble choir built in a red veined stone, suggest but faintly the massiveness without. The transitional apse, forming a vast bastion in the walls and externally throughout the church, presents a fortress in itself, well suggesting the militant Christianity of mediæval Spain. St. Vincente and

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St. Pedro are both twelfth-century buildings, the west front of the former being the glory of Avila. Set back beneath an arch which joins the two short western towers is a late Romanesque double doorway, the archivolt of which is richly carved and moulded, the classical acanthus leaf being amongst the details. Saints supported on columns stand against the jambs and dividing pier, and these, although a little crude in treatment, have a great amount of human feeling, and are earnestly engaged in conversation with each other.

The Spanish peasants think that the saints which grace the niches of their churches come down from their positions once in every hundred years, and, if they overstay their time, they turn again to stone, and so cannot return, and this is why there are so many empty niches.

Internally the church is solid and massive, with arches supported on circular columns, and vaulted with boldly-moulded cross ribs. St. Pedro, although less imposing, is as interesting as St. Vincente. The beautiful crossing is Romanesque, and is lit by a fourteenth-century lantern, which it supports. The roughly-chiselled carving and masonry, here brought into prominence by the light, melt away into the mysterious gloom of the nave transepts and chancel.

Tudela and Tarragona are exceptionally fine examples of transitional architecture. Tarragona by some is thought to be the finest building in the Peninsula. The general date of this great work is the latter part of the twelfth and early thirteenth centuries. The apse, however, which is Romanesque, is early twelfth-century work. Internally, the simple, solid dignity of the unmoulded arches, supported on massive stone piers, is relieved by grotesques and scrolls carved on the caps and in the string-courses; the grand balance of light and shade, and the beauty of proportion, are expressive of the manly power of this early style of architecture, a style in which Spain is especially rich. The interesting lantern at the crossing, formed into an octagon by pendentives in the spandrils of the arches and vaulted with bold groining ribs, is, I think, the first example of such a treatment in architecture. The cloister court is one of those silent gardens of loveliness in which architecture, mellowed down by time, combines with nature to form a dream of colour. The early-pointed arches of the cloister, divided by round-headed windows and circles enriched with the dog-tooth moulding, peep out between the luxuriant foliage which rises from a garden divided into paths by clipped and flowering shrubs, while here and there a fountain cools the fragrant air with its sparkling jet of water.

The cathedrals of Toledo, Burgos and Leon were built in that great period of mediæval art, the thirteenth century. Toledo, grandest of the three, is the finest example of Gothic in the Peninsula, and its solid magnificence, vast scale and the richness of its fittings place it amongst the finest buildings in the world.

The King Don Ferdinand III. and Archbishop Rodrigo laid the first stones of this church on August 14, 1227, and the architect, according to a contemporary inscription, was Petrus Petri. It is unfortunate that this inscription is in Latin, for it makes it impossible to decide with any certainty whether he was a Spaniard. Those who claim everything in Spain to be done by others than Spaniards, state that he was a Frenchman, Pierre le Pierre, while the Spaniards claim him under the name of Pedro Perez. Whether, however, Petrus Petri was a Spaniard or Frenchman, there is no doubt that on entering this grand building one is struck with an effect essentially different from that created by churches in other countries. The sombre impressiveness, the proportions, the drama of chiaroscuro stamp it with a distinct individuality, and even should the root have been transplanted from the soil of France, the tree has assimilated the poetry and drama of its Castillian surroundings. Its proportions are colossal, it being the third largest church built in Gothic times. Seen from the transepts it conveys the finest impression; the brilliant Spanish sunlight pierces the richly-coloured windows, striking in diagonal shafts across the dark, mysterious voids, here and there lighting up a column or exquisite bit of carving, and glistening on the silver chastening and copper-gilt details of the screen. The air is filled with the aromatic scent of incense, and the pale, grey smoke which rises from the censers lingers about the cavernous arches, and mingles with the mysterious atmosphere which envelops the vaulting. Nowhere else is architecture so dramatic, so full of mystery. The cathedral is cruciform in plan, with an apse at the east end, and has double aisles which are continued round the chevet. The capilla major is enriched with carvings and tombs of the fourteenth, fifteenth and sixteenth centuries, and cut off from the transepts by the most interesting and magnificent metal screen in the country of metal screens—Spain.

The high altar is in late Gothic design, elaborately carved in wood, gilded and painted, and, altogether, this capilla major is the most gorgeous work of Gothic art in existence, and well represents the epithet of wealth applied to Toledo Cathedral (Toledo for wealth, as the Spaniards say). The stalls are in delicate Renaissance work, and were designed by Maestro Rodrigo in the year 1495, and the metal screens by Domingo Cespedes in the year 1548.

This jewel of Gothic art is set in the crown of Spain. Toledo, the once imperial and magnificent, now forlorn and desolate, is but the skeleton of the past. Built on a rock of granite, the venerable frame stands like a rock, on a rock girdled round by the river Tagus boiling through a ravine at its feet. In this city is epitomised the whole history of the Peninsula. Romans, Visigoths, Saracens, and again Christians, have in turn held sway, and here all have left their mark. Crossing the wild and melancholy river and linking up its rock-bound sides are two bridges, part Gothic and part Saracenic—the bridge of the Alcantara and the bridge of St. Martin. When arriving at Toledo, one enters the city by crossing the bridge of the Alcantara. Passing under the portcullis of the gate, one indeed feels that one has left the dull commercial world of the present day, and is entering the age of chivalry. On the further side of the bridge still stands the Moorish tower restored in Gothic times, and the narrow road supported on one great arch which spans the river was rebuilt in the thirteenth century. A small panel in the wall records the fact that it was rebuilt after a great deluge of rain commencing before the month of August and lasting until December 26 in the year 1258. The bridge of St. Martin is even more interesting than that of the Alcantara. The great spanning arches were rebuilt probably after the same flood. The gateway, however, is a work of Moorish art of the ninth century. Above the bridge rises a grand view of the rock-built city. Conspicuous is the church of St. Juan Los Reis, the walls of which are covered with votive manacles given by descendants of families who were freed from Moorish bondage when Toledo was reconquered.

The great works in Toledo are numberless, but we cannot leave this city without mentioning the one small vein of art into which the streams of Christian and Saracenic architecture intermingled, and gave the very rare style of Moresque. In a town which had been reconquered by Christians after the Moorish occupation, many Moors of the artisan classes remained, and being a skilful people they were employed on the buildings erected by their Christian masters. On rare occasions these buildings were entrusted to their hands, and in these one finds a style founded on Gothic construction, but in detail Moorish; such is the thirteenth-century brick tower of St. Ronan, the apse of St. Christo de Luz, and several other churches. In the choir triforiums in the cathedral there is a slight suggested trace of Moorish influence in the upper arrangement of the interspanning arches, but here it is the motif which is Moorish, the detail being purely Gothic.

The foundation-stone of Burgos Cathedral was laid in the year 1221, during the episcopate of Bishop Maurice, an Englishman, and the original fabric of this great church was completed in the incredibly short time of nine years. The church is cruciform in plan with single aisles and an apse, and is surrounded by lateral chapels. Externally the rich outline of the spires, octagon, and great octagonal chapel at the east end, are features superimposed on the original structure, and, owing to the situation, these additions are always conspicuous, and give the appearance of a church of much later date. The interior is a magnificent example of architecture. At the moment of entering from the western doorways the effect is somewhat injured by the blocking up by the coro, but from the choir or transepts, the fine effect of proportion, the drama of chiaroscuro, the beauty of the carving and the richness of the fittings are unsurpassed. No doubt much of this effect is given by the light flooding in from the late octagon, which octagon is condemned by authorities who can see beauty only in purity of style and academic art; still, those of broader mind can at least here put on one side their more fastidious tastes to enjoy what is probably the most perfect drama in architectural art.

The old Gothic lantern having fallen down in the year 1539, the present one was commenced by Juan de Borgona, and completed by Juan de Vallego in 1567. It is Gothic in form, but Plateresque in detail. From an architectural

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point of view it does not bear analysis, but as a combination of motif and detail it triumphs over rule and produces one of those impressions which time can never obliterate.

The spires and octagonal chapel were designed by John of Cologne, and carried out between the years 1435 and 1456; and, although German in style, the detail is much influenced by Spanish art. The interior of the octagonal chapel is vaulted in most delicate interlacing work of late Gothic design. The stone is smooth and cream coloured, and the carving throughout is so exquisitely minute that the general suggestion is that of an ivory casket. In front of the Renaissance altar is the tomb of Don Ferninando de Velasco, the Constable of Castille, for whom this chapel was built, and it is still the property of the same family.

The cathedral at Leon, commenced in the year 1214, is much more correct according to the laws of northern Gothic architecture. Lightness and grace are its chief features; the aim seems to have been to use the least possible amount of material with the greatest amount of space and effect. In France, at the same period, a similar attempt was being made in the church at Beauvais, and in both a like result followed, that of the constant difficulty of keeping the church in structural stability. It is quite northern in plan, and although not nearly so long, otherwise the proportions are the same as those of Westminster Abbey. The bays are lofty and slender, the triforium pierced, and the clerestory, which is nearly half the height of the building, completely filled in with a six-light window. Shortly after its erection, however, for the sake of increasing its stability, two of the lights were filled in. Externally the church is not satisfying when compared with such exquisite examples of this style of architecture as those existing in the north of France. One cannot but help feeling that here the Spaniard was treading on ground which he did not fully understand, and that there is little really Spanish in this undoubtedly fine cathedral.

Elsewhere in Spain one comes across this extremely lightly-built Gothic, but the style never left its French origin, and was never quite satisfactory on Spanish soil. Perhaps the best works in this style of art in Spain are the western doorways of the cathedral at Vitoria. These are perfect examples of northern French art, and suggest not only that the architecture was French, but that even the carvers and masons must also have been. This cathedral and one or two of the churches in Vitoria are so lightly constructed in stone that great uprights have been placed in front of the columns to give extra stability to the vaulting, a necessity which is quite ruinous to their architectural effect.

In the fourteenth century Gothic art in Spain developed more purely on national lines, and French influence seems to have quite disappeared. The most interesting buildings of this period are to be found in Catalonia and Aragon. A school of architects had sprung up in the Island of Majorca of which the leading light was Don Jaime Fabre. Much interest had been aroused by the Dominican church he was erecting at Palma at the end of the thirteenth century, now unfortunately destroyed except the cloisters, which are used as a prison.

In the year 1298 the King summoned Fabre to Barcelona and requested him to make plans for the new cathedral. These designs were put in hand at the commencement of the fourteenth century, and a very interesting agreement between Fabre and the clergy is still in existence. According to this agreement Fabre was both architect and builder. It enters minutely into all arrangements about payments and duties of the architect, and I think I am right in saying that it even states that during Fabre's residence in Barcelona he was to have two new hats a year. This cathedral is oblong in plan, with an apse at the east end, the crossing formed by the transepts being flush with the outer walls of the aisle chapels. At the west end is an octagon only partly carried up in mediæval times, but now being completed. The nave is very lofty, and the groining of the roof starts from the caps of the nave piers, leaving but small space above. The triforium and clerestory are represented by a narrow arcade and circular windows. The window spaces are all small except those round the apse, and they are filled with fine old glass. The chevet is seven-sided, the tall slender columns supporting stilted arches, and the stone is a rich russet colour. When one enters the transept door from the brilliant sunlit streets the darkness is profound; but by degrees, as the sight gets accustomed to the gloom, here and there parts of the glorious architecture stand out where they intercept shafts of light, and the tall graceful arches of the chevet rise in dark relief against the jewelled background of the richly-coloured glass in the apse. Boldly bracketed out above an arch in the north transept, the great organ rears its mass of finely-carved plum-coloured wood, and the delicately canopied stalls in the trascoro form a filmy group of cobweb spires, from the sides of which spring up the piers of clustered shafts supporting the arches and groining of the roof. All above, though, is lost in mystery, a dark impenetrable mystery, through which floats the pale blue smoke of incense.

The great French cathedrals may be finer architecturally, may be more perfect in proportion and detail than this church, but is not the atmosphere which pervades a building more eloquent than the stone itself, and can architecture rise beyond that which impresses the mind with the mystery which surrounds our life and leads us to the contemplation of a future state?

The cathedral of Palma, rising in a golden mass of masonry from the shores of the Mediterranean; the square-planned cathedral of La Seo, at Saragoza, and many others in this district, are all remarkable for that strange impressive atmosphere, and, like great works in Nature, grasp the mind and lead the thoughts to contemplate the mysteries of the future.

The cathedral at Gerona is another exceptionally interesting fourteenth and early fifteenth century building. The choir apse and choir aisles are planned on the usual French arrangement, and were carried out in the early fourteenth century. In the year 1416 Guillermo Boffy, who was then master of the works, made a design for completing the church by the addition of a nave of a single vault of 75 feet, the arch completely spanning the choir and its two aisles. As might be imagined, this suggestion seemed so hazardous that the chapter of the cathedral called together a meeting of the most illustrious architects of Spain to discuss the possibilities of such an erection. After due deliberation the designs were approved, and this, the widest Gothic vault in the world, was erected; it is at the present day in perfect structural condition. (For comparison with our English churches, Westminster Abbey is 38 feet, and York, our widest span, 52 feet, whereas Gerona is 75 feet.) When one enters, the great cavernous space appears larger in proportion than it really is. That mysterious gloom which is usually present in Spanish churches is here pierced by a great diagonal ray which, striking from the south windows, floods the three chancel arches with light. Far off in the distant gloom are seen the graceful, stilted arches of the chevet, and here and there a jewel of colour sparkles in the windows of the apse. The artistic effect is perfect, the drama sublime. This arrangement of light and shade is undoubtedly as much part of the design as the columns and arches, the groining of the roof or plan. This mass of light passes through three richly-stained glass windows in the south-east corner of the nave; all other window spaces are but panels in the walls. Critics say this grand effect is but the outcome of chance, that the architecture, being borrowed from a northern source, had too much window space, hence much had to be blocked up, and time, the mellower of all things, has mellowed down a crude and barbarous makeshift. Has time or accident written avarice in the eye of the moneylenders by Quentin Matsys, or woven the golden light which illuminates a head by Rembrandt? No, this is art, consummate art, art which is akin to that of poetry and music.

Many of the documents connected with these great buildings are remarkable, for they prove how great was the care and thought bestowed on every minor detail. Perhaps one of the most interesting is that connected with the completion of the Miguelete at Valencia. This proves that even in the days when Gothic was a living art it could not be produced without great effort, and, just as to-day, resort had to be made to selection. This manuscript states that Peter Balaguer, an able architect, shall receive fifty florins from the fabric fund of the new campanile in payment of his expenses on the journey which he made to Narbonne, Lerida, and other cities, in order to see and examine their towers and campanili, so as to imitate from them the most elegant form for the completion of the tower at Valencia. This tower was commenced in the year 1381, Juan Frank being the architect, and evidently, the tower not being considered satisfactory, they sent this other architect to get some better suggestions for its completion than that of the original designer.

The romantic beauty of this rock-bound land gave opportunities quickly grasped by mediæval builders, and Manresa, in its poetic situation, is one of those dreams in which they loved to dwell. Perched on the summit of a rock which is broken into picturesque hollows filled with gardens, the

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church crowns the lofty eminence; crossed by ancient bridges at its base, the rushing river Leobregat winds between huge rocks and olive yards; and faintly seen on the horizon are the pale blue mountains, far off spurs of the noble range of the Pyrenees. The great ship-shaped rock, Segovia, is at times an unequalled vision of romance. Built up amongst the mountain heights, the mists descend, and as they slowly wind around its base, it seems as though the rock-built ship is moving, supporting on its decks the wall-girt town, the prow crowned with the towers and turrets of its castle. The situation is indeed unsurpassed for beauty and strength. In the castle, which in mediæval times was impregnable, was kept the money reserve of the kingdom, the mint being in a small building on the river at the base of the rock.

The fifteenth century gave to Spain its largest and, perhaps, most famous Gothic work and the largest Gothic church in the world—Seville Cathedral. It was commenced in the year 1403, and completed about a century later. The great building covers an oblong, 414 feet long by 271 feet wide. It has double aisles and lateral chapels. The coro, as is usual in Spain, fills up the centre of the nave. This arrangement of the coro is necessitated by the elaborate ceremonies and the number of clergy who take part in them. The centre of the church being enclosed led to the buildings being planned shorter and broader so as to allow more space for the people crowding round the sides of the high altar to attend the sermons at High Mass. In the larger cathedrals, such as Toledo, Burgos, Seville, &c., there are sometimes two or three high masses, with organ and full choir proceeding at the same time. The public, as a rule, attend masses in the side chapels, and the service at the high altar, except the sermon, appears to be principally for the clergy.

This arrangement, by which the choir is continued into the eastern bays of the nave and enclosed by stone screens (the trascoro) has been very adversely criticised by authorities on architecture, and from the point of view of the general vista, on entering by the western doorways it certainly is in many cases most injurious. The screens, themselves, however, and the fittings which they enclose are occasionally of such great beauty that they sometimes even more than compensate for the injury done. This arrangement was probably introduced in the fourteenth century, the period at which the churches became much squarer in plan. In such a case as La Seo, at Saragoza, which has a nave and four aisles all of the same height, and with the length and breadth equal, the enclosed coro adds immensely to the effect.

The interior of Seville is noble in the extreme. The massive nave piers rise in moulded shafts, broken only by narrow caps running round the arches and groining of the roof. The immense height of the arcade is carried through the space which in most cases in our English churches would be the triforium. This gives the proportion which so great a scale requires. Beyond the crossing the high altar towers above the coro in a dark mass of carved and gilded wood, and between the nave piers is seen the forest of massive columns which support the double aisles and surrounding chapels.

The sombre majesty of the effect, the richness of the glass and fittings, the dignity of the architecture, well portray the Spanish epithet of solemnity applied to this cathedral, and produce an effect akin to that experienced when contemplating the greater works of Nature. In 1889, part of the vaulting above the choir fell down, and fear was felt for the general stability of the building. This damage has been repaired, and so excellent is the restoration that the appearance of the building is quite uninjured.

In the sixteenth century, when most countries had adopted the Renaissance art, Spain still held on to Gothic form for its ecclesiastical architecture, and the two great buildings of Salamanca and Segovia are the last great Gothic works erected. In the year 1513 the clergy called together a number of architects to draw up a report setting forth the essentials of such a building as they wished to have. This report decides not only the size and proportion of the building, but even such projections as buttresses, &c. Amongst these architects Juan Gil de Hontanon was selected by the chapter to carry out the building. In 1522, the same architect was called in to design the cathedral at Segovia; at his death this work was completed by his son, Rodrigo Gil de Hontanon, in the end of the sixteenth century. These two great buildings, the last spark of the fire of Gothic art, group up in massive towers and domes, crowning the towns over which they rise with majesty and domination. In detail, perhaps, they do not bear analysis, they may have faults of ostentation, but as expressions of the thoughts and minds of those who reconquered Spain to Christian rule and advanced their banner to a new-found world, they are works of expressive art and grand dramatic power, and form a fitting climax to the growth of that art of which they are the final utterance.

ART IN EDUCATION.

"ART as a Subject of General Education" was the subject of a lecture which was delivered in the theatre of the Royal Dublin Society recently by Mr. James Ward, Hon. A.R.C.A., London, under the auspices of the Arts and Crafts Society.

In all their schools, the lecturer pointed out, nearly every subject of general education was compulsory or was thought necessary for the proper education of the average boy or girl, except the subject of drawing or art knowledge. When it was taught it was taught in a tentative way. In some schools it was still treated as an "extra subject." Drawing, he urged, should be taught to every boy and girl in their schools by properly qualified experts, and as much time should be devoted to this subject as to any of the other lessons, for it might easily be shown a knowledge of drawing, or art, was quite as important in the education of boys and girls as any other subject of school study. If drawing had its proper place in their schools it would lessen the overwhelming number of candidates for clerkships, Civil Service and otherwise, and shop salesmen, the supply of which greatly exceeded the demand. It would be better if more attention were paid to the directing of pupils to the dignity of labour as expressed in the work of the mechanic, the artisan, and the craftsman. The elements or principles of technical knowledge should be taught in every school, and, as drawing was the foundation of all technical knowledge, it should have more hours in the week devoted to it in the schools than it had at present. They wanted to have a love for and an appreciation of good art; for, in spite of the writings and teachings of Ruskin, Morris, and others, and of the establishment of museums, picture galleries, and schools of art, a knowledge of art, or an adequate art culture among the masses of the people of these countries was at present very small indeed, and would likely remain so until the subject was accorded its just and equal measure of importance with the other subjects in the curricula in their schools and colleges. The lecturer proceeded to deal, says the *Irish Times*, with the close relationship which existed between Art and Nature. Emerson had said "Art is Nature passed through the alembic of men." The highest form of art, like nature, was creative and original. A full and liberal education, which must include art culture, would fit those who might be called upon to take up certain positions in life, where they might act as directors or guides to the community at large. They would not be surprised to find that art education was at present treated with so much indifference when it was considered that they had not yet seriously thought of it as an important factor in the welfare of the nation, not to speak of its commercial value to the State. A considerable portion of the wealth of France was derived from the profits on the goods and wares of an artistic nature, which were turned out annually by the deft fingers and fertile brains of French men and women. Was it not the imperious Parisian milliner who dressed the feminine world? Germany and Switzerland were rapidly adopting the French ideas and methods of art instruction in their schools and colleges, and were establishing and developing new institutions known as trade art schools, where boys and girls were taught for a term of four years in the subjects of drawing, modelling and design, as applied to all trades and manufactures where an expert knowledge of art was essential. England was just beginning or thinking about the establishment of such schools, but, as far as he was aware, the movement had not yet reached Ireland. There were many modern instances where both clergy and laity had unknowingly, he admitted, acquiesced in the disfigurement of their churches and cathedrals by allowing inartistic people to cover the walls and vaults of their sacred edifices with commonplace designs and crude colouring, entirely out of harmony with the architecture and uses of the fabric. In churches so disfigured, and there were many of them in Great Britain and Ireland, the worshippers who might have the fortune or the misfortune to possess an artistic taste, found it very disquieting to their peace of mind to sit throughout the length of a service in a badly-coloured church, because however devoutedly they might be disposed, it would certainly "mar their calm," if not irritate their sense of proportion and fitness of things. Better far to keep to the puritan,

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whitewash in our churches than to make them the examples of commonplace and misapplied decoration. Much of the modern stained glass was imported from foreign countries, and its greatest recommendation was its cheapness. It was clear that their bishops, deans, chapters and churchwardens would be all the better for a little education in art matters, especially if their churches were in need of stained glass. It was the duty of all committees who had to superintend the erection and decoration of public buildings and churches, to employ expert advice if none of their number were possessed of artistic knowledge. Nature-study ought to prove a delightful and charming recreation or change from other school lessons of the children, if the subject was taught in an intelligent way. Referring to the new Universities, he said he sincerely hoped that provision would be made for the foundation of a professorship, or a lectureship, in art, so that the future graduate should be enabled to pass through the new Universities, carrying with him an appreciation, at least, of the aims and significances of art. The governing body and senate of the National University would surely see that some form of art culture must needs be a part of the college curriculum, because they could not allow Ireland to be behindhand in this matter. There was no better way of learning history than by studying the art and architecture of a country, and certainly none more interesting. In fact. the history of every ancient and mediæval nation was largely written in the remains of art and architecture. With the knowledge of art their lives would be happier and brighter. They should not look on art as a luxury. They should look on it as a valuable asset, which would have a refining influence on the lives and manners of the people.

THE ULSTER SOCIETY OF ARCHITECTS.

THE annual report of the above Society was presented at the last meeting. In the course of it the Council say that during the progress of the Irish University Bill through Parliament the following resolution was passed by the Council:—"That any university created for Belfast and the province of Ulster will be incomplete unless provision is made for the establishment of a Chair of Architecture therein, and it is essential that sufficient funds be provided by the Government to enable the statutory authority of the proposed university to provide such a chair." The Queen's University of Belfast has now become an accomplished fact, and it is hoped that the Senate will be able to fulfil the wishes of the Society. The Council has not allowed any opportunity to slip of using its influence to stop the demoralising practice of public officials engaging in private practice. During the year the Urban Council of Bangor made an appointment of surveyor for the district, and it was made a condition of the appointment that he was not to engage in any private practice. Following the comparatively satisfactory arrangement made by the Holyrood Urban Council reported last year, this is considered very encouraging. The Commissioners of National Education and the Local Government Board have recently become active agents in supplying stock pattern plans for the erection of schools and labourers' cottages, which are in some cases being availed of by local committees and authorities regardless of their unsuitability to local circumstances, site and material, which can only be properly met by the employment of a qualified architect in each individual case. Like most model plans, they are usually unsatisfactory, except where they are plagiarising—a circumstance not unknown—from the designs of architects lodged with the Department. This matter has received attention, and further action will be necessary to protect architects' interests as well as prevent waste of public money. The unnecessary difficulties that were experienced by architects in obtaining the approval of plans by the city surveyor for trifling alterations induced a member of the Council, in a case in which the disapproval of a plan seemed uncalled for, to seek to have the law settled by a superior Court. This action resulted in obtaining a clear definition of the surveyor's duties, which, in the case of alterations that do not involve the taking down one-half of the area of the front wall towards the street, are to be limited to seeing that the by-laws in force are not contravened. The Council has recently addressed a communication to the Senate of the new Queen's University of Belfast with reference to the appointment of an architect for the buildings required in connection with the university scheme. This is one of the most important architectural problems which have arisen in Belfast, and it would be deplorable if it were not dealt with in the best possible way, both for administrative facility and architectural effect. It has been suggested that this can only be obtained by a competition, the conditions of which should be drawn up by an architect of the highest standing, and that as the university is intended to afford educational facilities primarily for the Province of Ulster, the competition should be confined to qualified architects (many of whom are former students of the Queen's College) practising in that province. By this means, says the report, the result of the consideration of the requirements by several minds would be obtained, and the appointment would be made on the merits, and not through the influence of friends, perhaps accompanied by the still more objectionable method of canvassing.

AMENDMENT OF THE LONDON BUILDING ACT.

AT a conference held at the County Hall on January 14, called by the superintending architect of the London County Council "to consider the questions raised in Part V. of the London County Council (General Powers) Bill," there were present representatives of the Councils of the Royal Institute of British Architects, the Surveyors' Institution, the Institution of Mechanical Engineers, the British Fire Prevention Committee, the Concrete Institute, the Institute of Builders, the London Master Builders' Association, and the District Surveyors' Association, when the following resolution was carried, with one dissentient:—

"That the scope of the said Bill (Part V.) should be limited to the construction of enclosing—i.e. external and party—walls."

The Council of the Institute had the matter before them at their meeting last Monday and passed the following resolution:—

"That the Council of the Royal Institute of British Architects unanimously endorses the resolution passed at the conference held at the County Hall on the 14th inst., and urges that the draft Bill should be amended accordingly. That a copy of the report of the conference and of this resolution be sent to the clerk of the London County Council and to the superintending architect."

Correspondence

[*The Editor will not be responsible for the opinions expressed by Correspondents.*]

Plumbers and Plumbing.

SIR,—Under this heading appears a letter in your issue of January 22, from a Mr. A. A. Adams.

Personally I tender my apologies for having forgotten the existence of the few London plumbers who have assumed the description of "The Associated Master Plumbers," a title which is sufficiently vague to disguise the parochial nature of its membership and the paucity of its numbers.

As President of the Institute of Plumbers of Great Britain and Ireland, an institution which is national in its scope and organisation, I claim the right to speak authoritatively on behalf of the great majority of plumbers in this country, both in London and the provinces, who have sufficient confidence in their ability to control matters which affect their own particular trade (like other trade and professional organisations), without delegating that authority to an alien body which has no connection with plumbing except in name. For these I do not wish to speak.—Yours faithfully,

WILLIAM CHALLONER,
President, Institute of Plumbers.

20 Tothill Street, Westminster.

Concrete Aggregates.

SIR,—I quite agree with the remarks of your correspondent "M. C. I." when he says "that whilst elaborate specifications and standards have been prepared for the cement and other binding materials, the question of the equally important aggregates has received little attention."

I have had occasion during the last few weeks to examine and report on the failure of two concrete jobs. In the first one five parts of gravel to one of cement were used. The cement was found to be perfect in every respect, but the gravel contained 7½ per cent. of loam. In the second case, seven parts of blast-furnace slag were used to one of cement.

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The latter again was found perfect, but the slag contained 12 per cent. of sulphates!

Notwithstanding this, no amount of argument could convince the builders that the failures were not caused by the cement. Most architects will specify that a clean suitable aggregate is to be used, but although he may have his cement tested, he will rarely trouble to have the aggregate analysed.

Considering the immense improvements in the manufacture and quality of Portland cement during the last few years, and the extraordinary precautions which are taken by all high-grade manufacturers to prevent inferior cement getting on the market, it is of far greater importance for the users to ascertain the quality of the aggregate, as this is more likely to be the cause of failure than the cement.—Yours, &c.,

January 22, 1909. T.

GENERAL.

Mr. John Slater, F.R.I.B.A., has been appointed by the Council of the Royal Institute to succeed the late Mr. E. A. Gruning as a permanent member of the Tribunal of Appeal.

The Surveyors' Institution will hold their annual dinner at the Hôtel Métropole on February 23, and not on February 16 as at first announced.

The Town Clerk of Dundee has received official intimation from Edinburgh that the claim by Mr. Mackison's trustees against the Corporation for his services as sanitary inspector is not to be insisted on in the appeal. The sum asked for under this head was 3,800*l.*

The Coventry City Council on Tuesday decided to organise a competition for designs for municipal buildings along Earl Street.

A Fund is to be raised for carrying out a scheme for the restoration of St. Nicholas Church, Rochester. The parish dates back to the time of the Norman Conquest. The church was erected in the fourteenth century, and partly rebuilt in the seventeenth century; it adjoins the cathedral. It was resolved that the work be approved at the estimated cost of 10,000*l.*, and that a committee be appointed to collect the necessary funds.

Mr. Frith, sculptor, and Mr. F. Pearson (consulting architect of Truro Cathedral) have been commissioned to execute the design of a memorial to be erected in the cathedral by public subscription in commemoration of the public services rendered by three distinguished Cornishmen—Lord Godolphin, who was Lord High Treasurer under Queen Anne, Sir John Eliot, the parliamentary leader in the time of Charles I., and Sir William Molesworth, Bt., who was the first statesman to hold the office of Secretary of State for the Colonies.

Fifty-nine Competitive Designs have been sent in for the offices to be erected at Truro for the Cornwall County Council, and nine have been selected by the office committee to go before the assessor. The estimate ranges from 10,000*l.* to 50,000*l.*

Fifteen Hundred Examples have been selected from the recent exhibition at the last International Art Congress, South Kensington, by the Dublin technical education committee for display in that city. These works comprise examples of drawings from primary, secondary and technical schools and schools of art in England, Scotland, Holland and America, and are illustrative of complete courses of study, from the most elementary grades of work to their highest application to art, crafts and industries. The exhibition will open on Monday.

The Board of Management of the Edinburgh College of Art, after careful consideration of the record of all students who completed the five years' curriculum of the architectural section of the Edinburgh (Royal Institution) School of Art in July last, have awarded travelling scholarships of 40*l.* to Adam Bruce Thomson and John B. Lawson, tenable for four months during the present year, along with diplomas of merit. Diplomas have also been awarded to F. D. White, D. J. White, and G. F. Kay; and certificates to G. H. Watson, S. H. T. Smith, and H. Sykes Mitchell.

The Council of the Royal Glasgow Institute of Fine Arts are considering a scheme for the extension of their galleries in Sauchiehall Street.

Mr. Edwin T. Hall, V.P.R.I.B.A., the assessor in the Bristol Royal Infirmary competition, has made his award with the following result:—First premium, Mr. H. Percy Adams, of London; second premium, Messrs. Henman & Cooper, Birmingham; third premium, Messrs. Worthington & Son, Manchester.

At a Meeting of the Royal Academy on Wednesday evening Mr. W. Goscombe John, A.R.A., was elected a full Academician, Mr. Bertram Mackennal an Associate, and M. Jean Paul Laurens Honorary Foreign Academician.

The Wolverhampton and District Architects' Association held last week their annual meeting at the Law Library, Lych Gates. The following officers for the ensuing year were appointed at the last quarterly meeting:—Mr. William Edwards, president; Mr. W. J. Oliver, vice-president; Mr. A. W. Worral, hon. treasurer; Mr. William J. H. Weller, hon. secretary; Messrs. F. T. Beck, J. Lavender, and T. H. Fleeming, members of the Council; and Mr. Ashton Veall, hon. auditor.

The Berkshire County Council have instructed their county surveyor to furnish such information as may be needed for inviting competitive designs for new county buildings at Reading. The following are the items of the estimated cost:—Purchase of No. 26 The Forbury, and compensation to tenant, 2,110*l.*; cost of pulling down the existing buildings at Nos. 26, 28 and 30 The Forbury, and rebuilding, 10,000*l.*; architect's fees and premium on competition, 540*l.*; legal expenses, 100*l.*; various (including rent of and adapting proposed temporary offices), 1,000*l.*; total, 13,750*l.*

The American Institute of Architects has now 868 members, composed as follows:—320 Fellows, 548 Associates, as well as 63 honorary members and 83 corresponding members.

The Scottish Modern Arts Association have been presented with a characteristic landscape by Mr. Nathaniel Hone, of the Royal Hibernian Academy. Hitherto its acquisitions have been confined to members of the Scottish school, but the acceptance of this canvas is in accordance with the constitution of the Association, which permits of "the acquisition of works of art by artists other than Scottish." The landscape, entitled "A Derelict," is a forceful and impressive rendering of a storm along a rocky coast line.

Two Mural Paintings by Sir W. B. Richmond, R.A., in the central hall of the new Sessions House, Old Bailey, are now free of scaffolding. The subjects are "Roman Law" and "Spartan Law."

The Committee of the National Housing Reform Council are organising a tour next Easter which will probably include visits to Cologne, Düsseldorf, Essen and Frankfort, and other German cities possessing good examples of town-planning.

The Report of the departmental committee on the Inebriates Act makes the following reference to the excessive expenditure by local authorities:—"We are not prepared to justify the erection of reformatories at anything approaching the amount per bed expended by the Lancashire, Yorkshire and London County Councils, even though subsequent additions, put up at much less cost, may reduce the amount per bed considerably below that now stated. We consider the expenditure by those bodies upon new buildings (596*l.*, 542*l.* and 403*l.* respectively per bed) is unjustifiable and a waste of public money. Magnificence of design, arched ceilings, oak-panelled board-rooms with expensive wood carvings, elaborately tiled passages and stained-glass windows are not essentials. In making provision at the public expense, the normal requirements of the persons to be provided for should be the chief consideration. The conditions should be improved only to the extent which is essential for his proper treatment as an inebriate; and the fact that such conditions have been secured to the satisfaction of His Majesty's inspector, at so low a cost as 100*l.* per bed, makes it impossible to justify the far higher expenditure incurred by the local authorities."

At Plymouth County Court last week the case of Williams *v.* Luke was again mentioned. It was an action in which arose the question of the training of a young man named George Williams by Mr. Montague Luke, architect, Plymouth, with whom he was articled. His Honour called the plaintiff's father before him, and pointed out how difficult it was to prove that proper attention had not been given to his boy. It was not right to suppose that an articled pupil had the right to claim the same attention from a professional man as a scholar would require from a schoolmaster. After the parties had consulted with their legal representatives, Mr. Pearce announced that they had agreed that the case should be struck out of his Honour's list on terms, one of which was that the parties would withdraw all allegations. His Honour expressed his pleasure at the result.

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The Architect.

THE WEEK.

Possibly the day is coming when the twentieth-century British architect will be as well aided in the carrying out of his designs by skilled craftsmen as were, apparently, the architects of the English Renaissance in the seventeenth and early eighteenth centuries. There can be little doubt that in those days the actual carvers and forgers of wood, stone, and metal were to a large extent the designers of the detail of much of the work they produced, guided and regulated by the master architect, and that the system of full-size drawings for every detail, as adopted by some of our modern architects, did not then generally if at all obtain. Granted that the sufficiently skilled craftsman, artistically as well as technically, can be found, it is surely far better that he should be allowed to put into his work the best that is in him, than that he should be reduced to the level of a mere facile machine. There must, of course, be a readiness of comprehension on the part of the craftsman of the feeling and spirit of the architect, so that harmony may result between the many parts and varied crafts in the building, and, on the other hand there must be, on the part of the architect, the ability to guide and direct and to convey his ideas and individuality to the craftsman. The necessity for this ability on the part of the architect emphasises the stress that Mr. Ernest George, in his presidential address to students at the Royal Institute on Monday night, laid on the importance for architects of freehand drawing. Not the freehand drawing of South Kensington nomenclature, but drawing from the cast and from the figure without tee-square and instruments. By this kind of freehand drawing a sketch on a half-sheet of notepaper, methodical and exact, would convey to the mind of the sufficiently skilled craftsman the intentions and thoughts of the architect as well as the full-size drawing. For such a sketch to be effective the architect must have ideas to express and the power of draughtsmanship necessary to give them expression.

The Stanley Technical Trade Schools, South Norwood, founded and endowed by Mr. W. F. Stanley, which, after two years existence, are now vested in the Charity Commissioners with an assured endowed income, are doing good work in training lads to become skilful, scientific, and artistic mechanics. The system of training adopted is the joint employment of schoolroom and workshop. In the schoolrooms the pupils learn to draw what in the workshops they carry into execution. By this means they learn to understand a drawing and to comprehend the interdependence of the several parts of that which they make, as well as the necessity for accurate compliance with the drawings. Although in these particular schools the aim of Mr. Stanley is chiefly to produce scientific workmen capable of raising England to the dignified position of the premier country in the world for the scientific exactitude and merit of its manufactures, the principles he has adopted seem to us eminently suited to the training of skilled craftsmen in the carrying out of architectural work. Although in the exigencies of modern manufacture, for the sake of speed and its consequent economy and for the attainment of the highest possible manual dexterity, it may be necessary to specialise to the utmost the actual work of each individual mechanic, the general realisation of the part that his special production plays in the whole and the necessity for the maximum of accuracy in his technique must make for efficiency.

"In the training of an architectural craftsman, drawing from the solid and drawing in the solid or modelling are of vital importance so that he may be able to understand what is meant in the solid by a drawing on the flat, and equally so for the architect student that he may be able readily, clearly, and exactly to convey by a simple drawing on the flat what he intends to be realised in the solid. It occurs to us to suggest that in the training of architect students at the Architectural Association and other institutions, as well as in the training of architectural craftsmen, it would be useful exercise for the students to make freehand drawings in design of ornament, and then for each of them to work from another man's drawing and model in the solid what was intended to be expressed. We do not intend to suggest this exercise in substitution of the modelling of a design by a student from his own drawing or from his own conception without a drawing, still less of the practising of modelling from a cast, but as complementary to all these. Thinking in the solid is of the utmost importance to an architectural student, and whilst modelling is a most valuable means of educating the power of such thought, it is not by any means the only one. The freehand drawing advocated by Mr. Ernest George should be enforced concurrently with geometrical drawing throughout a young architect's training in the schools. He should not be allowed to draw geometrically a single order without making also a freehand perspective sketch of that order. He should not be allowed to make the simplest design without drawing in perspective that design before he starts elevations or sections.

The education of craftsmen has been well initiated by the "higher elementary" system of training adopted at the Medburn Street School, East St. Pancras. Here boys are taught, besides drawing, how to make things—chairs, tables, cupboards, and minor articles of household use. They are taught to design wall-papers, book-covers and other practical applications of the drawing of ornament. The work of the school is, however, hampered by the limitation of age, as for the most part scholars are not allowed to remain in the school after the age of sixteen, whilst there appears to be no adequate provision for financial assistance to those whose parents are unable, without bursaries or scholarships, to keep their sons at school when they have reached the wage-earning age, thus crippling the development of those who belong to the class from which architectural craftsmen are mostly drawn.

Archdeacon Sinclair, at the induction of the Rev. H. C. Dimsdale as rector of St. Augustine's and St. Faith's-under-St. Paul's, advocated the retention of the City churches still left, against the views of those who urge that these monuments of our English Renaissance architecture should be pulled down, their sites sold, and the money thus obtained, as well as their emoluments, used for the erection and endowment of new churches in the more populous outer ring of London. The Archdeacon made a point of the value of the historical associations, the beautiful and dignified architecture of these old churches, and of their usefulness as homes of retirement for celebrated and honoured men who had borne the heat and burden of the day. From a mere monetary point of view the advantages of retention certainly seem rather dearly purchased, for the value of one church in the City would suffice for the erection and equipment of two or three in the suburbs. But money is not everything; and, besides, as far as our observation goes, the churches in populous parishes of 5,000 or 6,000 inhabitants that are already in existence do not seem to be able as a rule nowadays to attract full congregations, whilst as fresh suburbs come into existence there seems to be no great difficulty in the provision of fresh churches ample, to all appearance, for the requirements of their respective districts. It suits the iconoclasts to lay emphasis on the small congregations found in our City churches on Sunday, but they ignore the uses to which in some cases they are put during the week—a reason for their retention that might be made irresistible by further activity on the part of City incumbents generally.

The chief point of the report of the statistical officer to the housing committee of the London County Council is that it is not practicable to supply the entire need for working-class accommodation by municipal building, but that private enterprise must continue to supply the greater part of the accommodation.

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THE ACROPOLIS OF ATHENS.*—I.

NOW that the whole surface of the Acropolis has been dug up clear down to the living rock, and the various treasures and remains sifted from the accumulated débris of ages, it is fitting that within the compass of one moderate-sized volume we should have an epitome of the discoveries made, the knowledge obtained, and the theories advanced as to the history, the purposes, and the form of the great masterpieces of Art in architecture and sculpture of which the Acropolis of Athens is the storehouse. Thanks, therefore, are due to Professor D'Ooge from all those who, though interested in the art of Athens, have not the time to devote to a complete study of the voluminous literature on the subject produced by many workers in the field of Greek archæology and research, written in several languages, and contained in magazines and papers of various societies, as well as in separate books. The volume now before us contains a record of the most interesting and important facts, and of the leading theories relating to the buildings and the other artistic and historical works of the Athenian Acropolis.

It is clear that Professor D'Ooge is not an architect and not perfectly acquainted with the technical language of architecture, so that architectural readers must not worry over some of his peculiar descriptions of, and allusions to, architectural features. When he speaks of "metopes of the older pediments," he must be understood to refer to metopes under the pediments, and even then not to exclude metopes in the friezes on the flanks. He speaks of "gable" when he means "pediment," and uses the two terms synonymously. He fails to distinguish as parts of the cornice between the corona and cymatium, and describes the latter as "the sima (*sic*) or cornice," not realising that the cymatium of the Parthenon is not a cyma; but, as Penrose pointed out, the only moulding in the Parthenon whose section is a pure and simple segment of a circle. It is rather amusing to read that the doorway of the Parthenon had "an upper sill, which served as a base for a large transom of lattice-work." Such curiosities of quasi-technical language are matters of small moment in a book of so much value, except that they lead to mystification when amateurs pick them up and fire them off in conversation with architects.

The American spelling "sima" for cyma is, by the way, particularly unfortunate, as σῖμός is used by Greek writers in the sense of concave as opposed to κυρτός, convex, and the cymatium of the Parthenon is convex.

Professor D'Ooge acknowledges his indebtedness particularly to Dr. Dörpfeld for much of the matter of his book, but he does not hesitate on occasion to differ from the theories of the great authority on Athenian archæology.

The relationship between the old Temple of Athena, discovered by Dr. Dörpfeld, the Parthenon, and the Erechtheion is one of the questions, and perhaps the most contentious, on which our author differs from the views of Dr. Dörpfeld. Professor D'Ooge assumes, we think quite unnecessarily, the existence of an older Erechtheion, which was the temple jointly of Erechtheus and Athena Polias. Later, that a separate temple was erected to Athena only, this being the old Temple of Athena, officially known as the Hecatompedon. Then the older Parthenon was commenced, before the Persian war, probably by Clisthenes, as a third temple to Athena. After the Persian war, he supposes that the assumed older Erechtheion and the old Hecatompedon were provisionally repaired, until they were superseded by the Parthenon and the Erechtheion, whose remains we see to-day.

Dr. Dörpfeld's view, as stated by Professor D'Ooge, is that the old Hecatompedon was restored after the Persian invasion and remained standing in the time of Pausanias and even to Roman times, notwithstanding that his own discoveries showed that the caryatide portico of the Erechtheion was built over the foundations of the peristyle of the old temple.

The generally admitted facts seem to be: first, that the old Temple of Athena—the Hecatompedon—was originally an amphiprostyle tetrastyle Ionic temple with an eastern chamber, divided into nave and aisles, a western chamber, and two small parallel chambers between the eastern and western ones; second, that a peristyle was subsequently added, probably in the time of Pisistratus, which Dörpfeld thinks was of the Doric order and Penrose believed to be Ionic; third, that the older Parthenon, commenced probably by Clisthenes, was in course of erection at the time of the Persian invasion and was destroyed by fire, the scaffolding furnishing fuel; fourth, that the present Parthenon, or new Hecatompedon, was erected in the time of Pericles, followed soon after by the present Erechtheion.

In the various theories superimposed on these facts, it seems to us that two other important points have been rather overlooked, the relationship of the Doric and Ionic orders and the multiplicity of cults of the goddess Athena.

It is too often forgotten that Doric and Ionic are distinct styles, the architectural expression of distinct peoples or tribes—Dorians and Ionians—who unitedly were components of the Greek nation—Panhellas. Plan types as well as columnar orders are marks of the two styles—distyle-in-antis of Doric, prostyle and amphiprostyle of Ionic. Attica was an Ionian settlement, the Peloponnesus a Dorian. That this was well recognised by the Greeks is shown by the inscription on the boundary pillar standing on the isthmus and described by Strabo.

With regard to the question of cult, it has been held on the one hand that the Parthenon was not the Temple of Athena Polias, and therefore not a cult temple; and on the other hand that the Parthenon was a cult temple, and therefore the Temple of Athena Polias. Both of these views ignore the fact of the multiplicity of cults of Athena. Just as in the Catholic Church to-day the Virgin-Mother is worshipped under a variety of titles, connoting various attributes and activities—as, for example, Our Lady of Loretto, Our Lady of the Seven Dolours, Our Lady Star of the Sea—so amongst the Greeks we have Athena distinguished as Polias, Parthenos, Promachos, Pallas, Nike, Hygieia, Ergane. There is therefore no improbability, but rather a practical certainty, that Athena was worshipped as Polias in one temple and Parthenos in another. Athena Polias, the protectress of Ionian Athens, would naturally have a temple of Ionic plan and Ionic order; Athena Parthenos and Nike, the virgin goddess who brought victory to the whole Greek nation, in a temple whose plan and orders symbolised the union of Dorian and Ionian—amphiprostyle but peripteral, with columns and mouldings of both Doric and Ionic styles. Athens aspired to be the head of the Greek confederacy, and so adopted the Doric style in the national temple, the Westminster Abbey of the Hellenes, the shrine of Athena Parthenos, whilst maintaining the local Ionic style for the Temple of Athena Polias, the St. Paul's Cathedral of Athens.

The plan of the old Temple of Athena, the Hecatompedon, is eminently suited for a joint temple of Erechtheus and Athena Polias, to which the allusions in the "Iliad" and "Odyssey" refer; whilst the Ionic style of its plan and order further confirm the view that it was the temple of deities of Athens.

When Clisthenes, the Alcmaeonid, influenced by his family connection with the Doric city of Delphi, commenced the older Parthenon, he would naturally advocate the use of the Doric style, and this would be readily adopted by the Athenians for the reasons we have already given. We cannot agree with the view of Professor D'Ooge that this older Parthenon, although Hecatompedon, was intended to "supersede" the old Temple of Athena Polias, to support which view he invents a purely supposititious older Erechtheion, but regard both

* *The Acropolis of Athens.* By Martin L. d'Ooge, Professor of the Greek Language and Literature in the University of Michigan. (London: Macmillan & Co. 1908. 17*s.* net.)

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old and new Parthenon as temples for a distinct cult of Athena.

We think that Professor D'OOGE clearly proves that the term "opisthodomos" was not used, as Dr. DÖRPFELD argues, for any part of the old Temple of Athena, but for the western chamber of the Periclean temple, although this was also distinguished as the "Parthenon." The posticum alone cannot have been the opisthodomos, for it is not a rear chamber (opisthodomos), and was neither large enough to contain the treasures listed in the inventories that have come down to us, nor suitable for the business transacted in the opisthodomos, or for the lodgment of a royal visitor. The evidence of grillage is by no means sufficient to upset our view, as naturally the portico leading to the treasury would require a protective enclosure even if both it and the opisthodomos were not used for the storage of valuables.

Dr. DÖRPFELD's arguments on the question of the opisthodomos and the cult of Athena Polias are, of course, in support of his theory that the old Temple of Athena, the first Hecatompedon, was restored and remained standing until Roman times. We see no necessity for this theory to explain any records or allusions in Periclean or post-Periclean times, nor do we think either facts or probabilities support the theory.

It is probable that the old Temple of Athena received less injury during the Persian invasion than the work commenced by CLISTHENES, surrounded as this was by scaffolding. We should suggest as probable that the western chamber and the two treasure chambers of the old Athena temple remained in use during the building of the Periclean Parthenon and the Erechtheion, but that the eastern chamber was so far damaged that it was pulled down, together with the peristyle. The position of the caryatide portico and its slight eccentricity with the axial line of the north portico of the Erechtheion seem to us presumptive evidence of our suggested probability. When the Parthenon and the Erechtheion, so far as it was built, were completed there was no longer any necessity for preserving or restoring the old Athena temple, as the Parthenon, in our view, contained the treasury in its "opisthodomos," and the Erechtheion provided a home for the cult of Athena Polias. We thus go a little further than Professor D'OOGE, who suggests that the old Athena temple was temporarily restored until the Parthenon and Erechtheion were built. We should limit this restoration or reparation and use as we have above suggested. We agree with Professor D'OOGE that the famous oath quoted by LYCURGUS and other literary evidence is strongly against the probability of any complete restoration or rebuilding of the old Athena temple.

(To be continued.)

STEELWORK.—IV.

By C. V. CHILDS, A.M.I.C.E.

RETURNING to the consideration of the steel frame, it is a far more difficult matter to design the steelwork for an English building than for one of those enormously high "skyscrapers," which in the majority of cases means nothing more than piling similar floors one on top of another. In the latter case the designer has only one floor to deal with at a time, and on bringing the reactions of the girders of any one floor to the points of the column supports all the weight on that floor is accounted for, and it only remains to tabulate the column loads floor by floor. On the other hand, in an English building with girders of the upper storeys bearing on the walls a great deal of care has to be exercised in seeing that these are all properly taken care of in designing the girders carrying these walls; also in seeing that the pressure on the brickwork or masonry is in no case excessive.

Then there are in all probability all sorts and conditions of chimney-stacks to be provided for, to say nothing of heavy stone cornices, in some cases six or more feet thick. The loadings on the girders for an English building are far heavier and more complicated than for a steel skeleton frame, except possibly in the case where the system is adopted of carrying the columns in the external party walls on cantilever girders at the basement floor in order to bring all the foundations within the limits of the building line. It may be mentioned that the regulation thickness of party walls in London makes this system unnecessary, though in one case at least—viz. the Ritz Hotel, a building on the steel-frame principle—this method has been used.

While on the subject of what is a necessity in American and not so in English practice, the lateral wind bracing may be referred to. The enormous height compared to the width of the base of a "skyscraper" makes this an important factor; it is also rather a complex problem.

The building itself is practically a cantilever, anchored by its own weight to the ground; what correspond to the flange stresses are easily provided for by increasing the areas of the stanchions in the external walls. The difficulty is in regard to the lateral bracing, corresponding to the web of an ordinary girder; in the lower storeys the strains are so enormous, and the space in which to deal with the bracing is so confined owing to openings for windows, doors, &c., that it is well-nigh impossible to put in the amount of bracing theoretically demanded.

The practice used to be to consider the bracing required for one or two storeys sufficient for all the floors; this was no doubt enough to guard against distortion during building operations. The probability is that the high buildings depend chiefly on the walls for safety against distortion by wind pressure; these would act as the diagonal, and the floors as the vertical, braces in an ordinary horizontal lattice girder; distortion, in order to take place, would first crush the panels of the walls contained between the girders and the stanchions; for this reason it is essential to carefully grout between the stanchions and the walls in order to make the bond between them secure.

Sometimes the question is asked, What is the effect on the framework that may be caused by the expansion and contraction of the steel, due to changes of temperature? In almost every case in America the connections of the girders are rivetted in position, so that the framework is as rigid a structure as a bridge.

In the case of the Carnegie Building, in which the whole of the steel framework was erected before the walls were built, the movement caused by the sun striking on one side of the building, before the other part, was quite a considerable amount, and heavy temporary timber braces had to be employed to keep the framework from twisting out of position.

When the walls are built and the building is occupied, no doubt the internal warmth helps to keep even the stanchions in the exterior walls at a more even temperature. Then again other materials are also similarly affected, so that the variation in contraction and expansion between the different materials is not sufficiently large to cause any serious damage.

The fact that brickwork expands and contracts, though to a less extent than steel, is seldom considered; while in the case of concrete the coefficient of expansion for changes of temperature is almost exactly the same as that of steel.

This fact is seldom realised in building construction, but in the case of large masses of concrete, such as for retaining walls of any great length, unless provision is made by providing expansion joints, trouble is likely to occur, either on account of the concrete cracking or the walls buckling.

A curious instance of this once occurred in the writer's practice. A large area of mosaic pavement was giving considerable trouble, owing to the pavement and the concrete vaulting continually cracking, causing the water to leak through into the vaults beneath. The paving formed a series of terraces, ending at the bottom in a flight of steps, in which the steel cross joists ran at right angles to the arches of the vaults.

The only effect of cutting out and making good the cracks seemed to be to push the steps farther and farther down hill, so much so that the spandril walls had slid along their plinth.

Apparently what was taking place seemed to be that the movement was due to the expansion of the concrete in warm weather, but in cold weather the concrete arches were not sufficiently strong to pull the other portion, including the steps, back into place again. By cutting through the concrete floor over a cross wall and putting in a lead gutter the trouble was almost entirely rectified. It is not often that such a clear case of the effect of the expansion and contraction of concrete under variations of temperature is forced upon one's attention.

Speaking from personal experience, the engineer, used to and fresh from the designing of American steel skeleton con-

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struction, is inclined to draw invidious comparisons and imagine that the "old country" is indeed old and not up to date, overlooking the fact that the conditions are entirely different, and that it is not ignorance, but the difficulty of altering legislation, especially where public safety is concerned, that checks the development of innovations.

Here the Board of Trade and municipal regulations are perhaps over careful and slow to move in new directions, and retard new enterprises; one has only to call to mind the difficulties that the motor-car industry had to contend with in its infancy before it was allowed the use of public roads. So, too, the projectors of local public works, such as tramways, &c., need in America only apply to the town hall, instead of having to secure a special Act of Parliament to obtain sanction for their schemes.

All the main features of the steel-frame building, however, have been adopted and become general in English practice as far as they are economically adaptable. Economic considerations govern all business enterprises. That the steel skeleton under existing conditions in London is far from economical one typical instance may be given. The proof of the pudding is in the eating, or in the doctor's bill afterwards, and this is not an isolated case. For a large business premises now erected in Oxford Street two steel designs were prepared, one on the approved lines of the American steel skeleton framework, and prices were obtained from the Continent for this design. In the other case the design prepared by the writer was what might be called a semi-steel framework—that is, every main-wall or floor girder in the building was carried on stanchions from basement to roof; the exterior walls were carried at the first floor level, except the main front, which being very massive was carried in three sections, at the first, third and fifth floor levels; the internal walls were sufficiently strong to support themselves, as well as the end bays of the floors. The price for this latter design, made in London and of English steel, was less than half that for the skeleton design—a saving of over 25,000*l*. Other cases might be instanced in which the saving showed an even greater proportion.

Beginning at the foundations, one may enumerate and consider separately the various features which have been adopted into English practice.

Grillages.—These, as already stated, were originally designed to overcome the difficulties due to the subsoil at Chicago. They were found to be equally valuable as a means of spreading the pressure over the footing area in all cases where the load on the stanchion was considerable. Formerly in England the loads on the stanchions were comparatively light, but of late years the steelwork has been called upon to fulfil more and more exacting requirements. The York stone, set on top of the concrete base, was amply sufficient when the loads were only moderate; now, in a modern design, the loads on the stanchions may amount to some hundreds of tons each. This would require a very considerable thickness in the concrete and a corresponding depth of excavation; hence the adoption of the rolled-steel joist grillage has become almost universal under stanchions carrying upwards of fifty tons. In London, except in unfavourable localities, such as made-up ground, it is usually safe to keep within a limit of three tons pressure per square foot on the ground. The following table may be found convenient in determining the sizes of the grillage joists under the above conditions:—

Stanchion Load in Tons.	Length of Stanchion Base.	Grillage Joists.		Area of Concrete Base, Square.
		Top Tier.	Bottom Tier.	
50 to 75	1'-8"	3-8" × 5"—4'-0"	None.	5'-0"
75 to 100	Do.	3-10" × 5"—5'-3"	None.	6' 0"
100 to 125	3'-0"	3-8" × 5"—5'-6"	4-8" × 4"—5'-9"	6'-6"
125 to 150	Do.	4-8" × 5"—6'-6"	5-8" × 4"—6'-9"	7'-6"
150 to 200	Do.	4-10" × 6" - 7'-6"	5-10" × 5"—7'-9"	8'-6"
200 to 250	Do.	Do.	5-10" × 5"—8' 9"	9'-6"
250 to 300	3'-6"	5-10" × 6"—9'-3"	6-10" × 5"—9'-3"	10' 0"
300 to 350	Do.	Do.	6-10" × 5"—10'-0"	10'-9"
350 to 400	Do.	5-12" × 6"—10' 6"	7-12" × 5"—10'-9"	11'-6"
400 to 450	Do.	Do.	7-12" × 5"—11'-6"	12'-3"

From the above it will be noticed that the concrete base under a stanchion carrying upwards of 400 tons (allowing 8 inches underneath the grillage and 1 inch for grouting under the stanchion base) need not exceed 2 feet 9 inches in depth.

Cast-iron distance pieces should be used to stiffen the webs of the joists immediately under the heavier stanchions, or the stiffeners should be rivetted to the webs. It is also advisable to rivet the top and bottom flanges of the joists in each tier together, with four flats 6 or 8 inches wide, two at each end; the joists are then ready spaced for setting position. It is usual to allow for ½ to 1 inch space for grouting between the top flange of the uppermost tier and the base of the stanchion, so that the stanchion can be set properly plumb.

The easiest method of doing this is to use four small wedges under the corners of the base plate. After the stanchion is set perfectly plumb by means of these wedges, it is carefully raised sufficiently to spread the grouting underneath it and then dropped back exactly in the same place over the wedges, which should not be removed till the grouting; but if bolts are used, they should not be firmly down bolts are hardly necessary, the base being bedded in the grouting; but if bolts are used, they should not be firmly embedded in the concrete before the stanchions are erected, as this is apt to cause trouble if the holes in the base plate do not come exactly over the bolts. This may seem obvious, but the concretor is often not over-concerned about the troubles of the steelwork erector. A variation in the grillage may advantageously be made for the smaller stanchions by rivetting the top tier, in the form of two steel channels, to the shear plates of the stanchion base.

WINCHESTER CATHEDRAL.

THE cathedral works and wants completed or requiring attention are set forth in a report from Mr. Jackson, R.A., who estimates a total outlay of 99,000*l*. The previous estimate of October 1907 put the outlay at 86,806*l*. It is interesting to note, as a proof of the care used for the chantries, that the magnificent one of William of Waynflete has been cleansed of dust without the least alteration or addition, and now, thanks to Magdalen College, Oxford, which the Bishop founded, this grand chantry stands in all its pristine beauty. The splendid chantry of Cardinal Beaufort has been similarly dealt with, the only new work being the replacing of pinnacles, which have been missing for years. Mr. Jackson says this is his final survey of the building, and he describes in detail all that is necessary to be done in the way of restoration. He adds, however, that in overhauling the building several repairs have presented themselves as requiring attention, which fall rather under the head of ordinary reparation of the fabric.

The lead roofs of the south side of the presbytery, the choir aisles, the tower, the north nave aisle, and both aisles of the south transept will need before long to be partly or entirely recast and relaid, and the parapets of the north nave aisle and clerestory will need repairing to a considerable extent, as has been done in the corresponding parapets on the south side.

The ironwork in the nave roof should be painted, and all the nuts seen to and tightened up.

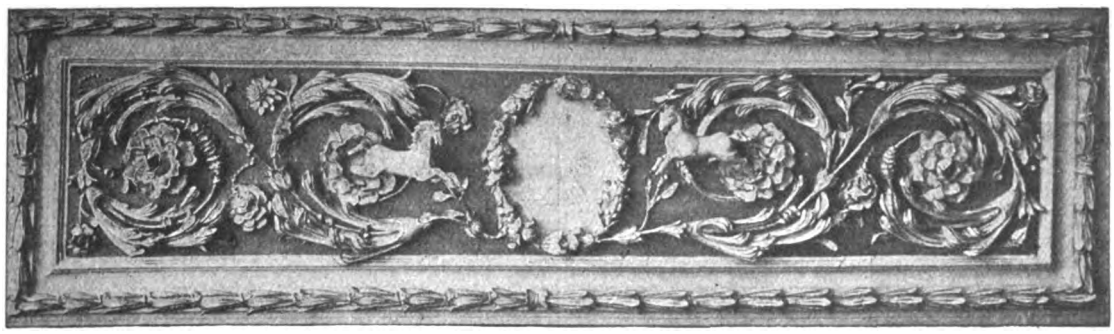
These matters are not of so pressing a nature as the others that precede them, but they must not be overlooked in estimating the work that lies in view.

The Waynflete chantry has had the supporting wall strengthened, as already described. The crack between the Norman and Early English building went through this chantry, and caused a serious fissure across it. This has been repaired, and the whole monument has been cleaned by simply washing it, but, of course, no tool has been applied to the surface.

The chantry of Cardinal Beaufort has not suffered so much. The support below has been strengthened, as in the case of the Waynflete chantry, and the pinnacles, of which many were missing, are being restored. The report concludes:—

I have gone carefully into the estimate of the various works mentioned above as still necessary to the security of the fabric, in consultation with the contractor, Mr. Thompson, of Peterborough, and I estimate that the total sum required will be little less than 99,000*l*. The prices are based on the experience of cost hitherto incurred in each part of the work, and though, of course, they are to a certain extent conjectural, I fear that the total expense will not fall short of the sum we have arrived at.

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PLASTER DECORATION.*

IF there is to be a revival of plaster-work in this country the handsome volume by Mr. G. P. BANKART entitled "The Art of the Plasterer" should prove of inestimable service. It is difficult to believe that plaster will never regain the importance that it once enjoyed. Indeed, during the last half-century there have not been wanting signs that this time-honoured form of decoration, which was employed in B.C. 1800 in the Palace of Knossos—not to mention B.C. 3500 in Mesopotamia—may take once more a prominent place in public and domestic architecture. But Mr. BANKART appears to have little or no hope of any emulation of the best work of the past so long as the existing conditions continue, when "servile workers attempt to realise the mathematically delineated visions of professional men set up in offices, men whose ideas were borrowed from this place or that, and whose thoughts had mostly been stolen from other countries during various holiday sketching tours."



The author seems to have had some difficulty in keeping his work within reasonable bounds. He has been able, however, to escape the allurements of a detailed historical account of his subject in order to treat at length of past and present work in this country. Chapters on Classic and Italian Renaissance work are, he explains in the Preface, included, as some slight knowledge of these is necessary to a right understanding of the development of English work. Plaster-work in France and other European countries and in the East is only lightly touched upon, as it was felt that these branches of the subject required separate treatment. A passing reference is, however, made to French work, sufficient to indicate that it served as the connecting link between the original Italian and the English schools.

Plaster-workers have, as we have indicated above, an inspiring past history. We need not go further back than Ancient Greece, where stucco was in almost universal use and where it was carried to a very advanced stage. It was the immediate predecessor of marble. The victorious Romans were at first as strongly influenced by Greek feeling in their stucco-duro decorations as in other forms of art production. VIOLLET-LE-DUC states that they employed it very frequently both for public monuments and private dwellings. Its use was passed down to the Gauls, though in an inferior form, and there is not, he says, a single Gallo-Roman building in which the remains of stucco-coatings, polished and painted, are not found. In the sixteenth century it became once more an important feature of architectural decoration owing to the discoveries by Cardinal GIOVANNI DE MEDICI in 1488, while excavating on the site of the Baths of Titus, of walls covered with fine paintings and stucco-work. VASARI gives the artistic credit to MORTO DA FELTRO, and he was followed by ANDREA DI COSIMO, who introduced the practice of covering the front of buildings with an intonaco of plaster wherein the black of ground charcoal or burnt straw had been mixed. GIOVANNI DA UDINE, the assistant of RAPHAEL, rediscovered the way to make stucco-duro, and in 1513 was commissioned to carry out the decoration of the Loggie of the Vatican, where he had the assistance of GIULIO ROMANO. These two artists also co-operated on the beautiful Villa Madama. Among the assistants of GIULIO was PRIMATICCIO, who in 1531 went to Fontainebleau at the invitation of FRANCIS I. of France. During his forty years work at that palace he firmly established plaster-working in France, and indirectly was a potent influence in its introduction into this country, for HENRY VIII. was determined that Nonesuch Palace should eclipse any French royal residence.



The guiding spirit in the stucco decoration of Nonesuch appears to have been a Florentine named TOTO DEL NUNZIATA, or ANTONY TOTO, who, in 1539, one year after the commencement of the building, was appointed sergeant-painter to the King. He was assisted by many other Italian modellers. JOHN EVELYN visited the ruins of the palace in 1666, and wrote:—"I took an exact view of the plaster statues and bas-relievos inserted between the puncheons of the inside walls of the court, which must have been the work of some celebrated Italian. I much admired how it had lasted so well and entire from the time of HENRY VIII., exposed as they are to the air; and pity it is they are not taken out and placed in some dry place—a gallery would much become them. They are mezzo-relievos the size of life." The royal patronage was soon followed by that of English noblemen, and it was not long before native craftsmen were working side by side with the foreigners. Mr. BANKART says:—

In the times of Edward VI. the English plasterer had pretty well learned from these foreigners the art of working in stucco, and earned his 11*d.* a day, while his brother painter received only 6*d.*, or, when lucky, a penny more. In 1547, or thereabout that time, an English stuccoist who had travelled in Italy, Charles Williams by name, is found working in England. He most probably had assisted in the work at Fontainebleau and also at Nonesuch. In 1547 Charles Williams wrote to Sir John Thynne, who was then engaged in building Longleat House, Wiltshire, and offered Sir John his services in supplying internal decorations "in the Italian fashion." At Longleat are two letters from Sir William Cavendish and his wife, asking for the use of this "cunning playsterer, whom they have heard had made dyvers pendants and other pretty things, and had flowered the hall at Longleat," to do like work for them at Hardwick. The old hall at Hardwick, now in ruins, was being built from 1567 to 1590, but was never completed. On the walls of the Giants' Chamber are to be seen at the present time the remains of a modelled frieze of excellent workmanship, undoubtedly the work of Charles Williams. . . . It is to be regretted that the ruins of the old hall are now in an extremely dangerous condition, so much so that there is risk in pursuing one's studies there. Charles Williams established a school of English stucco modellers. The coloured frieze in the state room of the present Hardwick Hall is probably the work of this school, executed between 1590-97, and besides being coarser in workmanship, it is inferior to

* *The Art of the Plasterer.* By George P. Bankart, architect and craftsman. (London: B. T. Batsford.)

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the earlier example. . . . The Englishman left to himself tended towards the burlesque, while the Italian, on the other hand, came as near to the perfection of form as he was allowed to by the material.



Native talent was not content with mere imitation, and by the end of the sixteenth century began to experiment with a coarser and more indigenous material than stucco-duro, viz. the ordinary lime and sand and hair with which the walls were coated. The artist was usually the local plasterer or mason, who evolved his own patterns for his parge-work. One of the best known examples is Sparrow's House, Ipswich. Mr. BANKART in his remarks on it does not mention as to how far the work now seen on the exterior is unrestored. It can scarcely be possible that after three centuries the modelling should have remained so sharp. The majority of timber-built houses in London up to the time of the Great Fire were enriched with this parge-work; but few remain, and none of these are included among the numerous photographic examples given in the volume. The illustrations have been collected from many different counties. It would appear that the human figure was very rarely introduced into exterior panels, and only occasionally into interiors.

The English school of plaster-work gradually superseded the Italian, French, and Dutch methods, both in the material and in the design. As the author points out:—"The great spacious halls and chambers of France and Italy necessitated a more ambitious treatment than the simple homes of the English people. The rooms were of less height and smaller in size than those of our neighbours, and the scope of the artist in plaster had corresponding limitations, of course; so no more was attempted at first than easily repeated patterns of panelling formed by moulded ribs of plaster. The panels were small to begin with, growing larger as time went on. The mouldings were of simple section, the earlier examples being made up of few members, chiefly groupings of beadings, ovolos, and fillets." The several photographs of Plas Mawr, Conway, prove that by the latter part of the sixteenth century the artists had acquired considerable freedom and confidence, animal forms being introduced with great success for heraldic purposes, though the ceilings are somewhat plain with prominent ribs. The work attained its zenith by the first half of the seventeenth century. The plasterer, we are told, received some ideas from the patterns of the brocades and embroideries of Persia and Italy and from the tapestries and needlework of the ladies. A striking instance of this is to be seen in the ceilings at Burton Agnes Hall, Yorks. The forms of their figures and ornaments, the growth of their floral sprays and sprigs, and the design of their running patterns in borders are extremely similar in the two arts.

The panellings gradually developed after the manner of the radiating ribs and fan-vaulting, and is known as the Pendentive System. The best example is said to be the Fish Room at Audley End, which dates from 1615. This system was superseded by a geometric arrangement of ribs, which differed from the earlier arrangement in its not being limited to straight lines.



Plaster-work was little known beyond the Tweed until the end of the reign of JAMES I. It would seem as if it was more of an exotic than in England. It was introduced into the castles by Flemish and Italian artists, and remained in the dwellings of the wealthy. The five illustrations of portions of ceilings in Holyrood Palace corroborate the remark that "the delicacy of the technique is most beautiful, and will bear the minutest scrutiny," and justify the legend that they were the work of gentlemen modellers, though perhaps they are not too painstaking for any band of amateurs.

The earliest important example of Irish plaster-work is that in the Royal Hospital, Kilmainham, Dublin, which was designed by WREN, and executed in 1680. It is shown on four full-page plates. With the exception of that building and another in Tipperary there are, we are told, no examples of Irish work which were not of the eighteenth century and none outside Dublin.

In the chapter entitled "English Plaster-work of the Later Renaissance," great importance is attached to INIGO JONES as having introduced an entirely new manner of ceiling decoration from Italy after his visits about 1604-5 and 1613-5, and whose influence endured for two centuries. The altered conditions are thus described:—"From the time of his coming, and after, there was none of the freedom of craftsmanship that existed in Queen ELIZABETH'S time, nor had he the skilled craftsman to help him out. His men were expected to carry out his instructions implicitly. No more will be heard of the old independence of craftsman or master builder, for the architect had to be first." This new attitude of the architect was continued by WREN, though he allowed very wide latitude to GRINLING GIBBONS. Mr. BANKART considers that, with all WREN'S genius as an architect, his ornament was never quite free from the spirit of the amateur, and that it became more and more meaningless. Detailed attention is given to the various City churches where WREN gave immense scope to the plaster-worker. After his death the craft rapidly degenerated. The Brothers ADAM were able to strike out on another line, even if their ideas were borrowed from Italy. It certainly can be said with truth that their ceiling decoration was graceful and refined in design, delicate and subtle in modelling.



The last chapter of the volume is devoted to "Modern Plaster-work." Mr. BANKART has the uncomfortable conviction that the time is out of joint. He blames the architect chiefly for the present unsatisfactory conditions, as being the man who designs without technical knowledge while using wrong patterns, and dictates without personal acquaintance with the material. "Why is the plaster-work of the nineteenth century so uninteresting, bad, and uncouth?" asks the author. The explanation offered is, "Because the calling is divorced from pleasurable and legitimate production. Besides which, in the completeness of this divorce from the craft, the opportunity of self-expression is denied to the worker, whatever his talent is." The author justly protests against details suitable for wood or stone being moulded in plaster, and illustrates his idea by means of diagrams as to right and wrong sections for mouldings. Valuable advice is given to the future designer as to the use of his new materials and the adaption of his design to new conditions. An additional chapter is entitled "Notes addressed to Students and Apprentices."

This volume (of which a copy has been accepted by His Majesty the KING) ought, as we have already said, to be a powerful agent in bringing about a new Renaissance in plaster-work. The ground is, we believe, more ready for the sowing of the seed than Mr. BANKART appears to imagine. No doubt he must find it difficult to be optimistic when he compares the work of the past with the present. But his labour will not have been in vain if it fires the rising craftsmen to emulate—but not to imitate—the splendid achievements of their distant predecessors. It will be a great day for architecture when that ambition is general, and not, as at present, confined to one or two artists who employ plaster for a medium.

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WOODWORK.

THE following lecture, illustrated by lantern photographs, was delivered on Wednesday evening last at Carpenters' Hall, London Wall, E.C., by Mr. E. Guy Dawber, F.R.I.B.A. :—

The subject of my lecture this evening—the historical growth of design in woodwork—is one of especial interest to English craftsmen.

After the admirable addresses by Mr. Schultz on "Reason in Building," it may be useful to follow the broad changes that took place throughout the past centuries in the forms and design of woodwork.

Some may argue that this partakes too much of mere archæology and antiquarianism, and that it is out of place to-day, but my answer to this is that every craftsman should know something of the rich heritage bequeathed to him by his ancestors, and that a study and analysis of the old methods of building and the proper use and application of materials will help us considerably in the solution of our own problems to-day.

England has always been a timber-using country, and its people from the earliest times have been accustomed to its employment in the building of ships and especially in the use of the bow and arrow.

Woodwork in this country was more varied in the purposes to which it was applied than that of any other, but whether this was owing to our insular position, our skill in naval architecture, or the fact that we had the good fortune to possess some of the best of European timber, it is certain that the buildings our ancestors erected are remarkable for the beauty and variety of their woodwork.

If there is one feature above all others which distinguishes the craftsmen of this country it is the skill they showed in the science and practice of carpentry, and we are indeed fortunate in possessing so many examples of their workmanship.

The subject divides itself into several heads, some of which we can only touch upon.

Firstly, the use of woodwork in roofs, spires, houses and barns, ceilings, floors, staircases, doors and windows, &c.; and secondly, the use of woodwork in furniture, screens, seats and stalls, pulpits, presses, chests and so on.

Of woodwork executed before the twelfth century we have few or no examples, but it probably did not differ much in design and character from that of the tenth and eleventh centuries, at least judging by representations in early illuminated manuscripts.

Up to the sixteenth century the Gothic woodwork and fittings in both churches and houses were all of what we should call an ecclesiastical type—the ordinary style of the day; and for more than three centuries there was absolute connection between wood and stonework, both in design and detail.

This is natural enough when we recollect that the masons who built the walls of the church, the house or the barn, and the carpenters and joiners who made the interior woodwork and furniture, were probably natives of the same village and brought up with the same ideas; and allowing for differences of technique, the simple patterns of the stonemason did very well for the timberwork.

Therefore we find the woodwork of the church identical with that of the house, and it was only after the Reformation and the introduction of the Renaissance and Classical detail that the ecclesiastical spirit in woodwork died out, and what we associate to-day with Domestic work took its place, but though to-night we are dealing with it separately, it must not be forgotten that throughout all periods it formed part of the actual structure.

From the time of the Conquest, our English masons were producing a series of wonderful buildings all over the country, many vaulted with stone, culminating in Henry VII.'s Chapel at Westminster, and King's College Chapel at Cambridge, but at the same time, whether owing to our national pride, or the skill and ability of our carpenters, in all their smaller buildings a preference was shown for timber roofs instead of the more usual stone ones.

Possibly, in certain districts this might have been due to the difficulty of obtaining good building stone, and they had of necessity to fall back upon the only other local material at hand.

During all this period when the art of masonry was developing to such a wonderful degree, woodwork to a large extent was more or less imitative, if we except the noble series of timber roofs, a large number of which still fortunately remain.

These exhibit a fertility of design and soundness of construction truly astonishing, and place the craft of the carpenters of the Middle Ages in the foremost rank.

The simplest and earliest description of roofs doubtless consisted of two rafters pitching against each other. Owing to its tendency to thrust out the walls, this formation soon led to the introduction of the tie beam, which in conjunction with the rafters gives us the simple form of roof still in use to-day.

We find this throughout the Middle Ages in domestic as well as ecclesiastical work, often with a king-post in the centre, treated as a shaft with moulded cap and base, and curved braces on either side.

Again, in certain districts we note a remarkable similarity in the design of the roofs.

The hammer-beam roofs of the eastern counties, the trussed rafter-roofs of Kent and Sussex, and the waggon-shaped roofs of the West of England, all show the influence of the fashion set, perhaps by some strong personality, or the abundance or limitation of the material at hand.

Many of the old tithe barn roofs were of admirable design, with centre and side aisles, the one at Harmondsworth in Middlesex, dating from the early fifteenth century, being a particularly fine example.

The well-known roof over Westminster Hall, one of the earliest (1397), is undoubtedly the most magnificent example in this country. This great arch of timber thrown across such a vast span is indeed a noble conception, superbly carried out and constructed.

These timber-roofs, the wooden screens to the roods and chapels, the stalls and benches, the doors and panellings all based the motif of their design and decoration on the cusping and tracery of the stone windows, and unhesitatingly copied and adapted them.

We notice the various phases of design succeeding each other in exactly the same way as among the contemporary workers in stone, the main difference being that the work in wood is generally thinner, flatter and more delicate, and it is useful to bear this in mind because it helps to simplify the earlier part of our subject.

The use of timber again in the framework of buildings was very common; and in conjunction with stone and brick formed in timber growing districts the chief material of their entire construction.

All, however, whether in churches, houses, stables, or barns, were constructed on the same principle, and with the same solidity and general goodness of effect.

You can see a group of these wooden houses in Holborn to-day, and in Kent, Sussex and Surrey numerous examples still remain.

The very beautiful Guildhall at Lavenham, in Suffolk, about the latter half of the sixteenth century, is very characteristic of the eastern counties, and is an admirable example of mediæval carpentry.

The lavish and almost wasteful use of timber in the construction of the buildings in the West of England is accounted for by the existence of the large forests known to have flourished there in the Middle Ages, at a safe distance from the iron-smelting works which depleted the woodlands of Sussex and the great shipbuilding yards of the South of England. Again, a very marked characteristic of western design as compared with the houses of the East of England is the elaboration of ornamental forms in the timberwork itself—more apparent the further north we travel, and culminating in the ingenious devices of Lancashire and Cheshire.

The old carpenters used the timber as it came to hand, crooked or straight, but always with an eye to the picturesque as well as the useful; and we see this especially in the designs contrived by using the bent and twisted pieces of wood in the curved braces and filling pieces in these half-timbered houses of the West of England.

The timberwork generally of the West is cruder and somewhat coarser in character than that found in the East of England and the Weald of Kent, and Mr. Reginald Blomfield attributes this to the presence of the Flemings, who doubtless taught the English builders some of their admirable skill in craftsmanship.

(To be continued.)

The Local Government Board have just sanctioned a loan for the cost of pulling down the Georgian town hall at Newbury, building additional municipal offices and widening Mansion House Street, at present a narrow thoroughfare with dangerous corners leading from Bridge Street to the Market Place. The erection of a new commodious town hall, with all the latest improvements, will be in hand a little later on.

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NOTES AND COMMENTS.

Antiquities and art treasures are in Italy a matter of national concern, and the Government regulates archæological research and provides a considerable portion of the funds. Archæology and art are in fact included within the province of the Ministry of Education, and Signor Rava has recently taken the opportunity of summarising the results of the last few years. Amongst the treasures added to the national collections have been the frescoes of Luini, the *Discobolos* of Castello Porziano, the *Magdalen* of Pietro di Cosimo, the *Annunciation* of Messina, the *Angel* of Penacchi, the bronze ornaments of sunken galleys from Nemi, and the collection of the antiquities of Palestrina. In the field of excavation have been the discoveries in the Roman Forum and Palatine Hill, of the Roman theatre at Turin, at Ostia, and in Egypt and Crete. The finances of exploration work are, of course, aided by the fees charged for admission to view, but whereas in the past half of the fees has been appropriated by the Ministry for general antiquarian purposes and the purchase of works of art, it is now proposed that each gallery, museum or monument shall be credited with the whole of the fees it earns up to a certain sum. This is, we think, as it should be, for no one objects to paying a fee to be allowed a sight of the Roman Forum, knowing that he is thus contributing to some small extent in the cost of discovering and preserving the treasures it contains.

Whilst we do not wish to enter into any political discussion on the merits of Free Trade and Tariff Reform, we think that the report of the Tariff Commission on the engineering industries, and particularly electrical engineering, closely connected as these are with the building trade, is one that should be studied by all who desire to form an unbiassed opinion. That British industries have not prospered of late as have those of some of our foreign competitors is a fact patent to all. How far this is the result of hostile tariffs and protection can be learnt from the evidence published in this report.

The exhibition of work by the students of the Camberwell School of Arts and Crafts shows that good results are being obtained from the training given at this institution and its allied centres. The one art in which this school fails comparatively is architecture, and in this respect it is on the same level with the majority of polytechnics or technical schools in London as far as our experience goes. Carving, modelling, lead and plaster work, cabinet work, jewellery, dressmaking, embroidery, pottery and many other crafts are excellently taught and intelligently learnt, and it would be more fitting, in our opinion, to style this a school of artistic crafts.

Professor Sayce has made an important discovery of the true site of the ancient city of Meroë, which he has located about half-way between Atbara and Khartum. Feeling dissatisfied with the dictum of Caillard, who in 1821 declared that the temples at Naga marked the site of Meroë, he made researches around the pyramids near Kabushia and has been rewarded by finding unquestionable signs and remains of a ruined city, including the great wall of the inner defences and the remains of the Temple of Ammon, mentioned by Strabo, together with part of the avenue of rams leading up to the temple. Professor Sayce has also found a statue of a king, life-size, and an important slab with Greek inscriptions, as well as scarabs, seals, and pottery of various dates from 700 B.C. to 300 A.D. The chief importance of the correct location of Meroë lies in the fact that it forms the centre from which can be measured the known distances of buried cities of ancient Ethiopia mentioned by early historians, and their approximate situation can be thereby determined.

It should not be forgotten that although a sample of Portland cement complies with the requirements of the British Standard Specification when tested with "dry standard sand," it does not necessarily follow that it will give as good a result with the sand that may be used on a particular building. This was forcibly illustrated at a recent meeting of the Royal Victorian Institute of Architects, when it was shown that the Leighton Buzzard sand—our standard—gave as a result one-third more strength than the Nepean River sand, used as a standard in Australia.

ILLUSTRATIONS.

COUNTRY MANSIONS AND HOUSES.—MR. ERNEST GEORGE.

On Monday evening last Mr. Ernest George, as President of the Royal Institute of British Architects, gave the customary address to the students. We have taken advantage of this opportunity to show some of the earlier residences which have contributed to the reputation which Mr. Ernest George has enjoyed for many years of being one of the leading representatives of his art, and especially one of the pioneers in that English domestic architecture which has won the admiration of those foreign critics who are most hostile to the architectural productions of this country.

Mr. Ernest George was born in London in 1839, and soon tasted success by winning the Royal Academy Gold Medal for Architecture at the age of twenty. After serving his articles with Mr. S. Hewitt, he commenced practice, and had as his first partner Mr. T. Vaughan; on the latter's death he was joined by Mr. Peto. When Mr. Peto retired he took Mr. A. B. Yeates into partnership. In 1896 he received the Institute Gold Medal at the hands of Mr. George Aitchison, R.A.

The earliest design which we illustrate is the large mansion, "Rousdon," Devon, built near the sea for Sir H. W. Peek, Bart., at a cost of nearly 80,000*l*. The external walls have a thickness of 3 feet, and the brick lining is 9 inches thick. Purbeck stone is used for the mullions and dressings. This house was designed while Mr. T. Vaughan was partner.

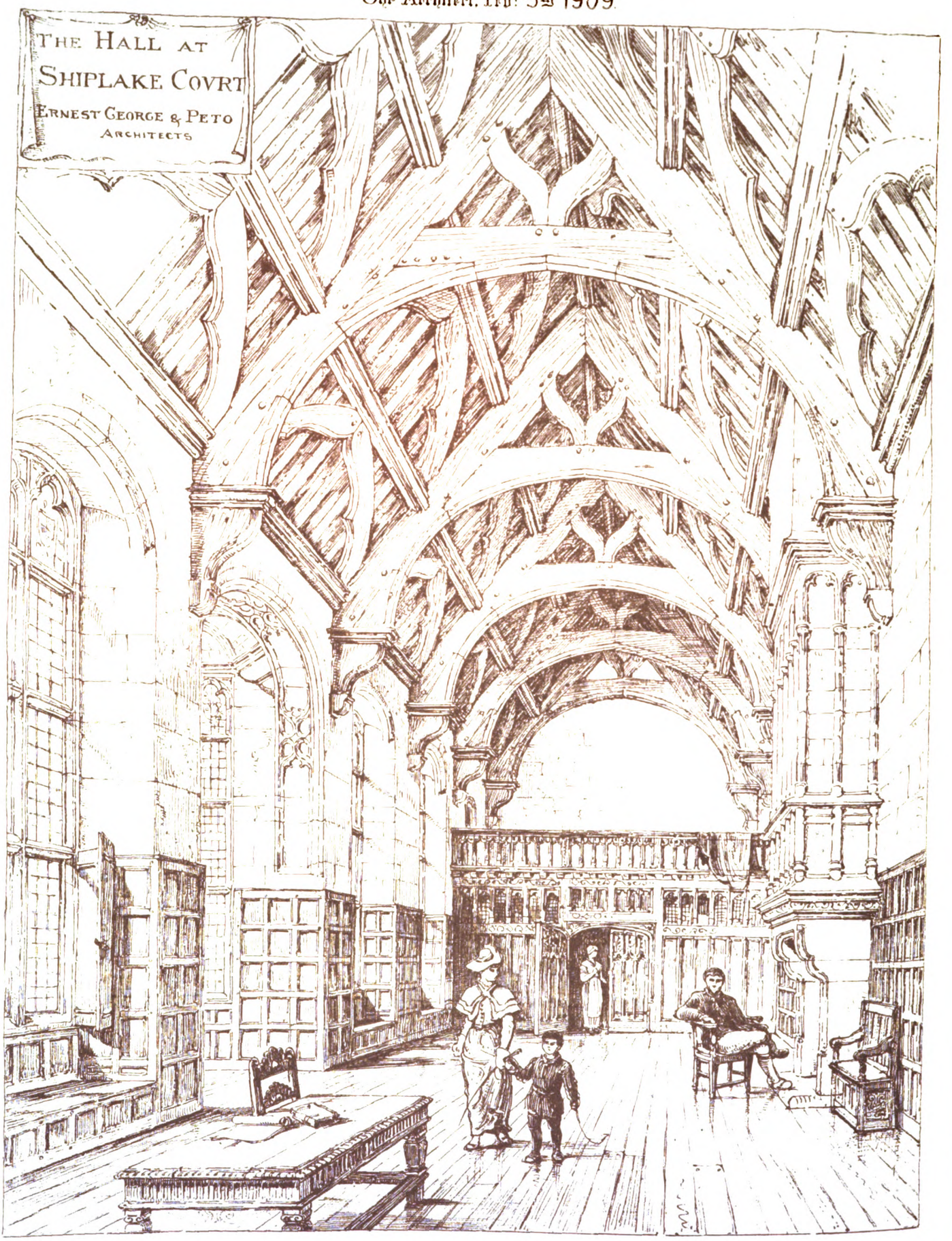
"Woolpits," Surrey, and a "House at Ascot," by Messrs. Ernest George & Peto, were shown in the Royal Academy of 1885. "Woolpits" was erected for Mr. Henry Doulton on the slopes just below Ewhurst Mill. On entering the house there is a fine panelled hall, 34 feet by 17 feet, with an oak staircase at one end. The dressings and mullions throughout the exterior are of buff terra-cotta, supplied by Messrs. Doulton. A large panelled hall, round which the principal rooms are grouped, is also a feature of the "House at Ascot." An unusual feature is the domestic chapel, 33 feet by 15 feet. The two rooms behind the verandah on the south side have each a bay window brought as far as its face, so as to prevent their being darkened.

The drawings on the opposite page to the above designs represent part of the firm's contribution to the Royal Academy in 1888. The hall of "Batsford," Gloucestershire, extends through two storeys. The view given is of the north side; bay windows are facing the south, which looks upon the park. The design shows a symmetrical Tudor house treated in a broad and dignified way, after the manner of a building of the period, and with an avoidance of fanciful features. The "Cottage at Harpenden" is more picturesque with its broken outline. The red-brick "House on Streatham Common" has the great interest of being designed for Mr. George's own occupation. From the same year's exhibit we have reproduced four small country houses at Henley, Denmark Hill, Bagshot, and Pinner.

The entrance-hall is generally a leading portion of the designs by Mr. George, and the one shown at Shiplake Court, Surrey, is 70 feet long, with an open timber roof and massive oak beams. Oak panelling is used to the height of the lower transoms around the room. At the far end is a screen and musicians' gallery. "The Poles," in Hertfordshire, is Jacobean in style. The walls are of brick, with stone mullions and transoms for the window. The dining-room, the drawing-room, and the library are so arranged that when the folding doors are opened there is a vista of 120 feet. The "Country House, Dorset," is a conspicuous exemplar of straightforward planning on a large site.

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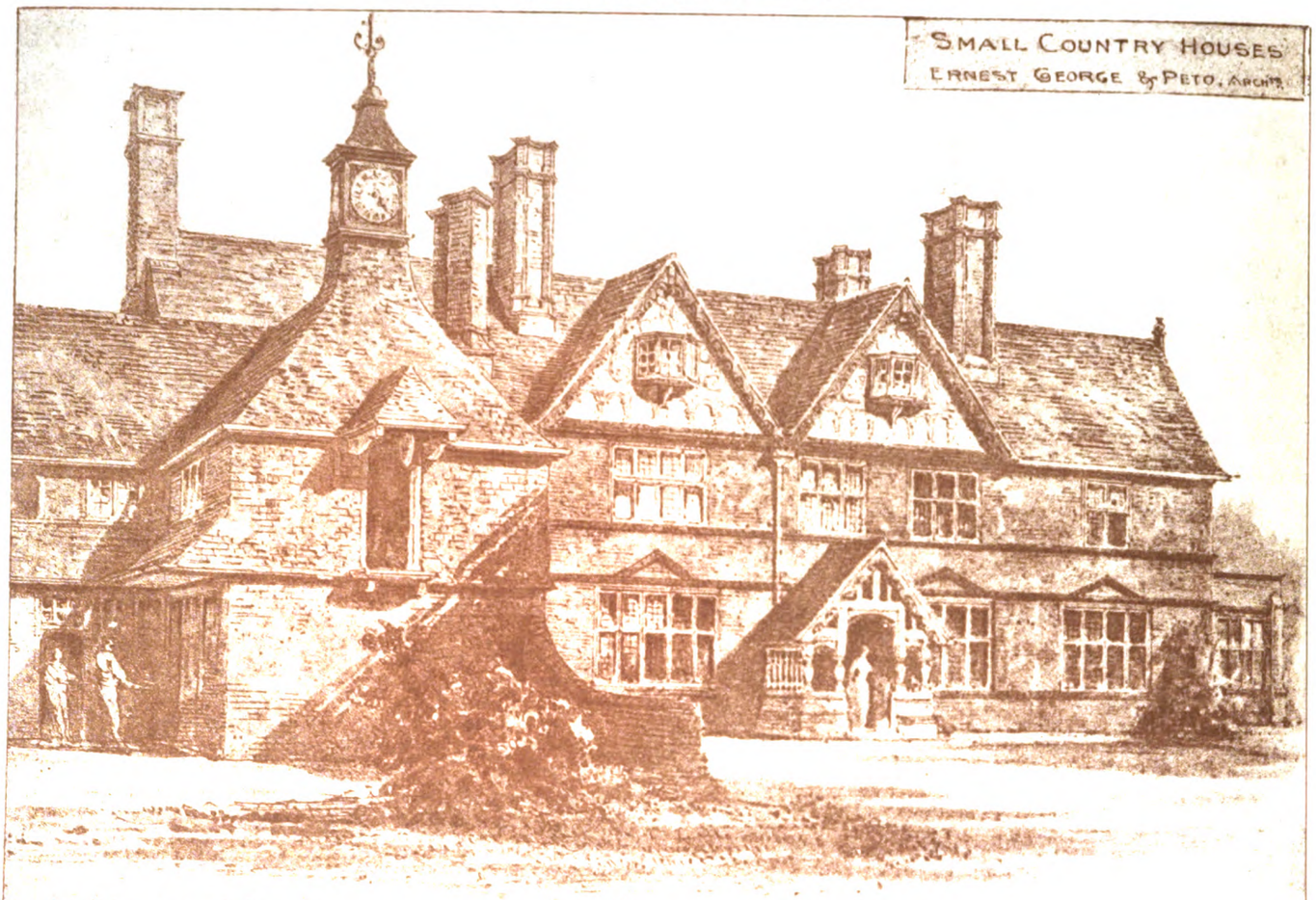
COUNTRY HOUSE, DORSET.
ERNEST GEORGE & PETO, ARCHTS.

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SMALL COUNTRY HOUSES
ERNEST GEORGE & PETO, ARCHTS.





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A COTTAGE, HARPENDEN.
ERNEST GEORGE & PETO.
ARCHITECTS.





BATSFORD, GLOUCESTERSH.
A. B. FREEMAN-MITFORD, C.B. ESQ.
ERNEST GEORGE & PETO. ARCHITECTS.



A HOUSE ON
STREATHAM COMMON
FOR ERNEST GEORGE.



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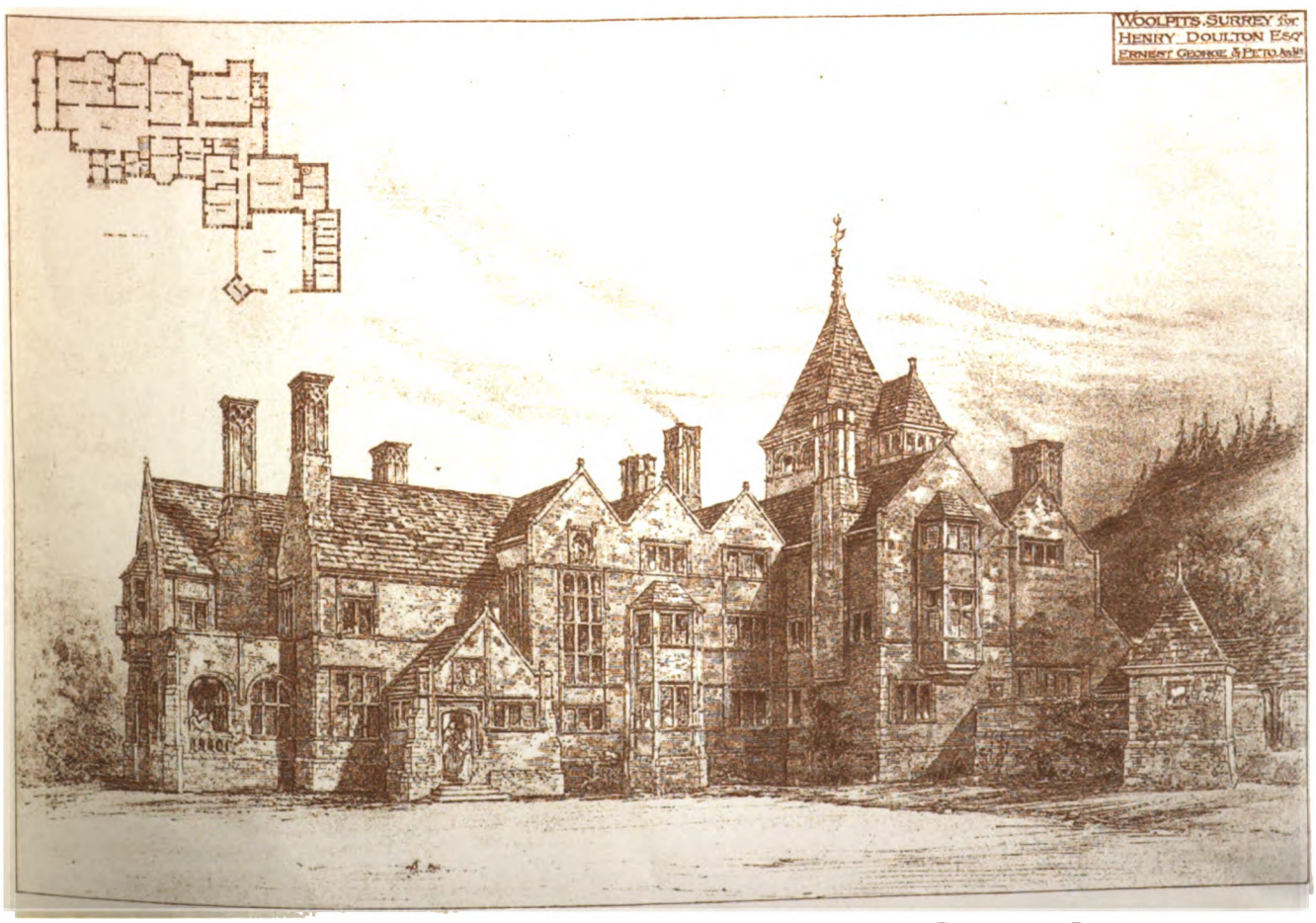
CHARLES STONOR ESQ.
HOUSE AT ASCOT.
ERNEST GEORGE & PETO.







WOOLPITS, SURREY for
HENRY DOULTON ESQ.
ERNEST GEORGE & PETO. Archts



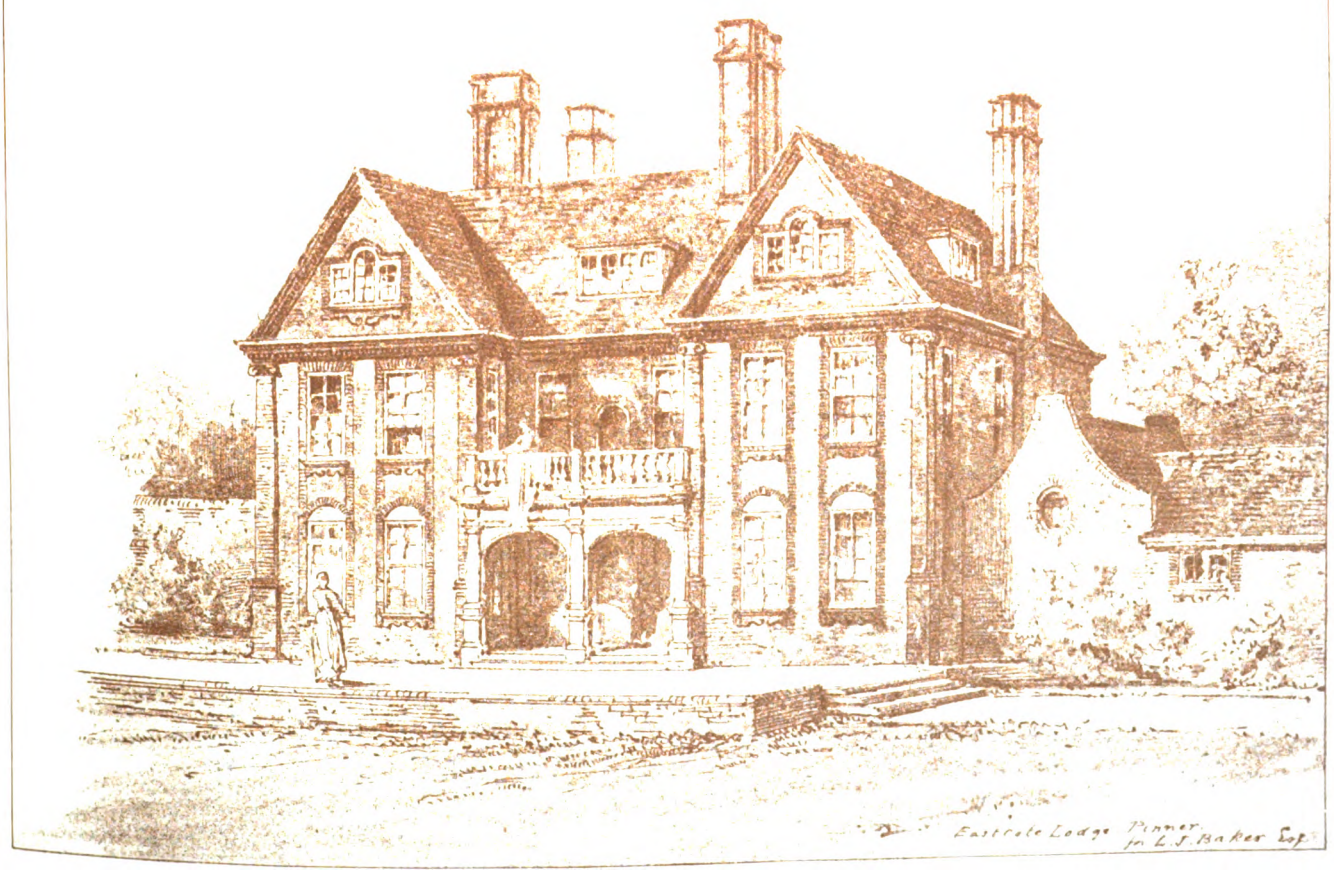
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SMALL COUNTRY HOUSES
ERNEST GEORGE & PETO, ARCHTS.



Rosehill, Henley
for H. Micklem Esq.

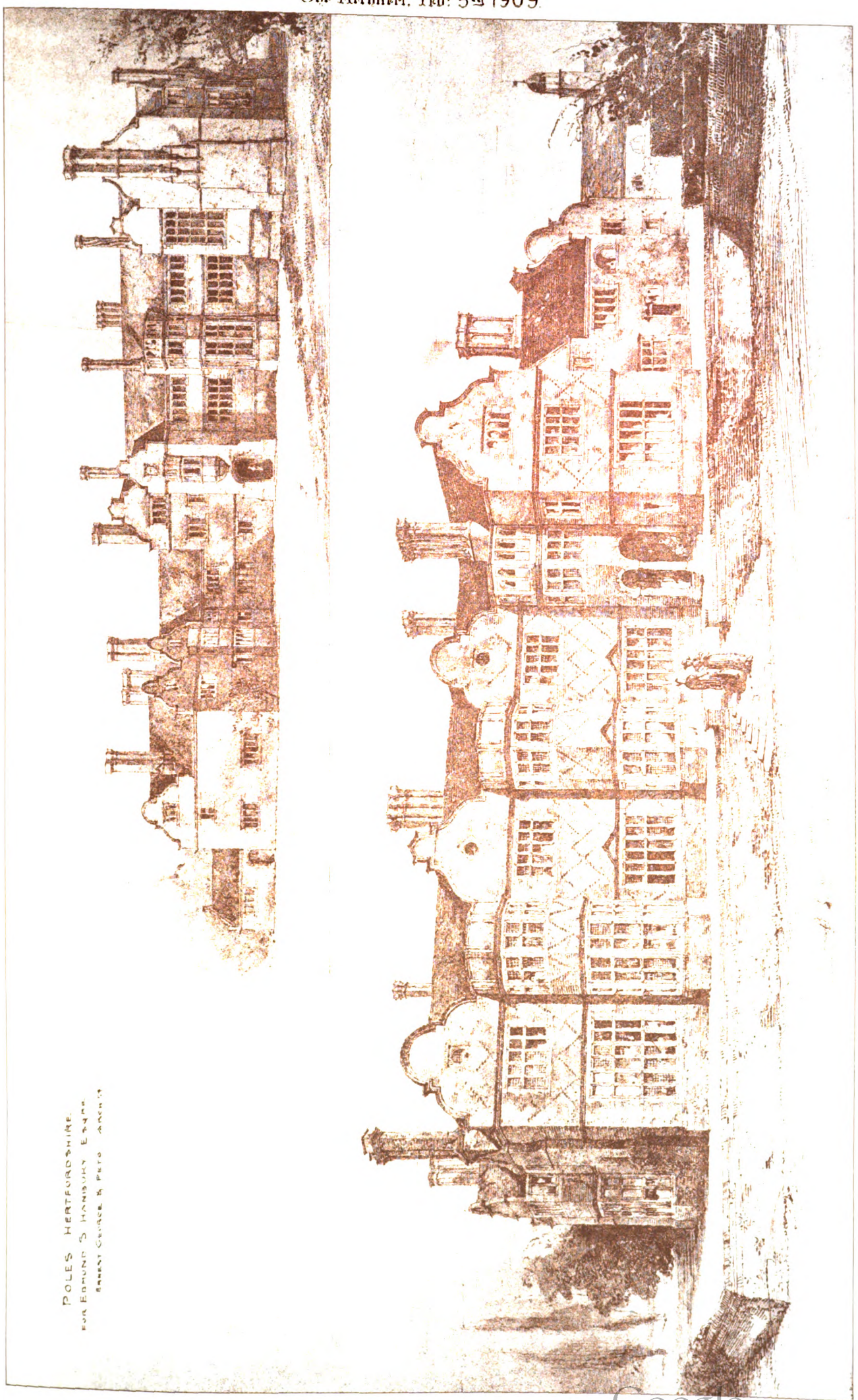


Eastcote Lodge, Pinner
for L. F. Baker Esq.

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POLES HERTFORDSHIRE.
FOR EDMUND D HANBURY ESQRE.
ERNEST GEORGE & PETO ARCHTS.

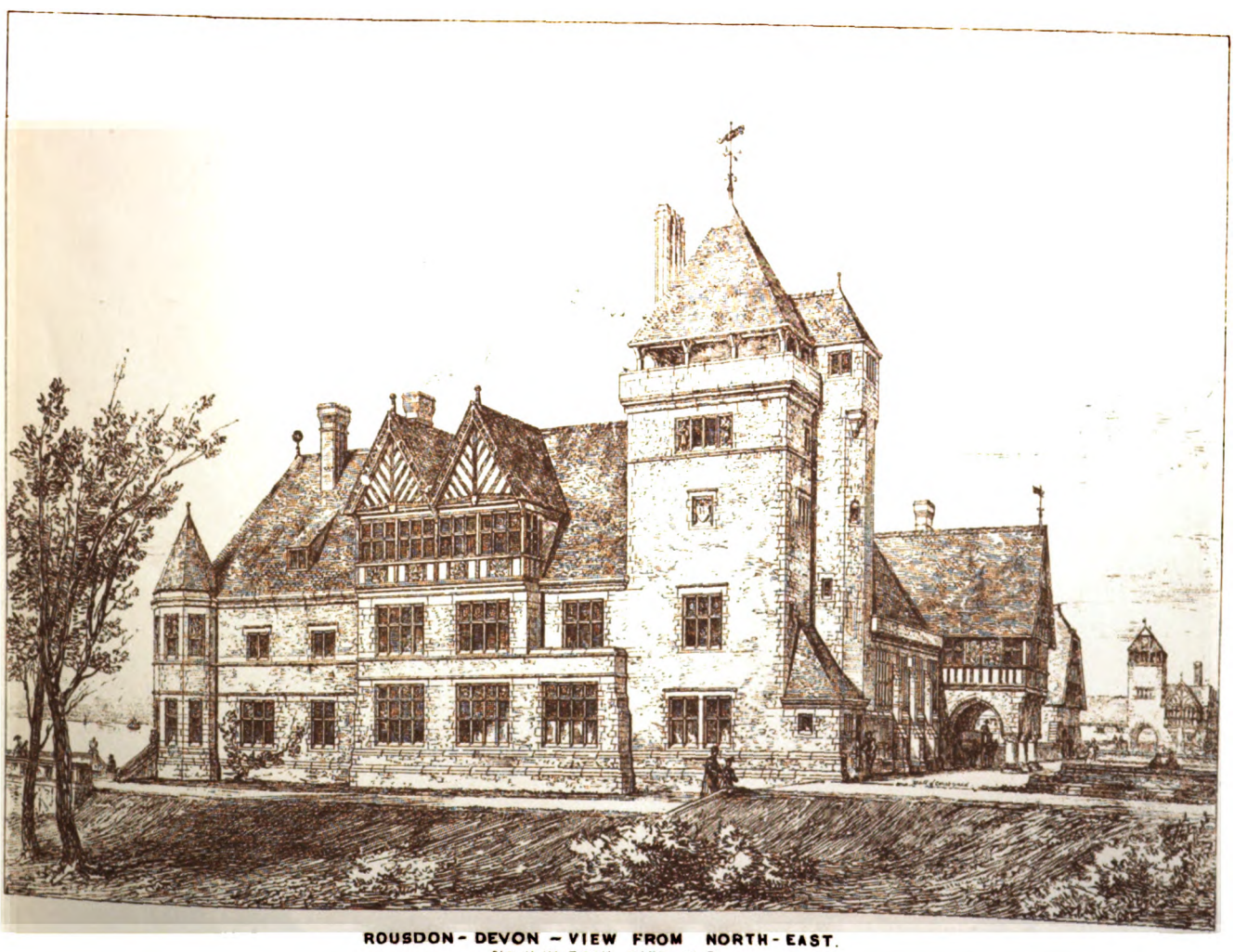
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ROUSDON · DEVON · SOUTH FRONT (TOWARDS SEA)
SIR H. W. PEEK BART · M P
GEORGE & VAUGHAN · ARCHTS



ROUSDON - DEVON - VIEW FROM NORTH-EAST.
SIR H. W. PEEK BART · M P
GEORGE & VAUGHAN · ARCHTS

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ROYAL INSTITUTE OF BRITISH ARCHITECTS.

A MEETING of the Institute of Architects was held on Monday evening last at Conduit Street, W., Mr. Ernest George, president, in the chair.

The PRESIDENT offered the congratulations of the Institute to their old friend and able past president, Mr. John Belcher, on the recognition of his abilities by the Royal Academy, in his advancement to full membership; and to Mr. Goscombe John, hon. associate, whom the Institute appreciated as one of themselves, and who also had been honoured by that body.

Mr. ALEXANDER GRAHAM, hon. secretary, announced the decease of Mr. James Neale, who in his younger days was assistant in the office of Mr. George Edmund Street. Mr. Neale gained the Pugin Studentship in 1875, and the Institute medal for measured drawings in 1876. He was elected as Associate in 1875, and Fellow in 1890. Although not an active member of the Institute, Mr. Neale was kind enough, said the hon. secretary, to remember the Institute in his will, and had bequeathed the sum of 1,000*l.* for promoting study in architecture, or for any purpose that the Council of the Institute for the time being might deem best.

It was agreed that a letter of condolence and sympathy be sent to the relatives of the deceased, with an expression of gratitude for the beneficent donation.

A vote of thanks was accorded to Mrs. Arthur Cates for a presentation of books to the Institute library.

Royal Gold Medallist.

The PRESIDENT announced that the Council proposed to submit to His Majesty the King the name of Dr. Arthur Evans, the distinguished Cretan explorer, as recipient of the Royal Gold Medal in the current year.

Address to Students.

The PRESIDENT said:—It is my privilege to-night to address our future architects, our students, may I say my fellow-students of architecture?—for the study of the great art is not accomplished in a lifetime. The young, however, have a capacity for learning and assimilating when the old have got into ruts and have acquired prejudices that hinder the reception of new impressions.

I speak to you who have the responsibility of remodelling our cities and of making the world that is to be, I trust with a great increase to its beauty. An artist paints his picture, and if it fails it can be obliterated, or if it has meretricious cleverness it endures for a time but when found out its place need know it no more. In the art of building the case is more serious; what we build must be seen whether we will or no; it has its influence on the "man in the street." It may be a source of pleasure, or it may cause familiarity with and toleration of that which is bad.

As architects it is a first necessity that we should be builders, for the arts of building and of architecture cannot be separated. The simplest structure may attain to architecture by admirable proportion and by a wise disposition of the parts; whether decoration comes in or not is of secondary importance. The question of style is a minor matter, for the artist's hand will be evident in the work, whatever the treatment he affects or the vogue of his time.

The education of the architect has been taken seriously of late, and his facilities for study are greater than ever before. I will not discuss the details of the training of which you have the advantage, but with it all I would say that what you do earnestly for yourselves is worth more than all that your able professors can do for you. They will endeavour to put you on the right path and to inculcate the principles, but it remains for you to give them practical application.

Much has been said about technical training, with the study and handling of material; and it would be all to the advantage of the architect that he should be a good joiner, mason, or worker in metal. When drawing a moulding he should have stone, oak, or plaster in his mind. He has so many good books of "Examples" now that he is apt to become a paper architect, losing familiarity and touch with the realities of building. Modelling is a useful accomplishment, and should be part of the training: it aids in the expression of ideas where the pencil often fails. The architect has, however, in the few years that can be given to preparation, so much to acquire that he can hardly spare time to grow efficient in the various crafts. Some have found practical knowledge by a term in a builder's yard, and I think I am right in saying that this was the early training of Richard Bentley, whose architecture gives evidence of his knowledge as a masterly constructor. Still, a boy must leave school prematurely and in a half-baked condition if he seeks apprenticeship to the crafts, and it is difficult to say at what age general education should give place to specialising.

The greatest architect that England has produced was known only as a man of science and a professor of astronomy until the age of thirty, when the resources of his great mind were turned to the art of building, at which he presently showed himself an accomplished artist. Notwithstanding this late start in life, Dr. Christopher Wren was allotted sixty years in which to build our cathedral, rebuild our city, and raise the many monuments that he has left to us as a precious heritage.

With the rudiments of scheming and planning, freehand drawing must be cultivated; and working from the cast and from the figure is perhaps the best training for the eye and for the hand, while it teaches a sense of proportion.

No work is more profitable than the measuring and careful study of existing buildings, making choice of fine specimens, and I am pleased to state that suggestions and directions for the guidance of students will shortly be published by the Institute in pamphlet form, giving a list of examples throughout the country that are considered most useful for study, also specifying those which will be valued as an addition to our architectural records. Those of you who go out with our scholarships, instead of sketching in a desultory way, will be advised to study seriously some building of distinct architectural merit, and it is intended that the result shall be published in some permanent form. It should add to the student's zeal and interest if he feels that he is thus contributing to the world's store of knowledge. See what details and mouldings give the strength and quality that you admire; note their size and projection, but, doing this, show also their place on the building. Note-books are sometimes filled with interesting doorways and windows, without a record of their relation to one another or to the wall-spaces that give them value. Study critically the buildings that impress you as fine; find out where and why they are good. It is a curious thing that criticism has come to mean exposing the faults; that is the easier and the more telling form, but it is a bad spirit to adopt. I have often been shocked at the flippant criticism by mediocre men of fine work of which they would themselves be quite incapable. The faults they see probably exist, but the quality and essence of the building are not in those imperfections. Make mental notes, if you will, of ways that you feel should be avoided, but seek the good first; it is the more profitable study.

As architects you will often be asked what you think of this man or that; perhaps you do not feel the architect in question to be one of our great lights. Let me beg of you to stretch a point and say all that is generous, though perhaps of a rival. It is unsportsmanlike to give away a professional brother or to damn him with faint praise. His reputation is his stock-in-trade. Let us among ourselves use all frankness: it is helpful to have our weaknesses pointed out if we are wise enough to profit thereby.

We have had so much of draughtsmanship, sometimes with very little behind it, that great facility has got rather into disrepute. The mind is sometimes better employed when the fingers are not too nimble; nevertheless the power to draw and to express your ideas with the pencil is one of the happiest endowments of the architect, and should be assiduously cultivated. There should be a careful avoidance of tricky methods, for we have seen drawings so pretty in themselves that the absence of good design is overlooked; the drawing is looked upon as an end, instead of being a simple medium or a diagram of the proposed building.

It is curious to look back on the fashions that have prevailed in my own time. When I was a pupil most perspectives were coloured, and there was a small income for many who were adepts at a skilful throwing-on of colour; then George Street, Norman Shaw and Eden Nesfield showed how much of the real qualities of a building could be expressed by line. One incident of the time was the discovery that one of these masters used a notched straight-edge, thereby admirably rendering the texture of roofs. I confess to having sacrificed a T-square myself in that cause. Light and shade, whether with line or the brush, are desirable to explain fairly the shape of a building. There was a pretty and telling way of leaving roofs and spaces white, as if under snow, with strong black touches here and there, the result being effective but not a fair rendering of the future structure. In one of my wanderings I met a nice young man who proposed making a study of art; I am not sure that he could draw, but he was interested in some blue and red chalk

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with which he touched in passages of his work: he found this treatment in the studies of the Old Masters to which he desired his sketches should approximate. If you have the power of drawing, it matters very little by what vehicle your thoughts are told, and all tricks are a hindrance to truthful expression. A method that obtained lately among the younger students was that of running the lines out beyond their natural limit, thus giving to a cornice or a stringcourse an unreal weight and importance instead of defining its contour. This may look brisk and sketchy, but a student's time is not very valuable, and a further half hour would be well spent in making the drawing correctly explain its parts. Do not be afraid of being methodical and exact, rather than sketchy. Nothing is more offensive than "sketchy" passages from a hand without the artist's mind, impressionism which is only scribble.

Fortunately Bohemianism has ceased to be a distinguishing mark of the student, for I can remember when nearly every Academy student wore long bushy hair; I am not sure whether I did so myself; I could have done so then. I see among you now men of fashion, with the greatest correctness of costume. Still I would say to the serious student do not be so beautifully dressed that you cannot carry a sketch-book or a two-foot rule in your pocket. You should be so far ready for work that the eight o'clock dinner, for which you must dress, is not always imperative. Michel Angelo, during a fifteen hours' spell of work, was content to munch bread; he slept little, finding that sleep made his head ache. He said that though he had made himself rich by his work he had lived always as a poor man. We may not all, like this giant, bring the mind to dominate the body, but I am sure that simplicity of life is to be aimed at by the true artist. You are fortunate in having your great interest in life; you have no need of the expensive pleasures or distractions that save the gilded youth from being bored. Much good work has been done in a garret, and I believe that the admirably appointed young man finds it less easy to throw his soul into his work than does one to whom art is the companion and solace. I would not have the artist a drudge; variety, good company and recreation are necessary if the work is to be a pleasure. It is essential also to move among men and to make good friends, for it is no use being a good architect if you have not a client to bring the work Accept week-end invitations, and, if you can, interest your host in a clever suggestion for altering and beautifying his place.

I hope with most of you that your art is sufficiently interesting to be the purpose of a holiday, whether in getting away on a Saturday or taking ten days in Brittany. You will be told that you want relaxation from work—golf, perhaps, or a lounge in a house-boat. From my own experience I would say there is more change of thought and of interest for the mind in seeing and assimilating fine things, living out of doors all day, sketching and measuring with a change of scene, of climate, diet and language. Our own beautiful country will supply matter enough for study, but crossing the Channel I have found to make a more complete break with the life of the office.

I suppose, without question, in the period that my memory covers, Mr. Norman Shaw has been the most followed, I might say the most copied, through the successive phases of his work; for the strongest men will always have a large following of those who imitate their manner. I value to this day the several books I managed to buy out of my youthful allowance, and among these are the sketches of Shaw and Nesfield. In their exposition of the architecture of France the examples chosen are all Mediæval; later work was not accounted of in those days.

I remember, in my own early visits to France and Spain, regarding the Renaissance screens in the churches as wicked innovations, although fascinated by them against my judgment. A château of Louis Douze or of François Premier was a rich find, while a work by Mansard or Vanbrugh we counted ponderous and dull. By common consent we now seek the more formal examples of buildings, and what was once dull we find dignified and restrained; while some will tell us that the quaintly picturesque, our first love, is hardly to be taken seriously as architecture. Unquestionably the student should study the purer classical works, rather than the picturesque Jacobean or Dutch versions, or perversions, of the same. There was an earnest attempt to gather up the traditions that were snapped in Tudor times; now the prevailing desire is to revive the later methods that had become traditional here until the advent of chaos; and in this last is our best chance of arriving at a happy unity of aim.

We may be disturbed again by waves of fashion, for no arbitrary law exists in matters of taste. There are Eastern races with a really fine sense of beauty, as shown in their splendid arrangements of colour and in their gorgeous stuffs; yet, among these, a lady can make no claim to beauty unless she is fat. Our standard differs from theirs and our taste is more catholic; yet it is difficult even for the most cultivated to keep an open mind for the appreciation of what is fine if it is not in vogue.

It is unnecessary to insist on the advantage of wide knowledge and of general culture. Avoiding the purely archæological spirit, history is perhaps the most interesting subject and the most sympathetic with our central thought or study. The world's history is written in its architecture, and it is a part of our schooling to follow the developments and to trace the growth of the various methods or styles, noting the influence of one country or people upon another. Our interest is less in the names or in the characters and peculiarities of kings than in the *work* that was accomplished in given periods and in the great masters of the arts that such periods produced. If a name or a date is mentioned, we can localise it by calling up the Byzantine, Mediæval, or Renaissance environment of the subject; it makes the past very real to us. The knowledge of foreign tongues is an invaluable aid to the architect. Through my own indolence in acquiring or in keeping up my knowledge of these, many precious books are closed to me; while in travelling one is often surrounded by people with whom the exchange of ideas and even the gentle amenities of life are difficult.

I have spoken of the study of fine buildings and of the use and misuse of the note-book, which we like to bring home full of pretty things. In our search for the latter we may possibly miss what is noblest in architecture. The sublime is not readily transferred to the sketch-book; it is no use making picturesque jottings of the Parthenon or the Pantheon. Those who have great facility with the pencil find less effort in the use of the fingers than in the exercise of the mind.

Drawing, to which I give a high place, may at any time become a snare, being made a substitute for contemplation and analytical thought, the seeking out of a reason for the forms we see, learning whether they were determined by the necessities of construction or were evolved as a part of a beautiful composition.

My fellow-workers may expect of me some remarks about water-colour sketching, which has always been my happiest recreation. Under favourable conditions of climate, with a sympathetic friend, a day spent with the brush in a spot selected for its beauty is as good a time as I can well imagine. The travelling student may wisely turn to brushwork for relaxation from the more exacting forms of study. We architects do not sufficiently consider the value of colour. We think of form, and perhaps light and shadow; too often conceiving a scheme in elevation only. One who paints must consider buildings in perspective, also taking account of their colour and their relation to surroundings. Yet of the student who is good enough to obtain an architectural prize from the Royal Academy or from our Royal Institute I would beg that he stick to his trade. Let him not, because he finds that he can paint pleasantly, throw architecture aside, however great the difficulties to be faced, before palaces or cathedrals are entrusted to him.

I have spoken of drawing and painting: what shall one say of photography? The art, or shall we say the science, brings to the eye all that is finest from all parts of the world—Indian temples, Venetian palaces, Eastern minarets, the sculptured doorways of great cathedrals, and these often taken with judicious lighting. By photographs or photo-prints memories of the world-treasures are brought to the armchair. As it affects the student this is a doubtful advantage; that which he attains without effort is hardly a possession; he had better worry himself for hours making an indifferent drawing than secure the best of photographs or of book illustrations of his subject.

In the last few years choice books have been added to our architectural libraries: the subjects, admirably selected by men of judgment, especially setting forth the beautiful houses throughout our own country. These we value while urging the student not to misuse them or make them an excuse for shirking the prosaic work of measurement and personal study; he is apt to be distracted by the quantity of material ready to hand and the many inventions presented to him, hardly leaving him the chance of originating. There is also the handy "kodak," by means of which he could snapshot that which would take a day to draw. We accept these things with our advanced civilisation, while we question if

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art is advanced by photography any more than music by the marvellous gramophone.

We have discussed the methods of study; how can the acquired knowledge best be applied or tested? I think there is no more useful exercise than to enter heartily into these competitions for medals and prizes. Doing so you are for the time being the architect to a palace or some monumental work with grandeur and scale to which you may perhaps never have the chance of building; but whether the prize falls to you or another, the benefit of the effort remains yours. Again, a little later, you begin for yourselves, and confiding relations entrust you with an additional wing, stables, or a motor-house. Your time is not filled up as it should be, and it is worth your while to take your two-hundredth chance in competition for the exercise of your imagination and powers of design; it is valuable training. The Open Competition is a quite unreasonable venture if looked upon in any other light than this; a multitude doing the work for which one only is commissioned.

This evening is the first occasion on which the prize drawings have been with us during the address to students and the review of their works; a discriminating friend will presently discuss the latter critically and in detail. I will only say that the competitive drawings reach a higher level this year. Some of those that escape mention might have carried off a prize in some previous competitions. There is not only good draughtsmanship, but in some cases evidence of design and composition, with an effort towards the "grand manner."

As we have said, there are fashions in our art and they influence the student. It is interesting to note that whatever the subject set, whether the "landing stage," the "corridor of shops," or the "pavilion," a dome of noble span is a leading element in the designs. Perhaps domes may become features in the architecture of the future; during my own career I have not been allowed the opportunity of raising a dome.

We have discussed methods of study and modes of working and drawing, but we must keep well in mind that these are but preliminary steps and stages. Looking on our great cathedrals and noble monuments of the past, we must remember how little they owe to draughtsmanship. No beautiful drawings, such as we see to-night, preceded the building of Westminster Abbey. The master mason chalked out indications of what was to be, and such lines were followed with more or less accuracy, slight inequalities giving a charm to the whole. It is pleasant to come upon elevations or studies for buildings by the great masters, but these, as drawings, would not pass muster with those before us to-night. We judge the embryo architect by his drawings, and it is generally a fair test of his worth. Yet we would remind him that to use art and science in building is his vocation, and there is none higher.

A poet has said—

> To build! to build!
> That is the noblest art of all the arts.
> Painting and sculpture are but images,
> Are merely shadows cast by outward things
> On stone or canvas, having in themselves
> No separate existence. Architecture
> Existing in itself, and not in seeming
> A something it is not, surpasses them
> As substance shadow.

Mr. PAUL WATERHOUSE read a criticism of work submitted for the Institute prizes and studentships.

Mr. J. J. BURNET proposed a vote of thanks to the President for his address and to Mr. Waterhouse for the admirable criticism on the architectural drawings. He advised students not to forget the seriousness of architecture in the cultivation of sketching and drawing, and to realise that the architect in practice must subjugate himself to the needs of the client.

Mr. W. J. LOCKE seconded the motion. Architectural students, he said, had an immense advantage over those who followed the art of letters, insomuch as the youthful efforts of the architect were encouraged by friendly criticism, whereas the student in literature received no such aid.

The PRESIDENT then delivered the prizes and studentships, the full list of which appeared in *The Architect* of January 22.

The Royal Society of Antiquaries of Ireland will hold their next meeting at Clonmel in the first week of July.

Mr. J. W. F. Phillipson, architect, Newcastle-on-Tyne, has been successful in a competition for new school premises (Primitive Methodist) at Consett, co. Durham.

AN AMERICAN BUREAU OF FINE ARTS.

THE American Institute of Architects have received the following report from their committee on the Bureau of Fine Arts:—

Gentlemen,—The committee on the Bureau of Fine Arts have the honour to report as follows:—

This subject is presented to the convention, not only as an abstract æsthetic question, but as a grave, practical problem, affecting great interests of the public generally and the economic administration of the National Government. The committee, after mature consideration, recommends that immediate action be taken towards the establishment of a Bureau of the Fine Arts, as a part of the governmental machinery, believing that it is necessary to the public welfare.

This definite and positive recommendation is the result of an investigation and examination of the records of the different departments, through which the following facts have been ascertained.

Since the foundation of the Government, more than $500,000,000 of public money has been expended for buildings and other works of art, which should have been under the control of a Bureau of Art.

In addition to this amount, large sums have been spent for parks, bridges, aqueducts, harbour improvements, designs for coins, stamps, bonds and bills, the value of which would have been greatly increased had they received intelligent artistic consideration.

About 90 per cent. of this total amount has been spent during the last twenty years. In the immediate future there will be spent the sum of $45,000,000, for which appropriations have been made.

Under existing conditions, there are many kinds of machinery for controlling these expenditures. Usually each act of Congress appropriating money for artistic work specifies the method of procedure, and designates the person or persons in whom the authority is vested. As a result, it is sometimes the President, a member of the Cabinet, a committee of the Senate or House, or a department or bureau; sometimes an army engineer, the superintendent of the Capitol, a committee of the Grand Army of the Republic, a special or private commission or a private individual, who controls and regulates the choice of the artist and the expenditure of the public money, and who acts not infrequently as artistic arbiter. In each case the arbiter regards the enterprise from his own point of view, without respect to its relation to the whole æsthetic question, and the result is, generally, waste of public money and always artistic chaos.

Your committee submits that the expenditure of this vast sum of money, without the supervision of a well-organised and competent authority, is unbusinesslike, improvident and not economic government. The fact that the present appropriations show that the ratio of expenditures for these purposes is increasing annually, seems to your committee to indicate that the necessity for action is urgent.

During the past, as many as fifteen bills have been introduced in Congress to remedy these evils. A synopsis of these bills has been compiled for the Public Art League of the United States.

The general character of the bills is best described in the report, as follows:—

"After an examination of all the bills which have been presented to Congress in connection with this subject, the committee feel that their effectiveness, if they had become laws, would have been marred for the following reasons.

"Such bills were introduced with the idea of ameliorating evils which existed in single departments or in single cases, one covering paintings and statuary for a single building; one the question simply of paintings; several bearing upon the buildings of the supervising architect's office.

"The fundamental error in all attempts at legislation has been in confining the law to one branch of art, or to isolated buildings. As buildings and their decorations of painting and sculpture, and the landscape, including monuments and fountains, are so intimately associated with each other and the effect of any one so easily enhanced or marred by the other, they should all be under the direction of one guiding body. The only way to obtain a harmonious whole is to have them all in the hands of one department. The lack of harmony between different buildings in Washington, the total lack of unity in the selection of their sites, and the still more notable deficiencies in the character, location, and fitness of statues and monuments, are all due to the separate committees, individuals and departments which have had charge of such matters for the Government."

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The first step toward a solution must be to recognise that the artistic problem is a single one. That the object sought is the product of a great totality. That the selection of sites, the general distribution as well as the design and execution of architectural work, monuments, landscape work, sculpture, painting, mural decorations, bridges, parks, and their accompaniments, are all parts of a coherent whole, and must be subject to one single authority, invested with such dignity as to command respect for its decrees, and that this authority must be guided by the most enlightened advice which the artistic professions can furnish.

Your committee therefore recommends as a remedy for the existing evils the establishment of a permanent Bureau of Fine Arts, the essential element of which shall be a Superior Council composed of a number of men of known and recognised eminence in the profession of the arts.

Your committee is guided in this action by the example of the older nations, notably France, whose logical treatment of this important question has placed her people at the head of the civilised world in all matters pertaining to the arts.

In order that the Institute may have at hand precise information as to what has been done in this matter in foreign countries, your committee has obtained from official sources a synopsis of the organisation of the French, German and Italian Ministries of Fine Arts.

In further support of its recommendation, your committee quotes the following resolution, which was passed after a thorough discussion at the International Congress of Architects at Vienna in July of last year, 1908, the subject of governmental direction of art having been designated as one of the four subjects for consideration by the Congress:—

"Resolved:—That every Government be urgently requested to establish a Ministry of Fine Arts or at least a section which shall deal with subjects relating to the arts. To such a ministry or section shall be attached artists of established reputation. Since architecture can be considered the leading art, architects shall be in a majority. The work of this ministry or of this section shall be the advancement and encouragement of the fine arts in all their branches."

This resolution has been endorsed by the principal artistic bodies of eighteen nations in Europe.

Your committee has judged best to place before you the economic and business aspect of this question first because from its point of view the necessity for immediate action is urgent. Viewed from the economic standpoint alone, the pecuniary benefit of a well-organised and regular system for the expenditure of great sums of public money must be sufficiently obvious.

It is obvious that existing value is never destroyed, but that, on the contrary, commercial values are always enhanced and new values created by artistic treatment.

To the great mass of cultivated and intelligent citizens of our country who recognise the irresistible force of abstract ideals, and who appreciate the lessons of history, there is a vastly more cogent reason for altering existing conditions.

It is that the expenditure of this vast sum of money signifies that we are establishing, at a rate never before exceeded, lasting monuments to our civilisation, and that, without proper management, these monuments will not represent and typify the state of cultivation which our people have achieved. The works of art of a nation are the records by which it is judged by posterity.

A nation's literature, its coins, its buildings, statues, paintings, bridges, roads and tombs are the undying testimonials of the character and intellect of its people, and the permanent record of their achievements.

The common desire of every race in every period of their history to preserve and guard artistic treasures evidences the instinct for beauty and the aspiration for immortality. The permanency of works of art is a sufficient reason for extraordinary care in their design and execution. When such works are undertaken by a Government, a high standard of excellence becomes a civic obligation.

It is the duty of the State, itself a product of the cultural needs of humanity, to recognise and foster the culture of the arts as the most powerful agency for uplifting and elevating the ethical standard of the people.

It is our duty to ourselves, to our forefathers, and to posterity to see that the monuments which we are now erecting, these records which our Government is now making, should be worthy representations of the true state of our social conditions and an evidence of the taste and cultivation of our time.

To those who recognise these facts should be entrusted the guidance of legislation concerning our monuments. It is their duty to demand that the expenditure of these enormous sums of public money should be made with all the wisdom, foresight and intelligence of which we, as a community, are capable.

As to the form of a Bill to present to Congress, your committee deems it advisable to wait the result of the discussion of this report, but submits the following suggestions:—

(*a*) That the Bill shall provide for the organisation of a bureau which shall have control.

(*b*) That there shall be a Superior Council, composed of eminent architects, sculptors, painters and other artists and laymen distinguished for their interest in and knowledge of the fine arts.

(*c*) That the members of the Council shall be appointed by the President by and with the advice of the Senate.

(*d*) That the recommendations of the Council shall be binding upon the chief of the bureau.

(*e*) That the chief of the bureau shall be the representative of the Government in all transactions involving the employment of architects, painters, sculptors and other artists for public works, and shall decide, with the concurrence of the Superior Council, upon the methods of choosing and the choice of artists or public works of art.

(*f*) That all public works (of a character to be described) shall be supervised by the Bureau of Fine Arts, and that the decision of the Superior Council in all such matters shall be final and binding upon all departments.

It is recommended by your committee that the following subjects should be included in the authority of the Bureau of Fine Arts:—

1. Architecture, painting, sculpture, park work and engraving.

2. Educational matters pertaining to the fine arts and the dissemination of useful knowledge among schools, colleges and universities pertaining thereto.

3. Administration of the National Gallery of the Fine Arts.

4. A system of national museums in different cities, and that a system of circulating works of art throughout the country be established.

In conclusion, your committee repeats from its report of last year:—

"The intention of establishing a Bureau of the Fine Arts is not to develop a national style of architecture or definite styles of painting or sculpture, but to invest the whole subject of the fine arts with appropriate dignity, to encourage the establishment of proper schools, to stimulate the universities in this much neglected branch, and to educate the people.

"In other words, the purpose of a Bureau of the Fine Arts would be to propagate the truth that art is not an effeminate luxury, but that it is the manifestation of that great vital force, the imagination, which is the original impulse behind all human progress; and to, furthermore, teach the people of the United States that if there is one thing above all others which is absolutely and universally democratic, typically and thoroughly American, and essentially in accordance with the whole spirit of the constitution, it is the inalienable right of all the people by inheritance to possess and preserve the works of genius of the human race, and to participate equally in the inestimable advantages and benefits of the study of the fine arts."

REINFORCED CONCRETE.*

(*Concluded from last week.*)

I NOW come to the consideration of the general structural lines of erections in these materials. In beginning a design for a reinforced concrete structure, the first thing the designer feels is the absolute lack of precedent. In dealing with structures of brick or stone, or even steel, there are by this time more or less recognised ways of solving every ordinary problem of design. If the designer be possessed of great originality, and can deviate from the hackneyed methods in a direction which others feel to be an improvement, then he has produced that which is not only interesting and pleasing, but he has advanced the art of design. But if he find himself unable to improve on the usual solution of the problem, then he is not blamed for adopting it; but he has failed to produce anything possessing special interest.

In designing reinforced concrete, however, no tradition or precedent exists; and if the designer should be unable to evolve from his own brain a form of structure which shall

* A paper by Mr. T. H. Markham, read at the last meeting of the Architectural Association.

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be at once sound as to constructive principles, suitable to the material, beautiful as to form and appearance, and withal practicable from a commercial point of view, then he fails to produce a satisfactory reinforced concrete building. This lack of precedent becomes a very real difficulty in a structure in which the utilitarian requirements give considerable latitude for the possible variations of form. One asks oneself, "How shall I begin? How is a thing of this sort usually done?" Then, to save oneself trouble, one is apt to fall into one of two errors, or possibly both, and to treat the structure as a steel structure would be treated, or else as a stone building.

Here I would just refer to the use of concrete as a structural material in ancient times. You will all remember the Roman use of concrete in large masses, though with a kind of reinforcement in the form of brick arches and lacing courses. Their concrete owed much of its strength and durability to the employment of a light volcanic earth, known as pozzolana, which formed with the lime a very strong hydraulic mortar. The chief uses to which concrete was then put were to form floors, or to form large vaults and domes with brick arched ribs and brick lacing courses, or to form walls with, generally, a facing of brick or stone. Since Roman times builders have not had the advantage of such an excellent material as pozzolana, and concrete almost dropped into disuse. Something similar was probably used for foundations in the form of very coarse and random rubble work, and as a covering to vaults in the mediæval buildings, but it is not anywhere evident as a part of the designed structure.

As to structural lines, the Roman use of concrete affords us no precedent for designing in reinforced concrete, because their use of the material was in *enormous* masses, and could only be where the principal stresses were compressive. Their concrete domes are said to have had no thrust but act merely as inverted saucers. Where they supported nothing but their own weight, the thrust might have been negligible; but it seems to me that there must have been a sort of internal arch action among the particles of the mass, and the thrust so produced, if not transmitted to the walls, must have been counteracted by the tensile strength of the concrete. If a superimposed load were placed on the dome, I think this thrust would surely have become more than the tensile resistance of the concrete could withstand, and unless some outside aid were forthcoming the whole would collapse. However, as I have already stated, we do not rely on the tensile resistance of concrete in any way. Wherever tensile stress exists, steel must be introduced. Moreover, another essential difference is that, whereas a Roman concrete wall was of very considerable and practically uniform thickness, taking stresses all along, in reinforced concrete no such arrangement is permissible. A wall consists of a framework of stanchions and beams, which take all the stresses, and the remainder of the wall is formed of mere screen panels of very little thickness. This is true of steel-frame buildings also, and it is this principle which is the only one that will affect the structural lines of architectural buildings. By architectural buildings I mean those forms of structures usually designed by architects as distinct from engineering structures, such as bridges, large roofs, water towers, &c. I think this framework and panel treatment should make itself very evident; and it would seem quite suitable to build the panels afterwards in some other material as brick, stone, block concrete, or terra-cotta, each panel being carried by the beam below it. The vertical members will, as a rule, be emphasised, as they are more important, becoming larger and stronger towards the bottom, because there they carry the whole load of the wall and their proportion of the floor loads, whereas the beams all do practically the same amount of work—i.e. carry the panel over, and a proportion of the floor—and are therefore [illegible] However, in some cases the horizontal members are emphasised, and the vertical members kept subservient. In buildings of the warehouse and factory class the windows are often made to take up the whole of the panel space.

I have alluded to the tendency to treat a reinforced concrete building in the same way as a steel structure as an error. I admit a certain reasonableness in such a course, on account of the fact that both methods of construction are subjected to exactly the same dynamic laws. We have already classed them together as being identical in their effect on the lines of architectural structures; but in engineering works, so-called, they will be somewhat different in their characteristic forms. Perhaps it may be thought somewhat out of place for me to address you on the subject of engineering, but I see no sufficient reason for the distinction between engineering and architecture. In old times bridges, towers, viaducts and such like erections were designed and carried out by the same men who designed public buildings, and probably private houses as well; so that I shall presume we still maintain some sort of intelligent interest in such work, though we may never be called upon to undertake it.

There will, I think, be much more scope for the use of reinforced concrete, and opportunity to evolve a suitable style of design in such buildings as bridges, large roofs, as over swimming baths, &c., towers for various purposes, lighthouses, tanks and reservoirs, to say nothing of all kinds of foundation work, than there will be in architectural buildings; and it is such I shall have in mind in speaking of the difference between steel and reinforced concrete.

In these structures reinforced concrete is likely to find favour, because it does not need the periodic painting necessary to preserve a steel structure from corrosion. In most, if not all, works of this kind, economy of cost is an important consideration; and in steelwork the cost varies approximately as the amount of material employed. Not so with reinforced concrete. In a plain and simple building of reinforced concrete about 30 per cent. of the total cost is expended on centreing and falsework alone, which all disappears when the structure is completed. Again, the metal costs a great deal more than the concrete, bulk for bulk, so that it may quite well happen that a design which uses a considerably larger quantity of material than the minimum possible may be of much less expense in execution, because it is of such a simple character, that a great saving of falsework is effected, or members are so skilfully arranged, both as to position and their internal composition, that the concrete is made to do as much work as possible, and the minimum quantity of metal is used. Therefore I would say, first and foremost, let parts be simple and large, rather than intricate and small.

In steel structures a certain all-overishness is often noticeable, arising from the use of small members in a sort of truss form of spider's web appearance; but in reinforced concrete it is better, if possible, to use larger main members and confine the connecting trusswork to certain parts. This gives a pleasing appearance from the fact that the more intricate parts are concentrated and the main members emphasised. This is, of course, not always possible, but can sometimes be contrived with a little thought. The volume of material is increased, but a saving may be effected on the falsework.

(The ethics of imitating stonework I speak of under my third heading.) Moreover, a great saving is effected if parts are repeated so that the same falsework may be used more than once; only it is not much good repeating any particular form or feature in another part of the structure much on the same level, because the falsework will be wanted in both places at the same time. Where repetition occurs, it should, if possible, be arranged so that the falsework will be finished with in one place before it is wanted at another. I am not advocating the repetition of parts *ad nauseam* by any means, but it is quite possible often for the same form to be repeated two or three times with very slight variation, not necessitating much adjustment of the falsework. In this connection I would mention that I have been told that it is not found economical to use the same wooden centreing more than three or four times. After that it becomes warped and surface-hardened, and the expense of correcting the defects is as great as forming new.

I need scarcely speak of the advisability of concentrating ornament and using it on the parts which have no great structural function to perform, so as to leave the main structural members simple and apparent as to their importance. At any rate, ornament, if applied to structural members, should be such as will not in any wise render the member apparently less fit to perform its function.

This brings me to my third and last division—decorative design and surface finish. In this part of our subject we may learn a lesson from the Roman builders, in that the surface treatment of concrete may be the same, whether it be used as mass concrete or reinforced. Roman concrete walls were finished in three different ways:—

1. Opus incertum, where the wall is faced with irregular pointed pieces of stone placed with the point inwards.

2. Opus reticulatum, which consisted of similar pieces of stone to those of the opus incertum, only the faces were square and regular, and the surface presented a sort of network appearance.

3. The walls were faced with thin triangular bricks laid breaking joint.

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Yet another method was to apply marble slabs, fixed to the wall by metal cramps. This method was also applied to brick and stone walls.

Vaults and domes often had coffers cut into their surface and the whole covered with a fine cæmentum marmoreum.

All these methods are of course still possible, and to them may be added mosaic and tiling.

As to modern methods. A very favourite way is to render the surface to resemble stone construction, and in some cases V-shaped strips are nailed to the falsework to form depressions in the finished concrete, similar to V sunk-jointed masonry, and the surface picked over to leave the flat surfaces rough. The attempt to imitate stonework so frequently adopted in buildings of reinforced concrete can scarcely be described as "building in truth," and therefore I must condemn it.

A certain similarity of appearance there will be of necessity between buildings of reinforced concrete and those of stone. I am not urging that this similarity, where it is natural, should be concealed, but I am deprecating any attempt at making the two alike. Two essential differences which I think should certainly have their effect on the types of design suited to each material are:—Firstly, that whereas stone walls are more or less of even thickness, supporting weight all along, walls of reinforced concrete are composed of stanchions and beams with screens, as before explained. Secondly, many features in stonework design are the outcome of the necessity for using this material in separate blocks. Reinforced concrete is a monolithic material. There are no joints; and I think all that, which in stonework design is the outcome of the necessity for separate blocks with joints, should be eliminated. For instance, a stone column has base shaft and capital, and the capital especially is distinctly a different piece of stone from that forming the shaft or architrave, and is treated as such. If a reinforced concrete support receives an enriched treatment at its upper end I think the ornament should run on to the beam above and possibly connect up with the base of the stanchion over. A reinforced concrete support in the form of a Corinthian column would be most inappropriate, though I would not object to a reinforced concrete beam being moulded as a Classic architrave. I think my meaning will be clear.

Another method, which is rather cutting the gordian knot than untying it, is to do all the structural and internal work in reinforced concrete and to form the front facing screen in stone or brick, built up independently of the rest of the structure and attached to it at the floor levels by allowing some of the floor reinforcements to project and be built into the masonry screen. This method is being employed at the road frontage to the new Post Office building. When this is done care must be taken that the slight settlement of the reinforced concrete structural part, which is bound to take place when loading has been applied, does not throw a certain amount of stress on to the masonry screen and so cause it to bulge.

It seldom happens that the concrete can be left without further treatment after the removal of the centreing or falsework in cases where the appearance has to be considered at all. Sometimes moulds are lined with zinc, sheet iron or plaster of Paris and oiled to prevent adhesion, and a coat of mortar to give a smooth surface is applied to the inside of the mould first, and then the concrete and reinforcement put in afterwards, but not forced so as to press through the mortar and appear on the surface when the falsework is removed.

In some large office buildings erected by the Turner Construction Company of New York the only treatment, applied after the removal of the wood falsework, was to put on a coat of cement and white sand with a brush. Another method they have tried is to apply a coat of oil paint, mixed with sand. In cases where very little work is done after the removal of the falsework some special precautions have to be taken to remove the unsightly variation in texture which is visible wherever a break in the laying occurred.

A certain percentage of colouring matter may be added to the cement if desired; the amount, say Messrs. Marsh & Dunn in their admirable book on reinforced concrete, should not exceed 10 per cent. per volume and should be less if possible. Of course care must be taken to ensure that no colouring is used which will have a chemical action on any of the materials used or be easily affected by the acids and other substances in the atmosphere.

It would seem that in treating the surface of reinforced concrete buildings all decoration should be comparatively flat, and if any ornamental features are added of considerable projection they must be reinforced and form part of the structure. The surface coating should be as thin as possible.

I would suggest that a suitable form of decoration would be a kind of sgraffito work done in this manner, the mould to be formed of plaster of Paris or other smooth surface coated with shellac to prevent adhesion, and having pieces of the form of the sunk ornament about ½ inch thick applied thereto in the proper positions. Then render over the inside of the mould with a coloured mortar flush with these applied forms. This coloured mortar will form the main surface of the member when finished; then float over the whole inside of the mould with another coloured mortar, which will form the sunk surface of the ornament; and then put in the concrete and reinforcement, taking care not to push any stones through to disturb the surface. If more adhesion were required between the layers of mortar and the concrete, wire or nails could be stuck into the mortar at intervals from the back as the concrete was being put in.

In cases where only a plain surface is required it may be formed as soon as possible after the removal of the falsework by the application of a rendering with a float, or by splashing it on from a brush to give a roughened surface; or a mortar may be used, with fairly large and coarse sand grains, which would leave a rough surface. Mortar applied as rendering should be of much the same richness as the concrete, otherwise the expansion and contraction will be different, with the risk of the surface becoming detached.

Another method which it seems to me would be quite a satisfactory one for buildings, especially in towns, would be to have the surface formed of faience blocks shaped at the back to connect more rigidly to the concrete. These would be placed in the falsework, with small pieces of card or felt in the joints, and the reinforcement and concrete filled in behind in the usual way. This method would have the advantage that the timber falsework would not need to be quite so carefully and expensively formed, as it has only to hold the faience blocks; it does not come in contact with the concrete; it could, moreover, be sooner struck. My idea in suggesting pieces of card or felt in the joints was to keep the joints between the faience blocks open, so that even if a slight settlement of the structure occurred, no weight would be thrown on the faience. Of course, these strips would afterwards be removed and the joints pointed up in cement. This is only a variation of the Roman methods already described.

Another treatment which has been adopted is to form the necessary beam and stanchion treatment in reinforced concrete, and to build the wall screens in the panels in brickwork or other suitable material. With that, I think, my suggestions come to an end.

I can only hope by these few suggestions to have somewhat stimulated your interest in a very large subject. Little has as yet been done to demonstrate the æsthetic possibilities of reinforced concrete; but I hope when you have the opportunity of erecting buildings in this manner of construction that you will do all you can to invent a suitable artistic treatment, and that it will not be allowed, either by architects or engineers, to be merely a cheap and always ugly or else hidden method of construction.

Mr. MATT GARBUTT proposed a vote of thanks to the author for what he termed an exceptionally able paper, and one of peculiar interest to those who, like himself, were not experts in ferro-concrete. It was therefore very good of Mr. Markham to deal with the subject from the beginning, and to touch on some of the principles which might govern attempts in treating the material in an architectural way. He felt, however, more could be made of it in large structures than in small ones, because the question of cost could not be overlooked, and in small buildings the temptation to reduce cost by reducing the thickness of the concrete covering would be rather dangerous. Doubtless concrete carefully and specially made for the purpose would stand very well, but that it would altogether resist the weather was hardly to be hoped. From the examples to be seen of Portland cement concrete work it was quite clear that with weather it deteriorated somewhat as stone did, but to an extent which must vary in individual cases. It was that difficulty, therefore, which rendered the use of a very thin covering undesirable, and in any case where a very small amount of concrete had been used between the weather and the steelwork the buildings would suffer quicker than the designers seemed to think. Of course, one way to get over that difficulty was to make the exterior faces in some form of veneer, but while that would be a legitimate method it could hardly perhaps be called a direct ferro-concrete treatment. It seemed to him the appropriate uses of the material were in

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big structures, where a stronger veneer could be applied. They had seen a good many illustrations of examples of buildings in ferro-concrete—more, he supposed, than most of them had seen in situ—and it seemed to him that the difficulty pointed out in the paper—the absence of any precedent—had been felt by the designers. Most of the buildings erected were imitations of stonework and nothing else, and, as Mr. Markham had said, that was not "building in truth."

Mr. EDWIN O. SACHS, who seconded the motion, said the point he would like to bring out was that the time had arrived for the Association to seriously consider putting into its curriculum a systematic series of lectures or classes on the treatment of ferro-concrete. Students now in the Association would, all being well, be in practice for themselves in ten years' time. In ten years' time, taking the speed with which knowledge of the material was progressing, it would practically be every architect's duty to go into the subject, and the sooner they understood it the better for all of them. There was no doubt ferro-concrete had come to stay, and what they had seen illustrated on the screen from the examples of work in the United States and on the Continent really told them there was a great deal that had to be learnt, both from the designing point of view of architectural rendering in construction and the designing point of view of treatment. There was still too great a tendency to take up special systems of concrete construction. Why could not architects, he suggested, take up the design of reinforced concrete much as they would design in steel framework, and evolve their own design on the usual principles of design, and not adopt any patent system?

Mr. H. H. STATHAM supported the vote of thanks. The paper, he said, produced rather a melancholy effect upon him when he saw the various attempts of what was supposed to be the architectural treatment of ferro-concrete. It clearly showed one how very difficult it was, in dealing with materials and construction entirely different from what they were used to, for the architectural mind generally to free itself from precedent and really evolve anything that grew naturally out of the construction. He was not enthusiastic about the material and would rather it had not come to stay, but while accepting the inevitable he was sure that anything which could be called the architectural treatment of ferro-concrete was entirely in its infancy. They did not seem really to have a new treatment of architectural form arising out of the material. In the treatment of street buildings also there was a total inability to get away from the stone precedent or tradition, and if anything was to be made of the material in a truthful architectural way they would have to try more and more to shake off that old architectural tradition. It was a difficult position to take up, but until they did that and put aside everything they had learnt and began over again he did not think they would make anything like truthful architecture out of it.

Mr. J. E. FRANCK said it would be some long time before they could hope to get a really satisfactory external treatment for the new material, reinforced concrete, because it was wrong architecturally to treat any building constructed in ferro-concrete as a stone structure. Ferro-concrete should be treated as a monolithic construction, and it was not right to put up stanchions and simply fill them in. He suggested the most suitable treatment was the panel one.

Mr. F. E. MUNBY said that when the new L.C.C. Bill was passed architects would find that ferro-concrete had come to stay. Its advantages were manifest, for on an expensive site if the walls could be reduced in thickness and the floor space increased, the client would naturally be very anxious to have it adopted. As regards style, it was very difficult to know what to do. He was certain that the styles as they were used to them were not suitable to the new form of construction, and they would owe something to anyone who evolved something new. On the scientific side there must be still a great deal to learn. Even as to the concrete itself, the true nature of setting was not settled yet, and there were two main schools of thought on the question which were entirely antagonistic. The one held that setting was due to crystallisation, and the other that the drying up of the gelatinous silicates was the cause of setting.

The PRESIDENT said there was no doubt that the greatest difficulty which presented itself to architects in designing in the new form of construction was the lack of knowledge of the material itself. He had not, he said, the smallest doubt that the Association would introduce the study of reinforced concrete in its curriculum.

The vote of thanks was passed by acclamation.

Mr. MARKHAM, in some concluding remarks, cautioned architects that the various patentees of the different systems of reinforced-concrete construction were keen in maintaining their rights, and anyone who carried out such methods of building without ascertaining whether he was using a patented system or not ran considerable risk of litigation.

ROYAL ACADEMY LECTURES—ARCHITECTURE.

MR. R. T. BLOMFIELD, A.R.A., commenced on Monday his course of lectures at the Royal Academy. The subject will be "Early French Renaissance Architecture," subdivided as follows:—(1) The Italians in France, (2) The Master Builders, (3) Gaillon and the Royal Buildings, and (4) Domestic Architecture to the death of Francis I. In his opening lecture Mr. Blomfield remarked that the tradition of French Renaissance is still vital in France, and exercises a powerful influence on present-day architecture; moreover, in its long career it has produced many masterpieces. French Renaissance, or rather neo-Classic architecture in France first began in the reign of Francis I., and reached maturity in the seventeenth and eighteenth centuries. But there was no abrupt beginning, for the chapter is only one of a series in the history of French art. It is this continuity which gives it its value, for the student should look forward to future developments rather than look back upon nebulous beginnings.

French writers have expressed constantly opposing opinions as to the original authors of modern French architecture. Some say the Italians, others claim that Frenchmen played a predominant rôle. On the other hand, it might be asked whether in the buildings of Francis I. there existed an architect at all. The answer to the problem will explain, said Mr. Blomfield, certain characteristic qualities of the architecture of that period. The difficulty of obtaining one is intensified by the contemporary chaos in the mingling of old and new, as well as the uncertain position of the art itself. Mediævalism died with Louis XI. At the end of the fifteenth century France undertook disastrous French expeditions. These were a political failure, but their effects were far-reaching and permanent, and from them dates the art of modern France. The nobility learnt that the courts of Italy were pleasanter places than the ill-lit rooms of their feudal castles, and that an art infused with beauty and joyousness of life was preferable to the work of the sad and patient artists of the north.

The first attempts were sporadic and might just as well have been imported ready made from Italy. The work of the first batch of Italian artists who came to France was limited entirely to ornament, painting and carving; first-rate men were not attracted, only the failures left their native country. Moreover French craftsmen (themselves capable of work of high excellence) were indifferent if not hostile to the new influence.

Francis I. was one of the great patrons of the arts, and had a mania for building which led him into many rash enterprises. His greatest undertaking was the palace at Fontainebleau. The building work of the first contract was carried out by a French contractor with French workmen at a cost of 170,000*l*. In following on with the decoration in 1535 Italian and French artists at first worked on an equal footing. Gradually the Italians became entrusted with the more responsible and better-paid tasks, while French sculptors, ornamentalists and painters worked under their direction. The superintending genius during five years was Il Rosso. There is some uncertainty as to the control of the building from 1540, the date of Il Rosso's suicide, and the date of Primaticcio's appointment as surveyor-general by Francis II. Mr. Blomfield dealt at some length with the question as to who designed those parts of the building which show distinct variations from the general methods of the master builder, and advanced the view that not only was Serlio appointed architect to Francis I., but that he actually did design certain important parts of the building.

The list of authenticated designs by early Italian architects, i.e., of designs which by their character confirm the tradition of authorship, is of the most exiguous proportion. The reason was that till the middle of the sixteenth century the French amateur was supreme, and thought himself qualified to be his own architect. The chief sinner was Francis I., the "amateur du premier rang," who stunted architecture to mere building details, and only succeeded in introducing second-rate models. Italian artists undoubtedly familiarised Frenchmen with the words of the new language, but the latter had to learn how to use them. They did not at first master the idioms, much less the inner spirit of neo-Classic architecture.

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LIVERPOOL CATHEDRAL.

THE Liverpool Cathedral executive committee held a meeting on Monday, at which Mr. Gilbert Scott, the cathedral architect, submitted a new design for the east window, which he considered would be more in harmony with the general character of the building than the original design. The new window is a four-light Gothic window of very large dimensions, being some 76 feet in height and 36 feet in width. It will therefore be the largest window in this country, and probably in Europe, and will be an exceedingly bold feature, ensuring also that the choir will be flooded with light.

Mr. Scott further presented a new design for the Lathom chapter-house, towards which the Masonic body of West Lancashire have subscribed a sum of 10,000*l*. By adopting the revised design the chapter-house can be proceeded with at once, and the cost will not greatly exceed the amount which has been raised by the Freemasons. The chapter-house is to be octagonal in form, and lighted by four large windows. Altogether it will be a charming addition to the cathedral, besides providing ample accommodation for the meetings of the chapter.

It was reported that an additional sum had been paid by the descendants of the late Sir Hardman Earle in connection with the fund for the lady chapel organ, with the object of enabling a more elaborate decorative scheme for the organ to be undertaken.

The committee accepted an offer from a lady, who does not desire her name to be published, to erect a large window in memory of her late husband, who was an original donor to the cathedral funds, and who during his lifetime took great interest in its construction.

A report was submitted as to the progress of the work during the last two months. Considerable headway has been made in the erection of the main fabric of the choir, while the roof of the lady chapel is at present being groined in stone. This is necessarily a slow operation, but it is hoped that the lady chapel will be finished within the next two years. The floor will be of green and white marble.

The annual meeting of the cathedral committee was arranged to be held at the town hall on Tuesday, March 2.

The progress made in the construction of Liverpool Cathedral during the past year is recounted in detail in the *Liverpool Diocesan Gazette*. At the close of 1907, in the cathedral proper, the choir walls on the north side had been begun, and on the other side had been carried up to 12 feet. Now the average height all over has grown to about 28 feet—an advance the magnitude of which can only be realised by taking into consideration the very large scale on which the building is planned. The width between the walls across the choir, taking in the aisles, is 86 feet 9 inches, and the length of the space in the first portion of the cathedral which will be available for services will be about 200 feet. In the lady chapel the height reached is now 56 feet, and the vaulting of the roof is steadily taking shape.

Correspondence.

[The Editor will not be responsible for the opinions expressed by Correspondents.]

What the Plumber Saw.

SIR,—I very heartily congratulate the writer of the above article which appeared in your *Contract Reporter*. It is very cleverly thought out, and should do a great amount of good in the quarter where it is most needed. It will be welcomed by the members of the Institute of Plumbers, and recognised as a faithful description of one of the many trials which cross the way of all plumbers.—Yours faithfully,

W. H.

SIR,—The article is most interesting and humorous because it has a direct bearing upon the subject. It sets forth one of the grievances from which the plumbing trade is suffering, both financially and as regards reputation. Few architects are capable of designing a drainage scheme which will meet modern requirements, and fewer still are able to design, specify and control the internal sanitary arrangements of dwelling-houses and public institutions. There however appears to be dawning in the architectural sphere a realisation of the pressing need of sanitation. But it will, I fear, be many years before the majority of architects recognise that the needs of improvements in public health are more essential than features that are pleasing to the eye as represented by the elevation of buildings, features which may prevent possibly a healthy interior.

Manchester. A TECHNICAL TEACHER.

GENERAL.

Members of the Royal Institute of British Architects are advised, by order of the Council, not to take part in the Stanley Council offices competition.

Messrs. Silcock & Reay, architects, Bath, have been awarded first place in the competition for county offices at Truro. The second and third places were awarded to Messrs. Pearson & Milburn, Chancery Lane, W.C., and to Messrs. Warwick & Hall, Gray's Inn, W.C., respectively. The assessor was Mr. Fellowes Prynne. These awards the County Council approved on Tuesday, but as the estimated cost (about 20,000*l*.) is greatly in excess of what was anticipated, the offices committee is to go into the whole matter.

The Memorial to the late Dr. Wilkinson, Bishop of St. Andrews and Primus of Scotland, will be placed in St. Ninian's Cathedral, Perth, in the form of a kneeling bronze figure, similar in design to the statue of Archbishop Benson in Canterbury Cathedral.

The Cambridge Antiquarian Society has passed a new law whereby "Members of the University of less than M.A. standing, and students of the same standing at Girton and Newnham Colleges, may attend the general meetings of the Society without introduction. Such persons may also become associates of the Society on payment of a subscription of 10*s*. 6*d*. per annum, which shall be due on January 1 in each year."

The Late Mr. James Duncan, of Jordanstone, Alyth, N.B., has bequeathed a part of the residue of his estate for the founding of a school of industrial art in Dundee. The amount of money available for the purpose is estimated at 60,000*l*., not more than half of which is to be used for buildings. Under the provisions of the will the school will be managed in connection with University College, Dundee, and the Technical Institute, the idea of the testator being that there should be no overlapping as a result of his bequest.

Mr. E. A. L. Ould, F.R.I.B.A., died at his residence in Boughton, Chester, on Sunday. Deceased was articled to a firm of architects in York, and afterwards acted as an improver with Mr. John Douglas, of Abbey Square, Chester. About 1883 he started business in Bridge Street Row, Chester. Over twenty years ago he joined Mr. G. E. Grayson, and, since the latter's retirement, Mr. Ould has been in partnership with Mr. Hastwell Grayson for about twelve years, carrying on business as Grayson & Ould, at 31 St. James Street, Liverpool. The deceased gentleman was one of the leading domestic architects in the North of England with a strong partiality for half-timbered work. He designed dwellings for Mr. James Lever at Thornton Hough, for Sir Alfred Hickman near Wolverhampton, a large house at Tattenhall, the Bank of Liverpool at Crosby, Bidston Court, and Bryn Estyn, near Wrexham. Woolton Church and St. Mary's, Liscard, were also from his plans. In connection with Mr. Hastwell Grayson, he was responsible for the designs of the secondary schools at Aigburth Vale, three or four other secondary schools in Cumberland, the Liverpool Hospital for Consumptives, Port Sunlight Hospital, and about 300 of the dwellings at Port Sunlight. Mr. Ould was a past president of the Liverpool Architectural Society.

Under the Auspices of the West of Scotland branch of the Garden City Association an exhibition of cottage designs has been opened in the rooms of the Scottish Guild of Handicraft, Ltd., Sauchiehall Street, Glasgow. A hundred sets of plans are on view. The following are the prize-winners of the various classes:—Class 1—For best all-round design for cottages to cost 400*l*.—Gardner & Millar, 144 St. Vincent Street. Class 2—Cottages of three or four apartments—A. Wingate, 131 West Regent Street. Class 3—For small holding groups—James Chalmers, 93 Hope Street. For economy in planning — Class 1 — Gardner & Millar, 144 St. Vincent Street. Class 2—James Chalmers, 93 Hope Street. All of Glasgow.

Jedburgh Abbey is one of the most important historical monuments in Scotland. Up till about 1870 the greater part of the nave was used as a parish church, and this was the cause of much damage to the masonwork. Since then, with the exception of part of the north transept, it has been roofless. When the new parish church was erected the nave was cleared out, and considerable repairs were executed. During the last six months a thorough examination and repairing has been going on under the superintendence of Sir Rowand Anderson.

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The Architect.

THE WEEK.

THE ceremonial visit of our King and Queen to Berlin has focussed our attention on Germany during the past week, and hence we have been more ready to take note of the disastrous floods that have been practically universal in that country. The rivers of Central Europe are largely fed from snow-clad mountains, which, under normal conditions, store up during the winter the supply that keeps them from too great diminution of flow during the summer. Usually it is in the month of May that the greatest volume of thaw-released water comes down from the melting snow and glaciers of the mountains. Then is the best time for tourists to enjoy the waterfalls and mountain torrents that lend so much charm to the St. Gothard route, for example. The snowfall that we had last month and the sudden thaw that we have lately experienced have both been more pronounced on the Continent, with the result that the Danube, the Oder, the Elbe, the Main, and the Rhine, and their tributaries have been unable to carry off fast enough the rush of melting snow and ice. Nuremberg is flooded, and the Frauen Kirche is an island. Dresden, Frankfort-on-Main, Leipzic, and Ratisbon, and many other smaller towns that are our happy sketching grounds are in a like condition.

ON the Continent the inland waterways receive far more attention from paternal governments than in our own happy-go-lucky island, but even this greater care and concern for the health and property of their peoples has not sufficed to avert the sudden onslaught. The condition of our own neglected rivers is a standing disgrace, and it is high time that a central government department was instituted for the prevention of floods and the proper conservation of the water that we receive from our rainfalls, which at present is allowed to work its own sweet will in causing damage, and waste its value by rushing down to the sea with as much celerity as possible.

AT the meetings of the Association of Technical Institutions on Friday and Saturday last some points of importance were brought forward. The new President of the Association, Mr. GEORGE T. BEILBY, of Glasgow, in his opening address urged that technical institutions should associate themselves more closely with industrial interests and give to the practical side of their teaching the same kind of reality that was found in the clinical education of medical students. Mr. BEILBY, as an industrial chemist, very naturally illustrated his argument by reference to the chemical industries, but as regards architecture, we should strongly advise that the Polytechnics and similar institutions, in London at any rate, should drop their attempt to train architects or to teach architecture, so vastly inferior are they to the work done at the Architectural Association, at University and King's Colleges. Let them devote their attention to the turning out of efficient craftsmen—bricklayers, masons, plumbers, plasterers, and so on. By all means let them throw open instruction in this direction to any embryo architect who desires to obtain, what is no doubt valuable, an insight into the practical craftsmanship of the building trade at first hand.

ANOTHER point of Mr. BEILBY'S address was the desirability of making available the technical institutions for the purpose of research as well as for instruction. With this we cordially agree, and the London Polytechnics would be doing a good work for architecture and the building trade if they adopted the suggestion of Mr. BEILBY. There are not a few architects in London who have a penchant for science, and would doubtless welcome the opportunity of carrying out experiments to test the feasibility of ideas that occur to them in connection with building materials and construction, for which the chemical, physical, and testing laboratories with which many of our London institutions are so admirably equipped might advantageously afford facilities. As far as our observation goes many of these expensive laboratories are not used to anything like the extent that they should be to justify the expenditure of public money that has been made upon them. The rate-paying architects of London have helped to pay for these, and it is, we claim, their right to be allowed to enhance their usefulness.

THE growing scarcity of timber means more in the world's history than an inconvenient shortage of supply in a useful building material which from habit we have come to regard as indispensable. It means the growth of the desert places of the earth, partly, perhaps, the result and evidence of the drying-up of our planet's moisture, which, if Professor LOWELL'S latest explanation of the phenomena of Mars is correct, must in the future extinguish all life in our world, as, according to the scientist, is visibly the process, progressing to finality in the ruddy planet. We do not pretend to set up our scientific knowledge against that of so eminent a man as Professor LOWELL, but it occurs to us to ask whether, if Mars is losing its water, it is not also losing its weight, and if this be so, how both it and our own habitat are to maintain their positions in the universe? Undoubtedly the deserts of our world are increasing in magnitude, for within the last 2,000 years the Roman cities of North Africa have lost the sources of water supply that fed their aqueducts, and the great desert of Central Asia has obliterated the life of a flourishing civilisation. The condition of the bad lands of Arizona and the central waste of Australia at the same past date are not matters of history, but it is clear that Arizona at least was at one time forest. With regard to Palestine, no longer flowing with milk and honey, we are on more certain ground. It is generally admitted that the cutting down of its timber trees has reduced this part of the world from a well-watered and flourishing agricultural and pastoral country to a comparative desert, and such a sequence may be assuredly prophesied to the denudation of the forest lands that still remain in the world.

AS an example of *ex parte* argument and the selection of data to support a theory, it would be difficult to surpass the use that has been made of the report of the Royal Commission on Sewage Disposal Plants in Great Britain by the opponents of Toronto's proposed sewage works. Selecting statements relating to septic "tanks worked at a twenty-four-hours rate" it was asserted that by the proposed scheme some 50 per cent. of the solids in the sewage would be deposited in the lake and would contaminate the water, thus ignoring the conclusion of the Commissioners quoted in *The Architect*, September 11, 1908, Supplement, p. 21:—"We are satisfied that it is practicable to purify the sewage of towns to any degree required, either by land treatment or by artificial filters, and that there is no essential difference between the two processes, for in each case the purification, so far as it is not mechanical, is chiefly effected by means of micro-organisms." The attempt thus made to discredit entirely the use of septic tanks may possibly be repeated elsewhere by interested parties, and we therefore think it desirable to again call attention to the finding of the Commissioners.

THE operation of the Patents and Designs Act of 1907 is already benefiting the building trade, as numerous foreign patentees have been, and others are being, forced to erect factories here for producing their protected manufactures. This development is of the further advantage to architects and their clients that the vexations and inconvenience caused by the delays in transit and supply of goods "made in Germany" are likely to be now very much minimised.

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THE FIRE RISK OF LONDON'S PUBLIC BUILDINGS.

THE unpreparedness of some of London's most valued public buildings, such as St. Paul's Cathedral, Westminster Abbey, and the British Museum, to adequately and promptly cope with an outbreak of fire is simply appalling. Take the case of St. Paul's. Everyone knows that our great Metropolitan cathedral, of which every Londoner is justly proud, is surrounded by high buildings, used as warehouses and shops for the dry goods trade, and crammed with highly combustible materials. If a fire broke out in one of these, as it might readily do, and a favourable breeze were blowing, masses of burning material would be blown on to the roof and dome of St. Paul's. Every architect knows that the roofs are formed partly with flats, the high parapet walls of which constitute them veritable pockets admirably adapted for the reception of burning fragments, and that both they and the dome (the most beautiful in Christendom), which looks so great and solid, are formed with sheets of lead, laid on boarding, and supported by a forest of bone-dry timber that would burn like matchwood if once it were set alight. Everything, therefore, is ready for a conflagration, and if the dome once fairly caught fire and were not promptly extinguished the whole would speedily be ablaze. Molten lead and falling timbers would probably soon overcome the resistance of the brick cone which carries the stone lantern; this would collapse, and in its fall would crash through the inner dome, and the whole burning mass would be precipitated into the interior of the church, and St. Paul's Cathedral would be doomed. How are we prepared to avert such a catastrophe? We are all proud of our Fire Brigade, and fully recognise the bravery and skill of its officers and men: but although its personnel has been largely increased and the efficiency and power of its apparatus has been considerably augmented since it has been under the charge of the London County Council, it is still far from being sufficient for the eventualities that might occur in our great Metropolis. Any really serious conflagration necessitates a "brigade call," when every available man and engine is pressed into service.

It is within the region of possibilities that the brigade might be confronted simultaneously with a Cripplegate fire and a Tooley Street fire, and it is quite unable to cope with two such assaults at once. Or, again, it is quite a possible contingency that while the brigade was engaged in a hard fight with a conflagration at, say, Messrs. WHITELEY'S premises at Bayswater, one of the great warehouses around St. Paul's might burst into flames. In such a dire event the cathedral would stand a small chance of being adequately defended.

Even if the brigade was at liberty to give its whole attention to a fire in the dome of St. Paul's, what sort of a chance has it of success? Water towers and powerful engines have largely increased the capabilities of the brigade, but we all know that every foot additional length of hose diminishes the pressure that the engine supplies. The engines must remain on the ground level, and the top of the cathedral dome is 365 feet from the ground. Anything that is humanly possible the men of our London Fire Brigade will do, but there are limits to the capabilities of both men and material.

St. Paul's Cathedral, then, should be so equipped that an outbreak of fire can be dealt with at once in the absence of the Fire Brigade. How is it equipped? There are water tanks in the dome, supplied with rainwater, and two tanks on a level with the top of the organ, from which a number of hydrants are fed. Necessarily these tanks cannot furnish sufficient pressure to throw a jet of water on to the dome, and, in fact, we believe that their utmost capacity is to reach the level of the stone gallery. In winter these tanks and the pipes from them are frequently frozen, and they are inoperative.

Some towns, like Brighton, have sufficient pressure in the ordinary supply mains of the street to render fire engines almost unnecessary; but London is not in that happy position. Even Manchester, which has a far higher pressure than London in its street mains, has not sufficient to entirely dispense with fire engines. If the hydrants in St. Paul's are connected direct with the mains of the Metropolitan Water Board the pressure, therefore, would not be anything like enough to safeguard the cathedral.

To summarise—the position of St. Paul's Cathedral in respect of fire risk is this: it is exceptionally exposed to the danger of fire; it is insufficiently equipped to combat fire by its own resources, and must depend on the Fire Brigade, the magnitude of whose responsibility is sufficient to prevent it from being able to render assistance; with the whole force of the brigade available it is scarcely possible for its power to save the dome of St. Paul's from destruction.

Westminster Abbey and the British Museum are not, perhaps, exposed to such imminent danger of fire, but their means of quenching it are also insufficient and inadequate.

In quelling an outbreak of fire and preventing its spread two things are of primary importance, promptness and power. In its early stages a fire is easily extinguished by a very small amount of water forcibly applied. A siphon of soda-water is a very admirable fire extinguisher promptly used, partly, no doubt, by reason of the carbonic acid gas it contains, but largely from the force with which its jet is propelled. An ordinary two-gallon pail, or even a common quart jug of water forcibly thrown will extinguish quite a respectable blaze.

Our London Fire Brigade is commendable for the celerity of its turn-outs, and if an alarm were given from St. Paul's Cathedral the men of the Watling Street and Cannon Street stations would quickly be ready to start. But our City streets are apt to be congested with traffic, and the engines might be delayed, or, worse still, might be busily engaged in fighting a conflagration miles away. What, therefore, is wanted is an equipment at the cathedral itself capable of attacking an incipient fire promptly and forcibly.

Fortunately engineering skill and commercial enterprise have placed the opportunity of installing such an equipment in the hands of the Dean and Chapter. The mains of the London Hydraulic Power Company are at the very door of St. Paul's Cathedral, of Westminster Abbey, and of the British Museum. The hundred and sixty miles of mains that the company has laid through the greater part of London are primarily intended for the supply of power for the working of lifts and other machinery, but they are also eminently suitable for protection from fire.

The prime essential for this purpose is reliability, and to this point we first directed our attention in our investigation of the facilities for fire extinction that the company has to offer. For the purposes of its ordinary business it is necessary for the company to ensure a pressure of 700 lbs. per square inch at any point in its mains at any time of day or night, under any conceivable demand. To provide this assurance it has established six pumping stations, all mutually connected, so that should any one break down the others will take up its work, while flexibility of response to varying demand is obtained by the automatically reciprocal character of the engines, which work faster when a call is made upon their energy, and slow down when the demand slackens.

It would be quite possible for the company to take a main to the top of the cross on the dome of St. Paul's and there deliver a jet of water at a pressure per square inch higher than any ordinary fire hose would stand. Such, however, would not be the best method of utilising the hydraulic power for fire extinction. This is far better done by using an injector fire hydrant, which is connected to the power mains and also to the water supply mains, or to tanks, and from which a combined jet of great force and volume is passed through the ordinary hose and nozzle.

The next point that occurred to us was that the great pressure at which the hydraulic power is maintained would be too great for any existing installation at present worked from the mains of the Metropolitan Water Board; but we learn that by the use of ELLINGTON'S patent automatic apparatus the pressure in the delivery hose can be regulated to any desired figure.

Another advantage that the system possesses is that it is by no means necessary to keep the rising mains supplying

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the hydrants always full of water, so that the disadvantage under which the present hydrants at St. Paul's labour of a liability to be frozen out of their supply is obviated, as the control of the supply can be arranged in the basement or any other convenient place.

Every building in London within the field of the Hydraulic Power Company's operations can thus be fitted, so to speak, with its own fire engine, always and instantly ready for use with any amount of power deemed advisable.

Now comes the question of cost. We do not know for what amount St. Paul's Cathedral is insured, or whether it is insured at all, but we can form an opinion as to the amount for which it ought to be insured and of the premium for that insurance, and, in our opinion, the amount of one year's premium would suffice for a very efficient installation of hydrants and injectors.

The working costs are, for fire service, quite small, as the consumption of hydraulic power is infinitesimal until it is urgently required for the extinction of fire, and even with the monthly test that Capt. HAMILTON recommends for all private installations of fire extinguishing apparatus, we doubt if the annual cost of an efficient set of hydrants at St. Paul's Cathedral would amount to 50*l*. The safety from fire of our beautiful Metropolitan cathedral would be cheaply purchased if the expense on both capital and maintenance account were ten times what it would be if the system we advocate, in the public interest, were adopted.

ARCHITECTURE: ITS TRUE PRINCIPLES.—III.

By R. OWEN ALLSOP.

NOVELTY IN DESIGN.

FOLLOWING our train of thought, and pursuing the argument, we should doubtless arrive at the conclusion that, not architecture, but the architect, is at fault. While we have eyes to see, and understanding to comprehend, it must be the case of the workman complaining of his tools, and ignoring the question of his own ability; for even in architecture composed of new combinations of that which is itself old, there exists an infinity of variety. Yet to draw a comparison between architecture and literature, we continue to copy old set phrases, of which the producer is as wearied as is the beholder or the reader. "Never imitate," says EMERSON; "your own gift you can present every moment with the cumulative force of a whole life's cultivation; but of the adopted talent of another, you have only an extemporaneous, half possession."

Between design and invention is much that is common. Both are the result of the power of reason. They

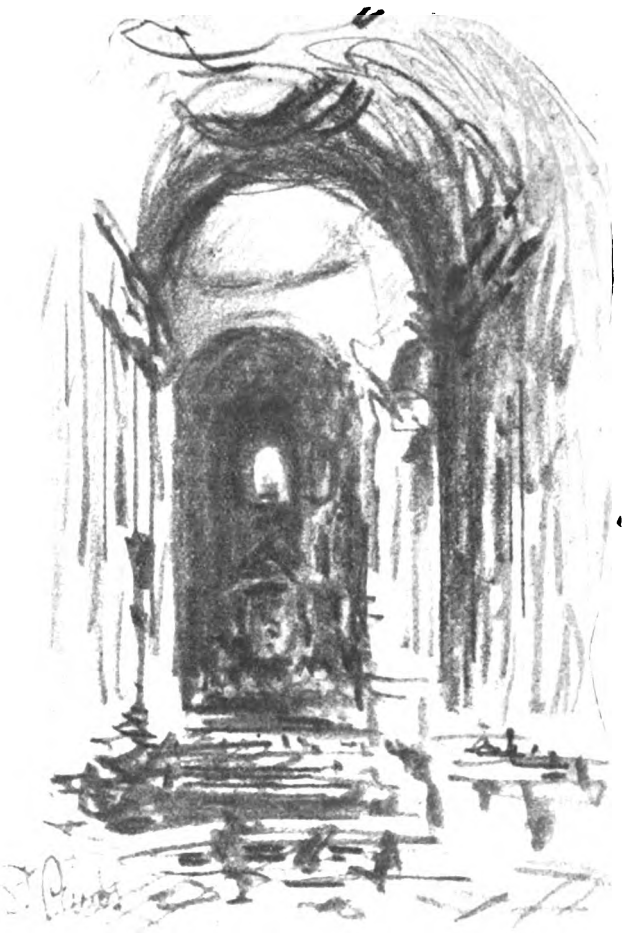


FIG. 8.—ST. PAUL'S.

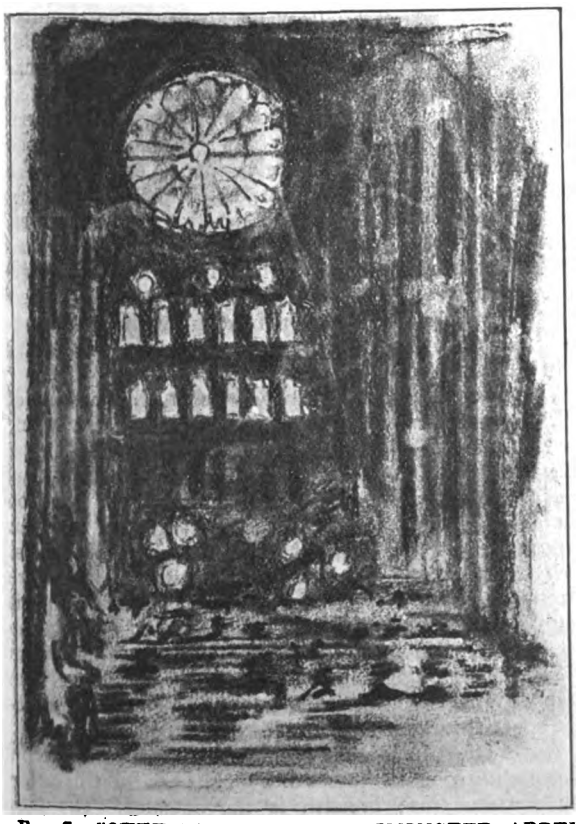


FIG. 7.—SOUTH TRANSEPT, WESTMINSTER ABBEY.

are therefore the product of the highest of the faculties, and require, as handmaid, the co-operation of imagination. As concerning patent law, the first essential of invention is novelty. It is an understood corollary that there is also utility. This must be applicable in the full to design proper, for apart from the usefulness of a house to serve the practical wants of man, the design of, say its ceilings, is useful for his entertainment. The two classes of usefulness, service and delight, cannot be separated in architecture. For, if this be done, we have on the one hand a building (which is not architecture) and on the other a monument, as such, unless indeed we are to argue that an Eleanor cross serves the practical purpose of commemorating a certain happening.

The necessity for invention in all except the purely imitative arts (if indeed such really exist) falls in with GARBETT'S remark, that it is the brain we admire in a work of architecture. Hence all machine reproductions are at once put without the pale. The stock baluster turned out by an automatic machine has nothing correlative to art. All that may concern it of the artistic is the effect of its grouping, and here we have an instance of how new combinations may instal something of the artistic even to work that in itself may be hopelessly vulgarised by countless repetitions. It is colloquially said "It is vulgar to imitate," and here it is vulgar to reproduce all forms, large or small, when such reproduction arises from a barren, unfertile mind. In all imitation is some mockery. Invention and imagination, which, in some senses, are synonymous, are what is needed in architectural design; but the invention must be useful (it is useful if beautiful) and the imagination founded on

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right reasoning. Imagination, out of control and restraint, is a disease, the chief feature of madness. A host of disorderly notions, writes CERVANTES, crowded through the brain of DON QUIXOTE. Contrary to a general idea, a kind of invention and a kind of imagination—hence an idea of novelty—is quite a common attribute of many persons. What more easy than to take a façade on paper and turn "inside out" the whole of the details? It is done unknowingly by the unskilful draughtsman, who thinks he is copying exactly, but in reality produces a copy different in every respect from the original. If there is any art in the copying of an old "Order" it must reside solely in the fact that only the trained eye can correctly copy. Hence there is art, but it is the art of the accomplished copyist; and as we have suggested before, a machine could be constructed to do this, indeed has been, in the automatic wood-carver actually rendered in every sense of the word a "commercial" article.

To what part of the architect's art can invention be applied? We might more reasonably ask, to what part can it not be applied? It may be applied to a plan, to a mass, to grouping, to details, to all. It is what we want. But the first essential of fitness, suitability and usefulness for service or delight, is apparently the stumbling-block. No one wants an old-time capital turned upside down for mere sake of effect. We should probably differentiate between true invention and a fraudulent substitute, a mere parasite, or, possibly, a parody of the real article. Invention presupposes the power of imaginative conception. A spurious invention could be more properly described as an alteration. Alteration is just what we want to avoid. It is the alterator who alters for mere sake of alteration that we have to thank for abortive art production. The true inventor conceives: he grasps the object of invention before it has materialised. This seeing with the mind's eye is a faculty required first and foremost of all designers, and if this is required in matters of detail, much more is it needed in questions concerning massing, if the result of the mass is to be unity.

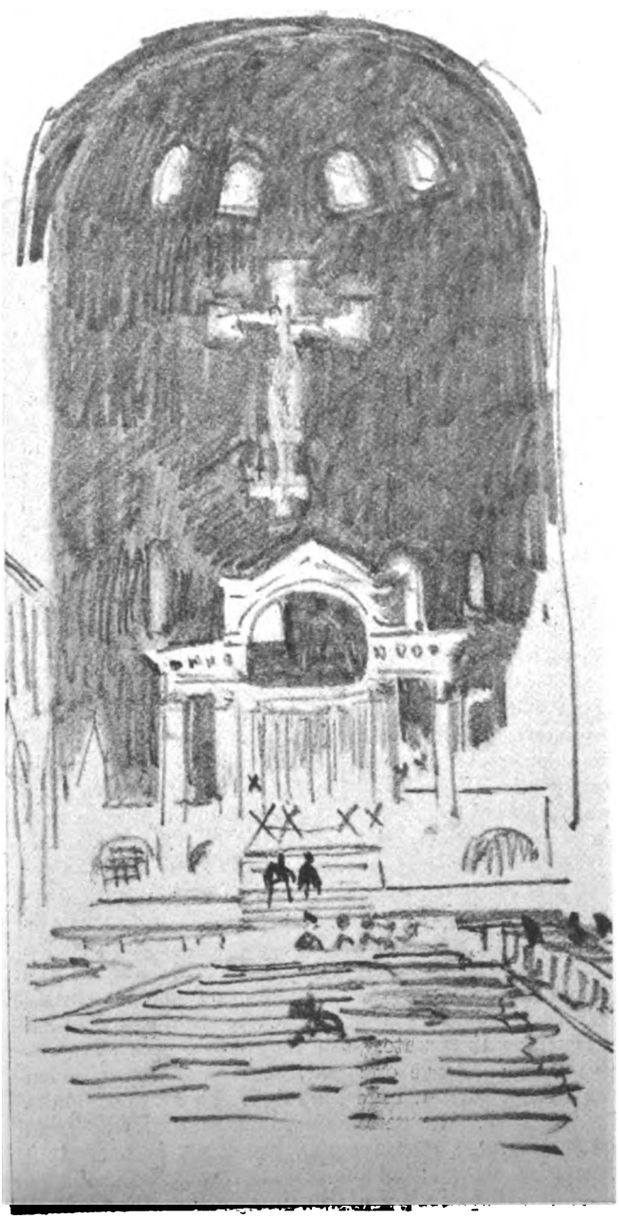


FIG. 9.—WESTMINSTER CATHEDRAL.

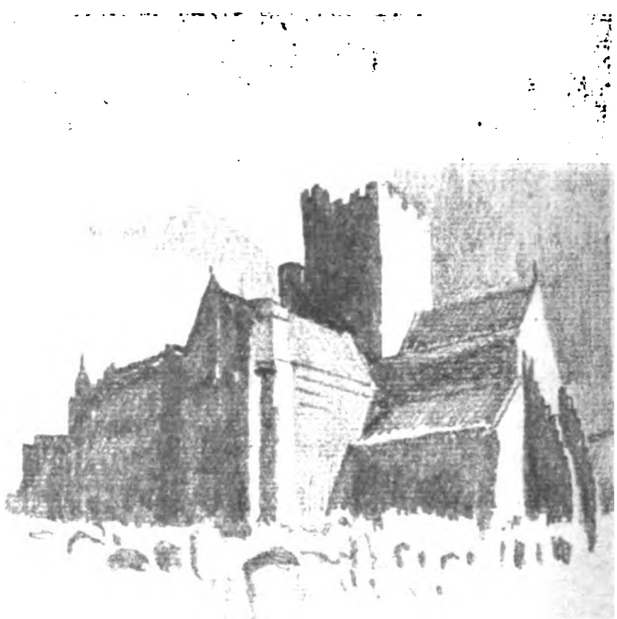


FIG. 10.—CARLISLE.

The novel effects of picture-painting arise chiefly from the new arrangements of old parts. It would seem that art, like science, must have its unchangeable primitive components. We have heard of late of the "molecular architecture" of chemistry. Such chemical building has for its stones and bricks the ultimate particles of matter. All varying forms are assumed to be composed of variation in parts. An original (new) chemical compound thus becomes a new, definitely-grouped structure. All art, then, seems to be variant, not by change of whole but by variation of the part. Therefore, we need not feel necessarily disconcerted at having to employ an old architectural feature, so long as there is freedom to form novel massing—new groups. Providing that the part is itself beautiful, we have no reason in complaining of its constant reappearance any more than we weary of the regular nightly reappearance of the moon.

Invention and imagination applied to the massing of architectural features seems the great present want. Composition, as meaning the placing together of parts, rather than design (suggesting the arrangement of surfaces), is the kind of study needed at the present day. Too much elevation drawing and competition work has been responsible for the lack of large and dignified effects. How many splendid corner sites are wasted by failure to make legitimate use of the external angle; although it may be any amount of flat elevational work is put in the façades. It is in interesting composition that the works of Sir CHRISTOPHER WREN are so distinguished. The perspective of WREN's compositions is always interesting, apart from any special ornamental detail.

Novel effect in interior architecture must be sought in the grouping of main masses of light and shade. Character results from this; breadth is the outcome. The fact sufficiently explains why it is that, in the roughest sketch, if some regard is paid to main masses, an impression is given which we recognise as pertaining to a particular

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building and to that alone. The rose window and contrasting lights below dominate the view of the south transept at Westminster Abbey. As sovereigns are worth more than shillings, so main impressions, conveyable to the mind, are more valuable assets to the architect than mere details. If these latter are coarse and unsuitable and void of vigour of conception and execution, by so much the work is depreciated in value; but one rarely, if ever, discovers insensibility to refinement in small matters in minds fitted to grasp broad effects. Where all attention is absorbed in producing form as distinct from producing effect from form, main impressions are overlooked. The broad effect of the view eastwards in St. Paul's concerns the contrasting light and shade of nave, crossing and choir. If our sketch gives any savour of this main effect, it is plain that details do not concern this, since if there can be said to be any detail whatever it may be safely designated as unlike any detail known to the student of architecture, let alone what is actually to be found in the cathedral. The mass closing the eastern prospect in John F. Bentley's Westminster Cathedral has marked individuality, even omitting the outline of the semi-dome over the choir, which is barely visible in a half light.

In studying buildings in the mass it is not at first easy to judge of the value and effect of great parts, the smaller ones persistently obtruding on the mind. A little practice enables one to see through, or in spite of, this, and to reduce the view mentally to an effect such as represented in fig. 10. In making such a drawing it is not always easy to determine what to show and what to leave out. The truth seems to be that it is impossible to make a drawing of this kind with absolute justice to the building as a whole, offering itself for consideration as a whole, and not expecting to be robbed of its minor features. The difficulty is especially felt if endeavour be made to produce an accurate line drawing. The reason would appear to be that in true architecture details grow into parts and parts into wholes, as a contradistinction to something applied—stuck on—and that the same difficulty is encountered as would be found if endeavour were made to give the effect of a rose-

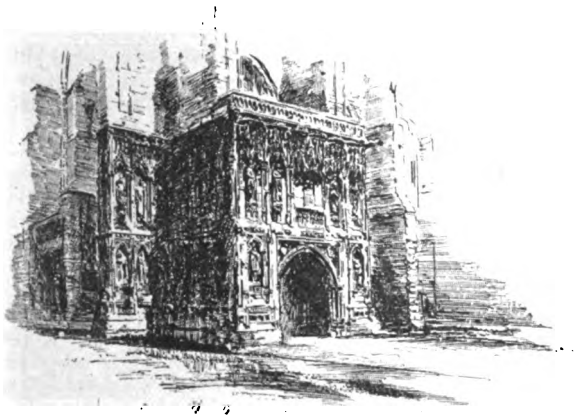


Fig. 11.—SOUTH PORCH, CANTERBURY.

bush with its blossoms and foliage lopped off. A compromise requires to be here and there effected, and, generally, suggestiveness aimed at. It is further noteworthy that if a building as a whole may be considered to comprise (1) main massing, (2) minor massing and (3) detail, in like manner is composed not only each subordinate part but also the detail itself. Thus the south porch of Canterbury Cathedral is a detail of the whole; yet it may also be viewed as a separate little building, and, whether we take the one or the other view, is resolvable into main mass, subordinate grouping and detail. Whether or no it is possible to make satisfactory drawings representing elaborate architecture with detail eliminated, the fact remains that these main masses exist, and, according to their nature, are potent for good or evil. If the former, they are the first cause of powerful effect upon the beholder, while if the latter, no amount of architectural form will ever remedy the prime defect—loss of character.

(To be continued.)

THE WORKMEN'S COMPENSATION ACT (1906) IN OPERATION.—IV.

By W. S. Holdsworth, D.C.L.

Cases Turning upon the Definition of Certain Terms.

The Casual Workman.

THE Act provides, section 13, that the term "workman" does not include "a person whose employment is of a casual nature, and who is employed otherwise than for the purposes of the employer's trade or business." In other words, an employer is not liable to compensate such persons if they are injured by an accident in the course of their employment. Two cases have recently been decided upon the meaning to be attached to the phrase "employment of a casual nature." In the case of Hill *v.* Begg * the appellant, a stockbroker, for about two years previously had been in the habit of employing a man to clean the windows of his private house. He sent a post card for him when he wanted him, and paid him when he had finished his job. He was under no obligation to employ him any more than any other person. The man was killed by an accident while engaged in cleaning windows. The Court of Appeal held that the person was a casual workman employed otherwise than for the purposes of the employer's trade or business, and that no claim to compensation arose. As Cozens-Hardy, M.R., said, it would be difficult to frame a definition of a casual labourer which would not cover this case. He pointed out that a broad distinction was taken by the Act. If a man employs another for the purposes of his trade or business, e.g. a dock labourer, it is immaterial that his employment is of a casual nature: if a man employs another for domestic purposes, the casual nature of the employment makes all the difference. As Buckley, L.J., pointed out, the case was analogous to that of a man who is in the habit of employing the same waiters when he from time to time gives a dinner or a reception. "In such a case the waiters may not incorrectly be said to be regularly employed in an employment of a casual nature." The second of these cases is that of Dewhurst *v.* Mather.† In that case a woman did washing for an employer at her house every Friday and on alternate Tuesdays. She worked for other persons on other days. While working for the respondent she pricked her thumb, got blood poisoning, and lost the use of her hand. It was held that this was not a case of casual employment—"There was a contract of service of a periodical nature." Under these circumstances the provisions of schedule 1, section 1, subsection 1 (*b*) applied. By virtue of this section, where the claimant has "entered into concurrent contracts of service with two or more employers, under which he worked at one time for one such employer, and another time for another such employer, his average weekly earnings shall be computed as if his earnings under all such contracts were earnings in the employment of the employer for whom he was working at the time of the accident." As the woman earned 15*s.* a week she was awarded compensation at the rate of 7*s.* a week.

The Sub-contractor.

Section 4 of the Act contains a long and somewhat complicated clause designed to give the workman injured by an accident a right of recourse either against the principal contractor or the sub-contractor. In substance the section runs as follows:—When any person (called the principal) for the purposes of his trade or business contracts with any other person (called the contractor) for the execution by or under the contractor of the whole or any part of any work undertaken by the principal, the principal shall be liable to a workman as if that workman had been employed immediately by himself—the rate of compensation to be ascertained by reference to the earnings of the workman under the contractor. This is the main idea of the section; but the generality of its terms is modified by the following provisoes:—(1) If the contract relates to threshing, ploughing, or other agricultural work, and the contractor provides machinery for this work driven by mechanical power, he only is liable. (2) The principal who is liable to pay compensation is entitled to be indemnified by the contractor. (3) There is no liability on the principal "in any case where the accident occurred elsewhere than on, or in, or about premises on which the principal has undertaken to execute the work, or which are otherwise under his control or management."

A case which illustrates this last proviso is the case of Andrews *v.* Andrews and Mears.‡ Mears contracted to do

* 1908 2 K.B. 802; 24 T. L. R. 711.
† 1908 2 K.B. 754; 24 T. L. R. 819.
‡ 1908 2 K.B. 567; 24 T. L. R. 709.

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certain work in connection with paving near Albert Hall, Knightsbridge. The work was to cart sand to Knightsbridge, and to cart rubbish from the job to a shoot belonging to Mears at Stamford Green. Mears made a sub-contract with Andrews to take away the rubbish and shoot it where he pleased. Andrews employed his son Andrews to do the carting. While so engaged he went to sleep, fell off the cart, and was killed. At the time, the rubbish was being taken, not to Mears's shoot, but to some other place. The County Court Judge held that both Mears and Andrews the father were liable to pay compensation to the dependants of Andrews the son; but the Court of Appeal reversed this decision, on the ground that it fell within this proviso. As Cozens-Hardy, M.R., pointed out, it would be quite absurd to say that all the roads radiating from the Albert Hall to any distance that the sub-contractor liked to take his cart were premises on which the principal had undertaken to execute the work, or that they were under his control or management.

There has not as yet been any general discussion of the section as a whole. But quite recently certain points have been considered by the Court of Appeal in the case of Mulrooney *v.* Todd and the Lord Mayor, &c., of Bradford.* In this case the Bradford Corporation bought a plot of land adjoining one of their markets. On this land there was an old mill. Todd contracted with the Corporation to clear the site, paying the Corporation 15*l.* for the bricks. While the work was going on one of Todd's men was killed. His widow sued Todd and the Corporation, relying on the provisions of sections 4 and 13 of the Act. Section 4 we have explained above. The material part of section 13 runs as follows:—"The exercise and performance of the powers and duties of a local or other public authority shall, for the purposes of this Act, be treated as the trade or business of the authority." In answer to this claim the defendants contended in the first place that section 4 applied only where there was a contract and a sub-contract. There was clearly no contract and sub-contract, for the Corporation were acting not as a contractor, but as an owner. The Court, however, refused to accede to this argument, pointing out that proviso 1, set out above, in relation to agricultural work, negatived this construction. In the second place it was contended that this was not a contract of employment at all, but a contract for the sale of goods, and therefore it was wholly outside the Act. No doubt there is much authority for the proposition that any contract which involves the transference of property from one contracting party to the other is a contract of sale But though, as we have noted above,† certain technical rules and presumptions of the common law have been allowed to operate to the disfavour of the employer, this particular technicality, which would have operated to the disfavour of the workman, was not allowed to prevail. The Court said simply that, looking at the whole transaction, it could not be regarded as primarily a contract for the sale of goods, a statement which is true of other cases which have nevertheless been held to be cases of sale. This, as we have said above, is the proper way to interpret the Act; and if this mode of interpreting the Act had been universally applied it is doubtful whether some of the decisions on the question of dependency would stand. In the result, therefore, the claim was upheld. But the Court expressly said that it was only a decision in the case of a municipal Corporation, and that it did not follow that the same reasoning would be applicable in the case of a private trader. The result is that many points relating to the application of this section 4 still await an authoritative construction.

The term "Workman."

Section 13 of the Act contains the definition of the term "workman." It does not include, as we have seen, the casual labourer unless employed for the purposes of his employer's trade or business; nor does it include a member of the police force, or an outworker,‡ or a member of the employer's family living in his house. It does include "any person who has entered into or works under a contract of service or apprenticeship with an employer, whether by way of manual labour, clerical work, or otherwise," subject, however, to this qualification, that if the service is not manual labour the total earnings must not exceed 250*l.* a year.

Just as we must reckon the value of board, lodging, and other allowances to arrive at the earnings of the workman,* so, under this section, we must make a similar calculation to find out whether the income of an applicant employed on other than manual labour exceeds the 250*l.* a year. Thus in the case of Dothie *v.* MacAndrew & Co.† it was held that the widow and children of a ship's captain, accidentally killed by a tramcar at the port of Antwerp, where his ship was docked, would fail in their claim, though the deceased's wages were only 216*l.* a year, if the value of his board provided by the owners brought his income over the statutory sum; and it was held that the proper test of the value of such board and lodging was, not what the captain saved by these allowances, nor what it would have cost the captain to provide his own board, but what the style of board provided by the owners would have cost him if he had had to purchase it himself. It would seem therefore that while for the purpose of reckoning the earnings of a workman to ascertain the amount of compensation due the value of such allowances is in many cases their cost to the employer,‡ for the purposes of reckoning the earnings of a workman to ascertain whether he falls within the Act, the value of such allowances is what the cost of similar allowances would have been to the workman.

It should be noted that the Act does not provide for the case where a man engaged on other than manual labour works for several employers and is paid by each a sum under 250*l.* a year. Is it possible to add together his total earnings so as to put him outside the Act? If we take the analogy of the converse case the answer should be yes. As we have seen, schedule 1, section 2 (*b*) provides that for the purpose of assessing the average weekly earnings of a claimant who works concurrently for two employers at different times, the earnings under all these contracts are to be added together and treated as if they were earnings in the service of the employer for whom he was working at the time of the accident. There does not seem to be any reason why this principle should not be applied in the converse case. But as yet nothing has been decided on this point.

Under the old Act there was no such comprehensive definition of the term "workman," and questions sometimes arose as to doubtful cases. One of these cases, Simpson *v.* the Ebbw Vale Steel, Iron and Coal Company,§ was commented on in *The Architect*, March 24, 1905. It decided that the manager of a mine at a salary of 400*l.* did not come within the Act. More recently in the case of Bagnall *v.* Levinstein, Ltd.,‖ it was decided (Farwell, L.J., dissenting) that a man who had taken a degree in science employed in a dye and chemical works at a salary, and commission on profits on his inventions and improvements, was not a workman within the old Act. The ground of the decision was that the man, though occasionally doing manual work, was not employed as a workman, but rather as a skilled expert. But probably difficult questions of this kind can but rarely arise under the present Act. Its definition of a workman is far more detailed, and the limit of 250*l.* a year, which it fixes for those not engaged in manual labour, will obviate the necessity for speculation as to the status of many who, though apparently coming within the words of the Act, are not workmen in the popular sense of the term. It may, however, be noted that some difficult questions may arise where a person earning over 250*l.* a year does any considerable amount of manual work. In such cases it may be necessary to have recourse to the reasoning employed in these cases. No doubt the test will be the character of the employment. The fact that the applicant does some manual work will not, as the last-cited case decided, be taken as conclusive.

It cannot be doubted but that the more comprehensive terms of the Act of 1906 have settled many difficult and doubtful questions which arose under the more limited provisions of the older Act. Though some of the provisions of the Act—e.g. those with regard to serious and wilful misconduct, and those with regard to illegitimate children—favour the workman unduly; though, as we have pointed out above, some of the decisions seem to go rather far in the same direction; yet it cannot be doubted but that the Court of Appeal have in general interpreted it according to its spirit. The governing idea has been to interpret its

* 25 T. L. R. 103.

† *The Architect*, January 29, 1909, p. 77.

‡ The Act, section 13, defines an outworker as "a person to whom articles or materials are given out to be made up, cleaned, washed, altered, ornamented, finished or repaired, or adapted for sale in his own home or on other premises not under the control or management of the person who gave out the materials or articles."

* *The Architect*, January 22, 1909, p. 61.

† 1908 1 K.B. 803; 24 T. L. R. 326.

‡ *The Architect*, January 22, 1909, p. 61.

§ 1905 1 K.B. 453.

‖ 1907 1 K.B. 531.

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words and clauses in accordance with the ordinary and popular meaning of the terms used; and their work may in the future provide a basis for a final or almost final codifying Act. It has been said that one half of the world does not know how the other half lives. The cases decided under this Act give to lawyers a somewhat detailed and practical knowledge of this matter—a knowledge which will doubtless indirectly assist them in administering other branches of the law, for it helps to keep their minds in touch with the realities of many different spheres of social life. "Law," said the late Professor Maitland, "is the place where life and logic meet;" and at all periods in our legal history a knowledge of life has helped to free the mind from too absolute a subservience to the abstractions of logic.

ROYAL ACADEMY LECTURES—ARCHITECTURE.

IN the second of a series of lectures on "Early French Renaissance Architecture," Professor Reginald Blomfield, A.R.A., dealt with the master builders. He pointed out that French writers differed as to the position of these men, one school treating them as simple workmen, the other describing them in terms of exuberant eloquence as accomplished architects. A similar difference of opinion existed in regard to certain English builders of the sixteenth century, and its solution was therefore a matter of historical interest.

The lecturer then discussed the methods of building operations as disclosed by the accounts of the royal buildings. The King gave his personal instructions to his valet-de-chambre or some important court official, and it was their business to see that contracts were drawn up and the building erected in accordance with those instructions. Full specifications were drawn up, but no architect is referred to till late in the reign of Francis I., and until the appointment of Serlio in 1541 the whole direction and control of the work was in the hands of a layman. The result of this want of competent control is seen in the buildings of the reign of Francis I.

The master builders were struggling blindly with details which they did not understand, and though they possessed considerable traditional knowledge of building processes, their knowledge was, as De l'Orme pointed out, a mere hand-to-mouth affair, and resulted in such disasters as the collapse of Beauvais. As to the guilds, their members seem to have been much more concerned about keeping the market for themselves than about mutual improvement and instruction in the art of building.

Very little, in fact, was known about the Chambiges, the Le Bretons and the master builders whom the enthusiasm of the French writers had exalted to the position of first-rate artists. This view was not borne out either by documentary evidence or by the buildings; though the latter (owing to the happy accidents of outline) were often picturesque, they had no pretensions to serious architectural design. On the other hand, there emerged from the evidence the interesting fact of the existence of a well-defined class of building contractor, with whom the business was hereditary.

The lecturer then dealt with men of the type of Bachelier and Hector Sohier, the builder of the choir of St. Pierre at Caen. He pointed out that here again, though there was abundance of ornament, there was an entire absence of the architectural sense, and that Sohier's work was typical of what fifty years ago was most popular, but in his opinion the least to be admired in the whole range of serious architecture.

The evidence was on the whole conclusive that till the appearance of Philibert De l'Orme, an architect—i.e. the man who from the first had devoted himself to the theory and practice of the art of building—did not exist in France. The buildings of that period owed their attractiveness to happy chance, to their historic associations, to their placing on the banks of the most beautiful river in Europe; but students should be on their guard against treating them as the last words of a consummate art. They were, on the contrary, the half-articulate efforts of beginners striving to explain themselves in an unfamiliar language.

In his third lecture Professor Blomfield, after calling attention to the effect on French culture of the Italian expeditions described the building of Gaillon for Cardinal Georges d'Amboise. He pointed out that the Cardinal believed he was building an Italian palace, but what he really got was a late Gothic house peppered about with Italian Renaissance detail. A comparison of the Amboise monument with the monument to Louis de Brize, in the cathedral at Rouen, showed that the influence of the Renaissance so far was merely superficial. French artists had not yet learnt the cool reticence which marked the best Italian work. Perhaps the most mature example of the architecture of this time (about 1520) was Azay-le-Rideau.

The man who contributed most to the establishment of the new manner in France was Francis I. himself. Building was with him a positive mania, though he never finished his buildings, and if anyone told him a building was in good order he replied that in that case it could not be one of his. His first great enterprise was the north wing of the Chateau of Blois, a building much restored and much misunderstood. Though this building was labelled Renaissance, it was in fact built by the French masons on traditional lines, imperfectly concealed by Italian ornament.

There was no foundation whatever for the legend that the famous staircase was designed by Leonardo da Vinci. It was simply the mediæval newel staircase dressed out with Renaissance details. To the west of this wing lies the block designed by François Mansard, which it was the fashion to deride. Yet it would be impossible to find a better object-lesson in the difference between the ordered dignity of the trained mind and the restless self-assertion of the tradesman.

The King's next undertaking was Fontainebleau. The lecturer described this in detail, pointing out the importance of the work of the Italian artists in relation to the decorative arts of France. Next came the palace of St. Germain, the hunting boxes of La Muette and Chartrès and the country house or hunting lodge of Villers Cotterèts, all the result of the king's passion for hunting, his craving for excitement. Meanwhile Chambord, begun in 1509, was on the whole the greatest of the King's enterprises. Ten years later he began the Château de Madrid in the Bois de Boulogne. A great block of a building lavishly decorated with glazed terra-cotta by Jérôme de la Control was conspicuous, and the result was what was to be expected from a princely amateur with considerable knowledge of ornament, and no one to keep him straight but the actual workmen. The fate of Francis I.'s buildings had been disastrous. St. Germain, restored out of interest, is a museum; Villers Cotterèts is a workhouse; La Muette and the Château de Madrid are utterly destroyed. Noble owners have been as indifferent as the Revolutionaries. And the great buildings that have survived the pick-axe and the fire have now to face the danger of being classed as historical monuments and being thoroughly "restored." On the whole the methods of the Revolutionaries were the least objectionable.

At a Meeting of the Aberdeen district of the Amalgamated Society of Carpenters and Joiners, held last week, a copy of agreement was submitted showing the conditions on which men had accepted employment in the City Colony Elevator workshop, under the Salvation Army's Men's Social Work Scheme. Those who receive employment must, it was stated, be unable to find work otherwise, or must be homeless or friendless. By the rules and regulations enforced in connection with the colony, the men must abstain from all intoxicating drink, must refrain from the use of bad language, must agree to a thorough cleansing of the body on entrance, must expect no payment of any kind beyond food and lodgings, and must recognise that any voluntary payments might be withdrawn at any time. The worker is entitled to have the clothes he brought into the colony returned to him on leaving, but is liable to instant dismissal and forfeiture of any reward promised for industrious work in the case of misdemeanour. The meeting considered the conditions harsh, and did not approve of them, expressing the opinion that no support to the scheme ought to be given from Aberdeen joiners.

The Water Committee of Glasgow Corporation at their meeting on Monday had under consideration the tenders which had been sent in for the construction of the embankment, discharge culvert, and other works in connection with the raising of the levels at Loch Arklet. There were twenty-two tenders. The sub-committee which was specially appointed to consider these, recommended the acceptance of the offer of Messrs. Charles Brand & Son, 188 West Regent Street, Glasgow, amounting to 100,651*l.* 0*s.* 11*d.* The next lowest tenders were 102,494*l.* 1*s.* 6*d.* and 106,008*l.* 14*s.* The water committee unanimously recommended the Corporation to accept Messrs. Brand's offer.

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NOTES AND COMMENTS.

ARCHITECTS have scarcely grasped the capabilities of mild steel in building when we are confronted with a new discovery by Messrs. JONAS & COLVER, of the Continental Works, Sheffield. Though this relates more particularly to the manufacture of machinery by the provision of a new high-speed steel, stated to possess six to seven times the cutting power of existing steel of a similar type, it is probably not without its influence on the future of building and architecture. The existence of high-powered cutting tools at once suggests the possibility of a more extended use of granite and other hard building stones, and a differentiation of the suitable and logical artistic treatment of such material. Then, too, we may no longer be restricted to the product of the rolling mill for the form of our girders, joists, and other components of our structural steel work, and it may be possible to evolve a steel architectural treatment that will not tempt us to cover up the barbaric nakedness of our ironwork with scagliola. The cost of turnery in metals should certainly be reduced, and it will no longer be necessary for us when we are designing wrought-iron work after the manner of the Spanish "rejas," to specify that our circular balusters, in order to make them financially possible, are to be in malleable iron. As hardness without brittleness seems to be the predominant characteristic of the new steel, we may expect that some day the scientific enterprise of our manufacturers will give us a steel for stanchions that will combine the great strength in compression of high carbon steel with the toughness and freedom from brittleness that now induce us to prefer mild steel for bearing members.

AMONG the cities that border the eastern seacoast of the United States, and contain the best examples of the "Colonial" style, Salem is one of the most interesting, its prosperity in the commercial marine business of the seventeenth and eighteenth centuries having provided the means for the employment of a quite remarkable group of excellent carvers and workers in wood. Most of their work is found in the interiors, but occasionally, as in our own eighteenth century work, richly worked porches and doorways of wood frame the entrance to otherwise soberly-treated houses and give a foretaste of the charming artistic skill displayed within.

THE success of the first Letchworth exhibition has produced a rush of imitators, but the experience of Newcastle, in the North of England Cottage Exhibition, at Walker, is calculated to give pause to the movement. The chairman, Sir WALTER PLUMMER, and the organising secretary, Mr. ALDRIDGE, at the meeting of the committee held last Saturday endeavoured to minimise the lack of success, and to urge that, in spite of the unfortunate financial result, necessitating a call of fifteen shillings in the pound on the guarantors, the citizens of Newcastle would ultimately benefit by the development of building on municipal lands and the improvement in the character of cottages that should be credited to the incentive of the Cottage Exhibition.

THE depletion of forest lands throughout the world, even in America and Australia, arousing, as it does, the fear that the shortage of supply which we are already feeling may ere long develop into actual famine, has before now suggested that we may be driven to use reinforced concrete for many parts of buildings for which we now employ timber. It is interesting, therefore, to read in this month's issue of *The Royal Engineers' Journal* an account by Major A. H. D. RIACH, R.E., of the manner in which, following the lead of Major STOKES-ROBERTS, R.E., in the barracks at Jubbulpore, reinforced concrete has been adopted in the construction of verandahs for the barracks at Ahmednagar for many parts that ordinarily are made of timber. Major STOKES-ROBERTS and Major RIACH are to be congratulated on their bold experiment and on the success they have achieved, as, in addition to the undoubted advantages in respect of durability and cost of maintenance that reinforced concrete possesses over timber, they have shown that under the conditions obtaining in India the initial cost of the work has been considerably reduced. Put shortly, while the cost of teak is 3.75 rupees per cubic foot, that of reinforced concrete for lintels, posts, &c., is 2 rupees per cubic foot. Part of this saving is due to the cheapness of labour, as the proportion of the cost of this item to that of material is as 1 : 2, and the result would scarcely work out the same here, as we cannot get coolie labour for a quarter rupee a day. On the other hand, material costs rather more in India than in England. As a considerable item is the expense of moulds, for all the members in concrete are cast and seasoned before fixing, economy largely depends on repetition of the same forms, and in a piece of work like a verandah this is possible.

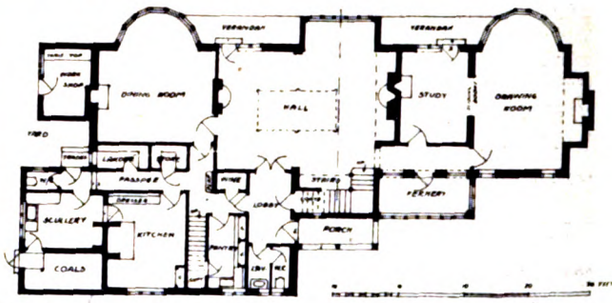
ILLUSTRATIONS.

CANTERBURY CATHEDRAL.
THE PARTHENON.

SEE "Architecture: Its True Principles," by R. OWEN ALLSOP, on pp. 107 to 109.

ST. HILDA'S MISSION ROOM, WARLEY.

THE building was erected about two years ago, and forms part of a scheme for a school, church, and vicarage. The portion now erected will be used as a school in the future (when the church is erected), and classrooms will be added on the sides as shown on plan. Thin



Black Country bricks have been used for facings, pointed in white mortar, and the roof covered with hand-made tiles. Walls internally are plastered, and the joinery is deal painted. The work was executed by Mr. T. A. SMITH, builder, Moseley; and the architects were Messrs. BUCKLAND & HAYWOOD-FARMER, Birmingham.

NEW PREMISES, PALL MALL, S.W.

THIS imposing building, 59-60 Pall Mall, has been erected for the London and Lancashire Fire Insurance Office. Mr. E. GUY DAWBER, the architect, had, in preparing his design, to allow of a public passage, known as Crown Court, to cut through his ground floor. The building is faced with Portland stone, and the roof is of green-glazed Normandy tiles. The upper floors are let as bachelors' chambers. The builder was Mr. JAMES CARMICHAEL, of Wandsworth.

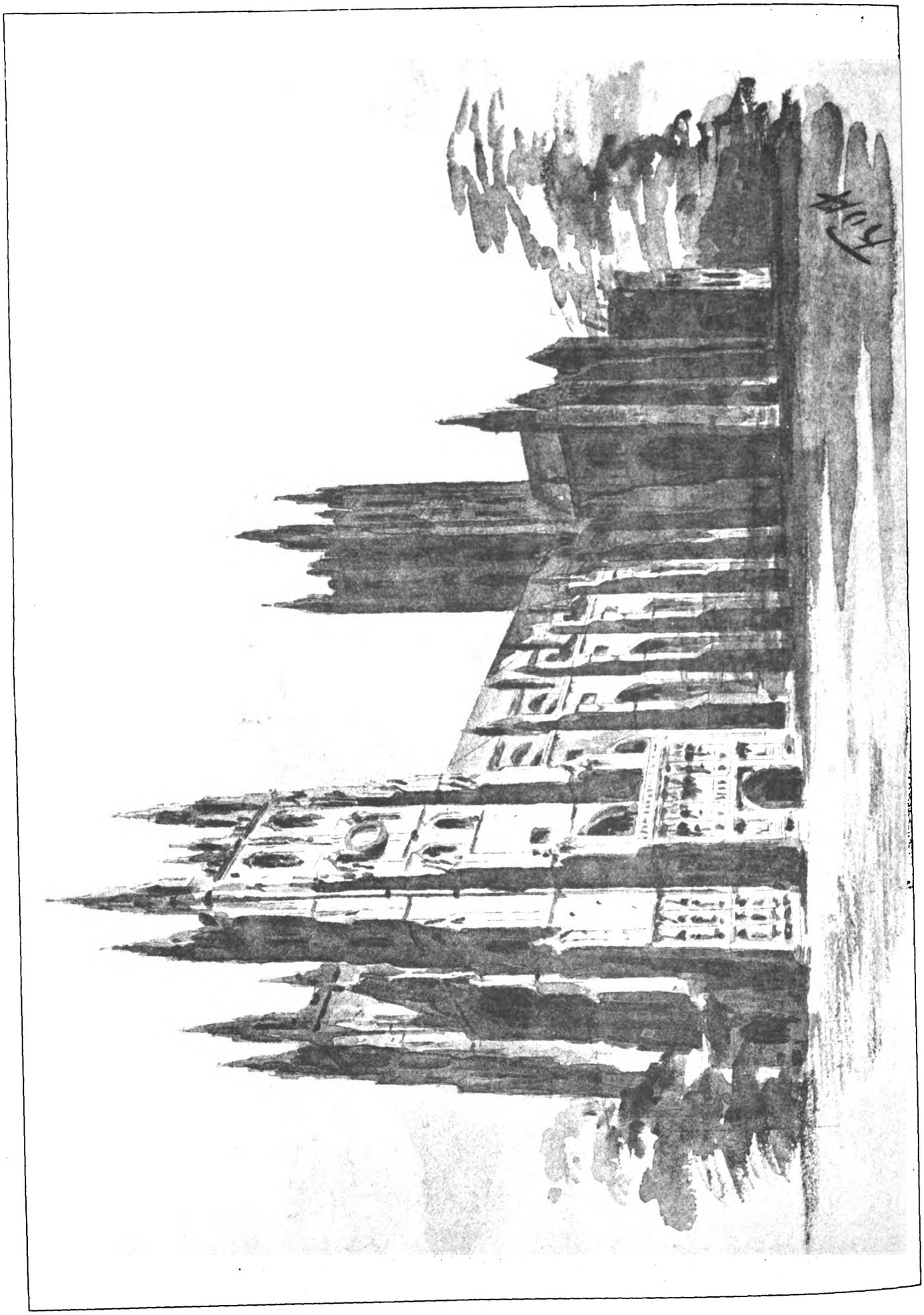
ST. ANDREW'S CHURCH, BOSCOMBE.

ST. ANDREW'S CHURCH, Boscombe, is built on a corner site, roads being on the west and north boundaries. The walling for external facing is of Devonshire limestone, finished with a fairly smooth axed face; the dressings, quoins, &c., are of Doulting stone. The same stone is employed internally, the walls being plastered, and roofs of pitch pine, left perfectly plain, and covered externally with red sand-faced tiles. The plan consists of a fairly wide nave, with north and south aisles. There is no chancel arch, the line between nave and chancel being marked with oak screens, which are carried across the aisles. There are similar screens at the back of the oak choir-stalls on either side. The north choir aisle forms a chapel, while the organ is placed in the south choir aisle. The priests' and choir vestries are at the east end of south choir aisle. Messrs. TRASK & SONS, of Norton, were the general contractors, and Messrs. BOULTON & SONS, of Cheltenham, made the choir-stalls and screens. The architects were Messrs. J. OLDRID SCOTT & SON, 2 Dean's Yard, Westminster, S.W.

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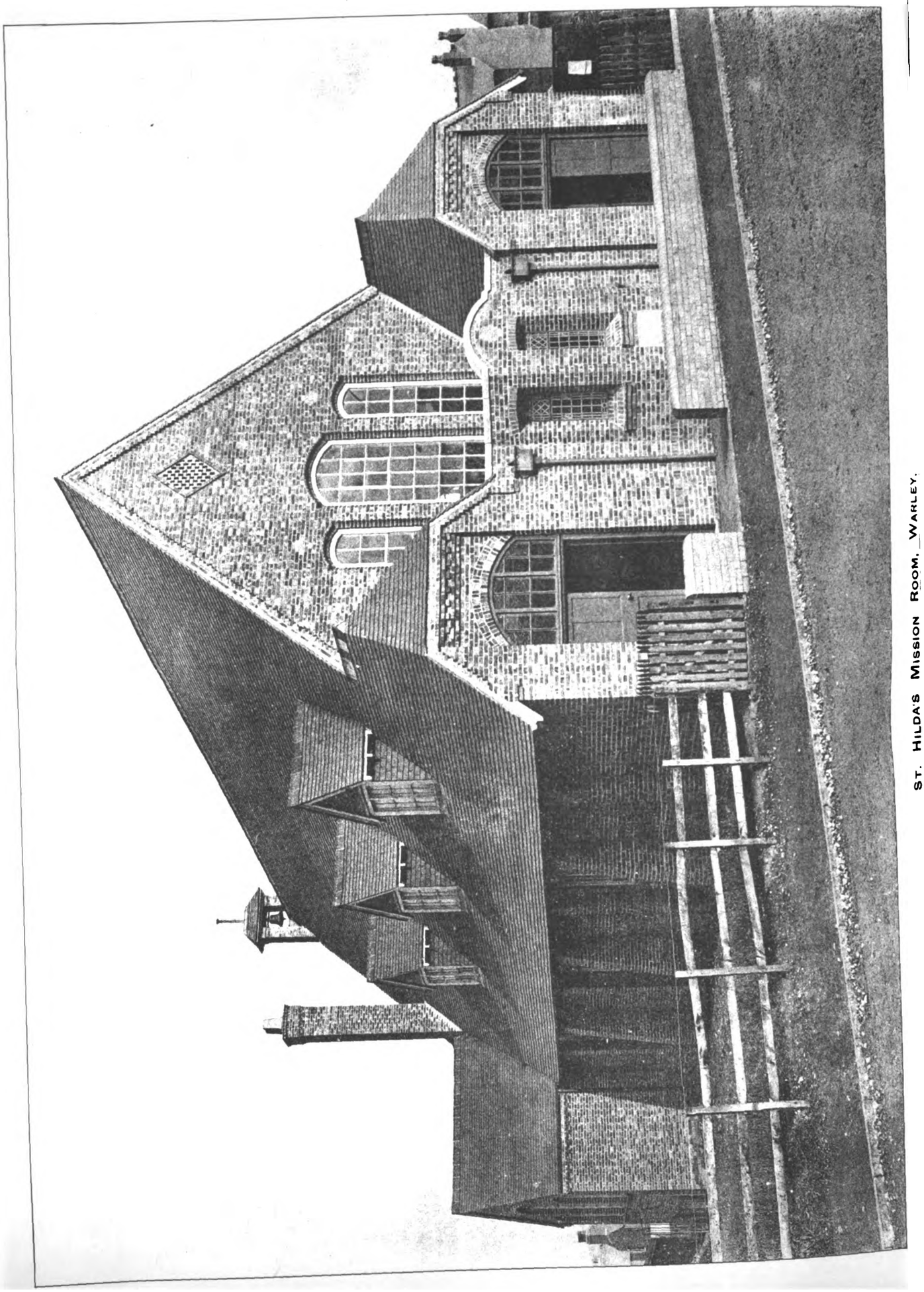


CANTERBURY CATHEDRAL.

ILLUSTRATING "ARCHITECTURE: ITS TRUE PRINCIPLES," BY R. OWEN ALLSOP.

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ST. HILDA'S MISSION ROOM, WARLEY.

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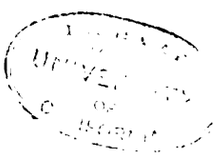


NEW PREMISES
PALL MALL S.W.
for the
LONDON & LANCASHIRE
FIRE INSURANCE Co.
E. GUY DAWBER.
ARCHITECT.

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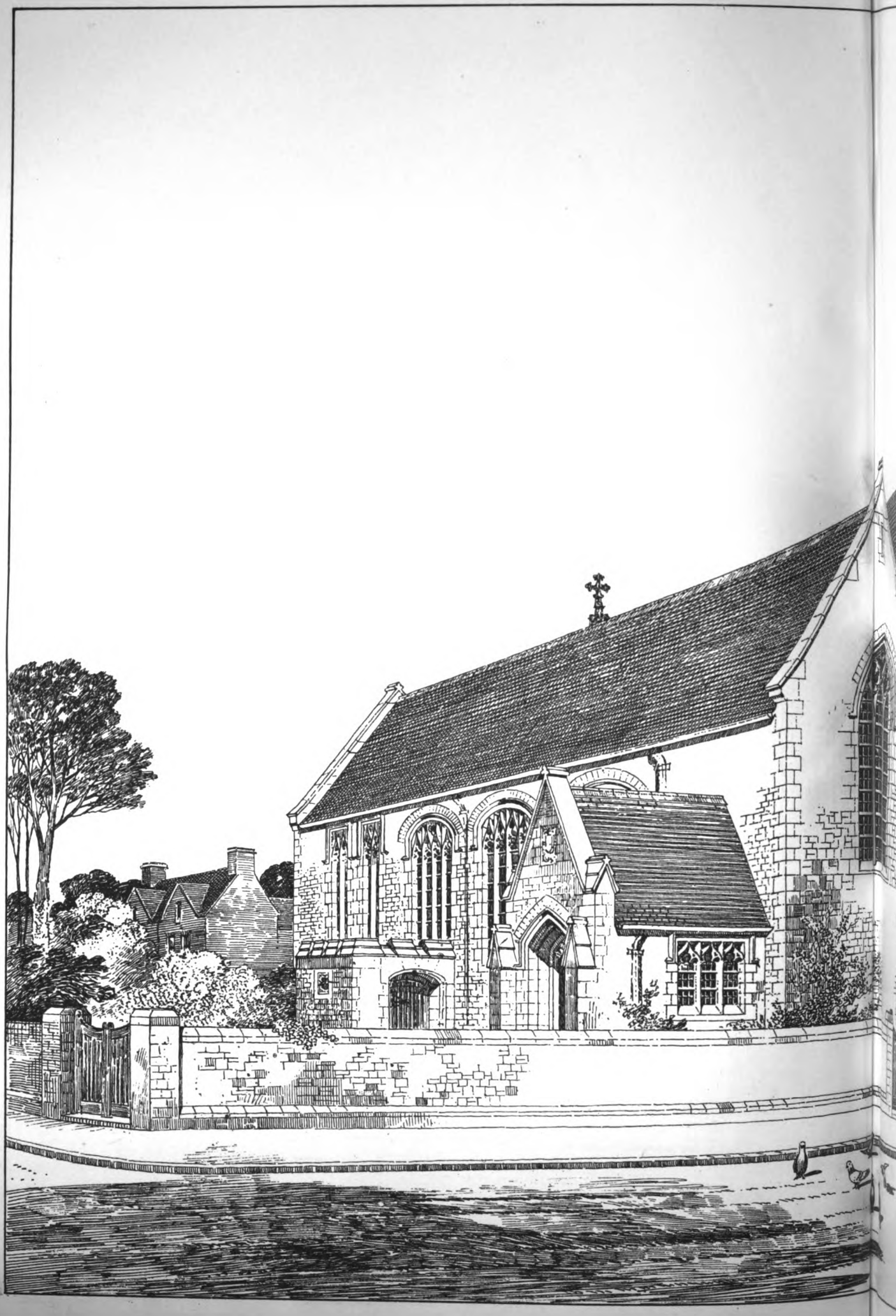
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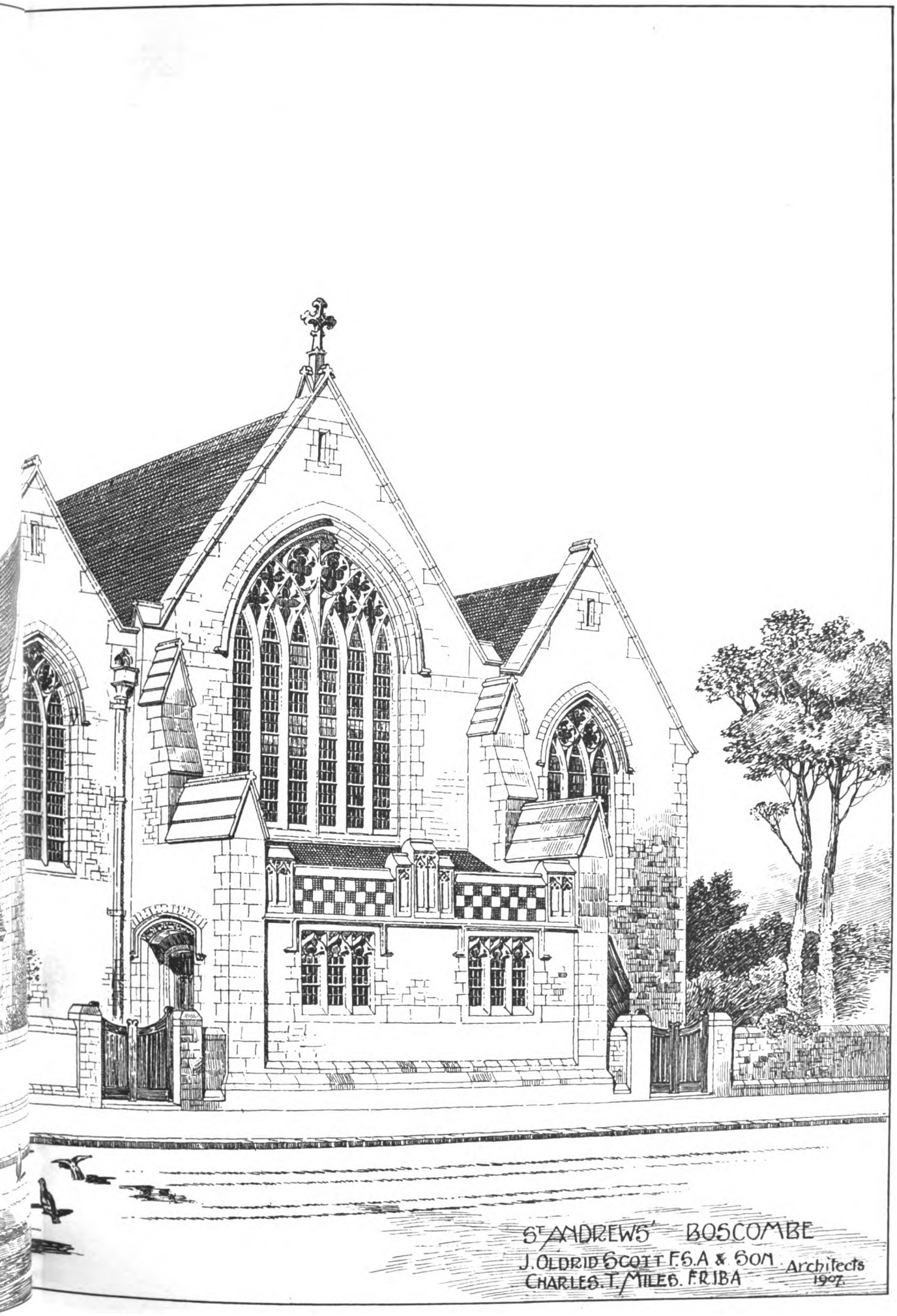
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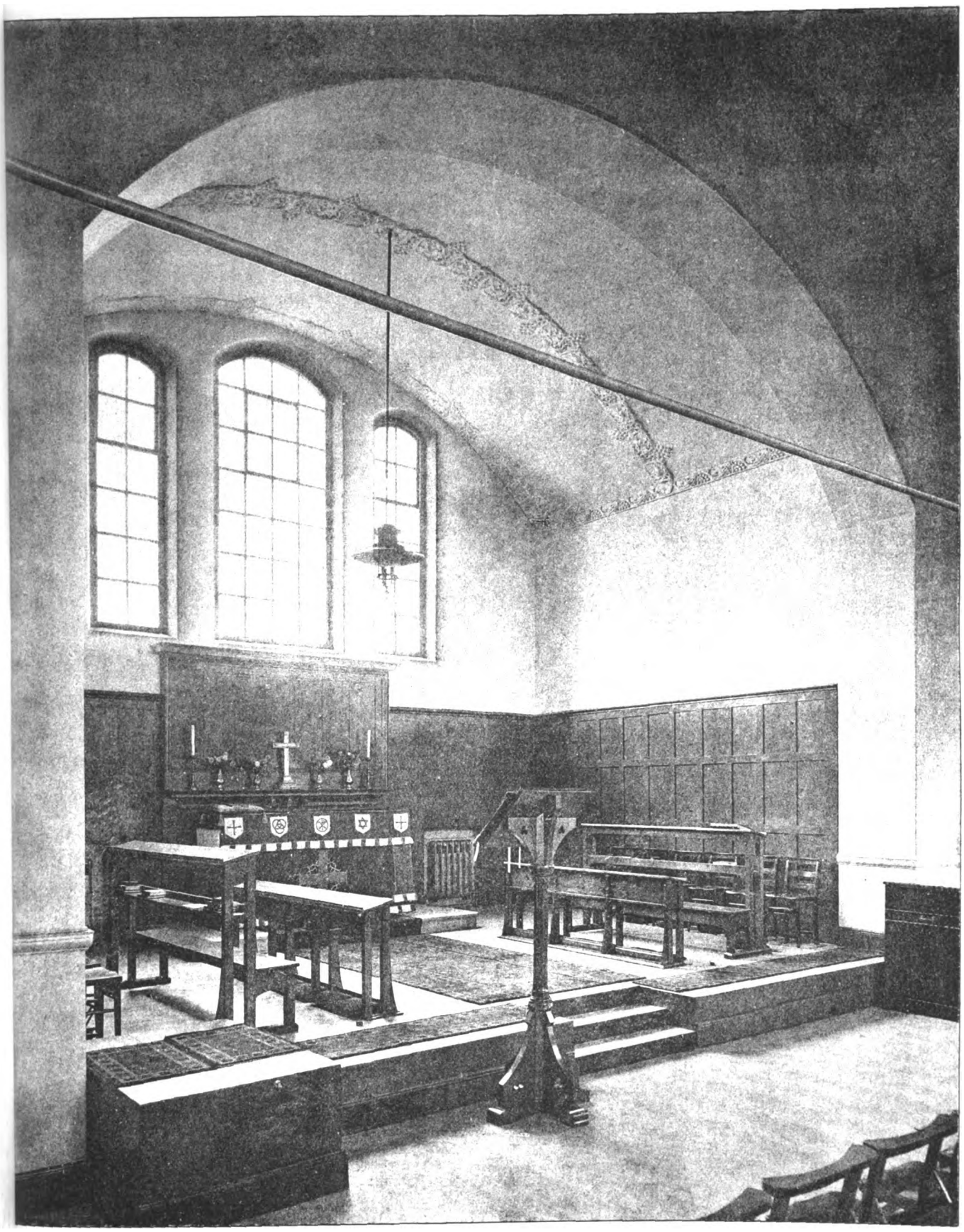
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UNIVERSITY OF CALIFORNIA

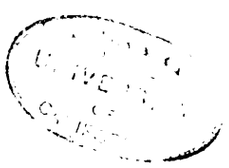
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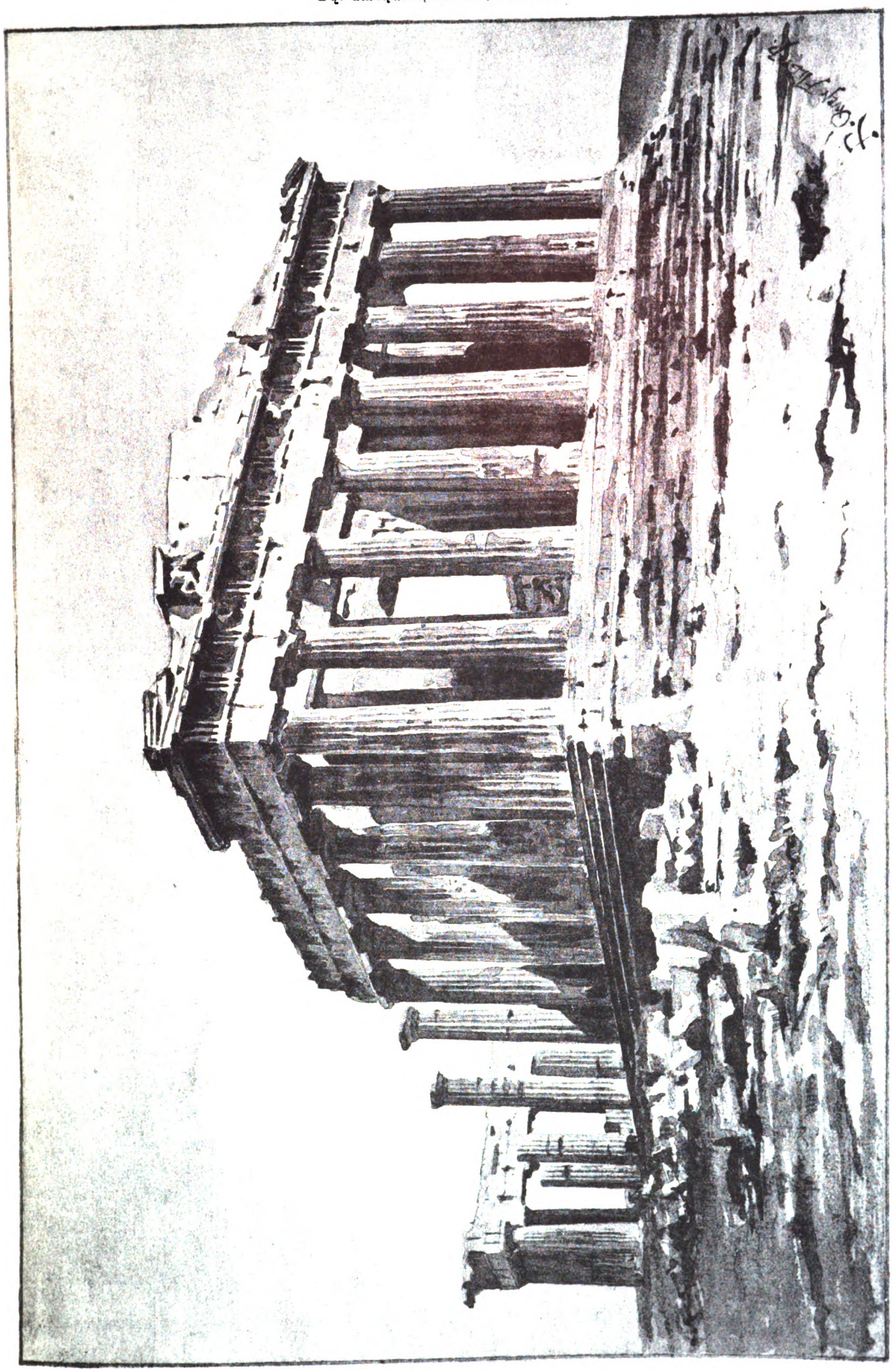
ST. HILDA'S MISSION ROOM, WARLEY.

Messrs. BUCKLAND & FARMER, Architects.

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THE PARTHENON.

ILLUSTRATING "ARCHITECTURE: ITS TRUE PRINCIPLES," by R. OWEN ALLSOP.

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THE ARCHITECTURAL ASSOCIATION.

A MEETING of the Association was held on Friday evening last at Tufton Street, Westminster, Mr. Walter Cave, president, in the chair.

The HON. SECRETARY announced the third spring visit was arranged for February 13 to the Holborn town hall, by permission of the architects, Messrs. Warwick & Hall, and also to the new premises of the British Medical Association, by permission of the architect, Mr. H. Percy Adams.

Mr. C. O. Hooper was duly elected a member.

Mr. H. T. BUCKLAND read a paper, illustrated by lantern views, on—

Schools.

In venturing to address you on a subject upon which so many are better qualified to speak than myself, I fear I cannot hope to add much that is new to what has already been said upon a class of building so governed by rules and regulations with regard to planning that any very great departure from existing models would be well-nigh impossible until a new curriculum provides a necessity for a different environment; neither would it be possible in an evening to attempt any serious account of the history and development of school buildings in England and other countries; but as it is always of interest to hear how problems of planning and detail have presented themselves to and been dealt with by others, I shall venture to draw your attention to some of the points which have particularly exercised my own mind in the planning and design of public elementary and secondary schools in a large town, illustrating my remarks by examples of recent school plans (kindly placed at my disposal by various architects) and some of my own.

Before attempting any illustration of plans of school buildings it will perhaps be well to consider the curriculum of the Council schools of this country as ordained by the Board of Education.

The elementary schools take children from the age of five; they may be taken younger, but the Board has recently discouraged the entrance of children under that age. From the ages of five to seven years children go into the infants' department, and from the latter age into the upper departments. In the upper departments there are seven standards, the lowest being number one; when children have passed standard five they are eligible for a secondary school, providing they can pass the entrance examination. In an elementary school children may be kept until the age of fifteen, after that no grant will be paid; and in secondary schools until the age of eighteen, after that age the same remark applies. In an elementary school the usual hours are from 9 till 12 and 2 to 4.30, with no school on Saturdays. The subjects taught are reading, writing, arithmetic, a little algebra, English history, geography, elementary physics and chemistry, singing, drawing, manual training and physical exercises. Latin and French are taken as exceptional subjects in a few schools.

At nine in the morning the various departments assemble in the hall for the Lord's Prayer and the singing of a hymn, and then dismiss to their class-rooms.

The above curriculum for an elementary school is, I believe, a fairly general one. I understand that in secondary schools very much greater licence is now permitted in the arrangement of a curriculum than was formerly the case, so that the one I am about to outline must not be taken as exactly typical, although it appears a very good one. The following is a list of the subjects taught:—Mathematics, comprising arithmetic, algebra and trigonometry; English; French; Latin; German; geography; history; singing; science; drawing; handicrafts (working in wood and iron); gymnastics. Of these, out of a working week of twenty-five hours and twenty-five minutes, drawing absorbs one hour and a third; handicraft, two hours; science, four hours and a half; and gymnastics, one hour and a half. These times are given as averages, as they vary in the different classes. In science, for instance, in the lowest forms one hour and three-quarters only are devoted to this subject, while in the highest it runs up to seven hours. In this particular school there are five forms, of which the sixth is the highest and the second or preparatory class the lowest; some of these forms are divided into upper and lower, and some of them into upper, middle and lower. The school assembles in the hall at 9 for hymns, prayers and a short reading from the Scriptures before dispersing to classes. The hours are from 9 to 12.30 and from 2 to 4.30. There is a half-holiday on Wednesdays and a whole one on Saturdays.

I have ventured to go into these details because it seems essential to have a clear idea with regard to the uses of a building before proceeding to discuss the kind of accommodation which should be provided to afford the maximum amount of convenience for them. In the daily time-table of both the elementary and the secondary school it will be observed that there is an assembly each morning before dismissal to class-work; this gives rise to one of the important differences between the plans of schools in this country and those of America and the Continent, viz. the relation of the assembly hall to the rest of the building. In the majority of our schools this occupies an important position, due mainly to its frequent use; in America and on the Continent it is usually placed on an upper floor and comparatively out of the way, owing to the fact that a daily assembly is not the rule, as the children enter the school and go straight to their class-rooms. For this reason we find many of these schools planned with a cloak-room in connection with each class-room.

The rules of the Board of Education to be observed in the planning and fitting up of public, elementary and secondary schools of necessity influence all planning so considerably that it is not possible for me to proceed very far without a reference to them, as they are the guide to which all authorities (upon whom the burden of providing school accommodation rests) are compelled to defer when arranging for the erection of a new building; rather, however, than discuss them seriatim I should prefer to consider their practical application. Let me assume for a moment that an education authority in a large town has to erect a new school and is about to instruct an architect to prepare plans. What are the points upon which the latter will need to be informed? (1) The number of children to be accommodated; (2) in what number of departments the school is to be planned; (3) is the building to be planned on one or more floors; (4) what numbers are to be accommodated in each of the class-rooms.

I have assumed a site has already been chosen, as in large towns sites have frequently to be purchased long before a school is required, so that in many cases the architect who is eventually employed to erect the schools cannot be consulted. Where, however, this is possible, it should certainly be done, as the question of aspect is an extremely important one. We have, many of us, I dare say, been faced with the problem of planning a school to go on a long narrow site, with its short axis north and south, and an absolute instruction to get the majority of the class-rooms on the south side—no easy matter if the school is to have central halls and the length of the site is comparatively limited. It is true in a large town that one is not able always to choose a site with the best aspect, for the simple reason that there is not one to be had; in that case obviously any instructions with regard to the aspect of class-rooms should be very general in character.

I will now return to the points upon which I suggested an architect would need to be informed before commencing to plan a school and consider them in the light of the Board of Education's requirements. Dealing first with elementary schools, my first two points together—number to be accommodated and in what number of departments. What does our guide say? "No school should ordinarily be built to accommodate more than 1,000 to 1,200 children in three departments. No single department should accommodate more than 400 children. A large school in three departments might conveniently be divided in the following proportions:—Boys, 360; girls, 360; infants, 380." It goes on to say:—"In departments of this size the most suitable plan is that of a central hall, with the class-rooms grouped round it." Now it is obvious from this instruction that a school with three departments if planned as suggested must have three central halls, unless advantage is taken of a further instruction, which says:—"A single central hall may be provided for the joint use at separate times of two departments, provided that it is so placed as to be readily accessible from the class-rooms of each department." There may be many examples of schools where this condition has been taken advantage of. The only one I am personally acquainted with is at Darlaston. In this school one hall is used for three departments. Now, although a three-department school may be the most efficient, it is also the most expensive both to build and to maintain, as a headmaster and two headmistresses have to be employed. Either this fact or a preference for a mixed school has led to the building of schools in two departments instead of three—viz. an infants' and a mixed department—whether with a view to economy or the preference already suggested I am unable to say. If the latter, the plea is certainly justified by the Continental and the American practice, as mixed departments are the almost invariable rule both in America and on the Con-

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tinent. And in Great Britain it may be said that as we go further north the mixed school gets more common and in Scotland is almost universal.

The next question upon which we have to seek enlightenment is whether the building is to be planned upon one or more floors. Upon this point our guide says:—"Where the site is sufficiently large, open and fairly level, the most economical plan is that of a school on a single floor. Such an arrangement is also preferable on educational grounds. In any case it is desirable that a school building should not be on more than two floors. A building on three floors is open to many objections, and should only be proposed in special circumstances or on very costly sites." This recommendation has, I think, been very widely adopted throughout the country; and in Birmingham no elementary school has for many years been erected with more than one floor.

Then as to the numbers to be accommodated in each of the class-rooms, after suggesting the sizes of the departments—boys, 360; girls, 360; infants, 380—the Rules go on to say:—"As a rule, such a department would probably require seven class-rooms." This would give us six for fifty each, and one for sixty, in each of the upper departments; and four for fifty, and three for sixty, in the infants' department.

Education authorities and head teachers in elementary schools are, I believe, fairly generally agreed that a class of fifty children is all a teacher can efficiently teach. The need for class-rooms accommodating sixty is chiefly to provide for the classes at the beginning of the educational year, as they are always larger then than at any other time, and only gradually drop to the average.

These, then, are the main points to which consideration must first be given in the planning of all elementary school buildings. I think there can be no question that a central hall is undoubtedly the best for an elementary school, as it affords excellent means of supervision and convenient access to class-rooms, and although schools have been recently built with an enlarged corridor which might almost be called a central hall, the examples I propose to show all have the marked characteristics of a genuine hall.

Different education authorities have different views with regard to the erection of a three-department school on one floor. We shall find some prefer all the departments in one block, others in two blocks (the infants' department being the one usually kept separate), and in some cases a preference appears to exist for each department in a separate block.

The *pros* and *cons* may be briefly summed up as follows:—A building in one block is more economical to erect; can be heated from one centre, and is consequently cheaper to maintain. In two blocks slightly better lighting and probably better disposition of playgrounds are possible, and one central hall may be side-lighted. In three blocks the same remarks apply, and side-lighted central halls become possible in all departments, and a natural system of ventilation is facilitated.

Special conditions as to site and other circumstances give rise to infinite variety in particular cases, but with such I do not propose to deal, so will proceed to a consideration of secondary schools. Government aid for secondary education has only been available since the passing of the Act of 1902; until that time the higher grade school was the only continuation of State-aided general education, and the buildings provided for this higher grade education were modelled upon those for elementary education; it is, therefore, not surprising to find that the earlier secondary schools erected after the passing of the Act of 1902 bear all the marked characteristics of the elementary school in their planning.

The central hall still holds its own, and the Board of Education appears to regard it as the best type of plan, as witness a general note in "Principles to be Observed in Designing and Fitting-up New Buildings for Use as Secondary Schools," which reads as follows:—"The rooms should be grouped compactly and conveniently in order to secure easy and effective supervision and economy in working and maintenance. Generally speaking, in the case of schools where the number of scholars is considerable, this result can most satisfactorily be secured by placing the class-rooms on three sides of and opening from a central hall."

Differences of opinion upon secondary school planning will, I think, be found mainly on this question, and a marked tendency may be perceived to provide a hall which is not a passage-room to and from the various class-rooms, corridors, &c. Such an arrangement affords a room not only for general assembly, but one which may also be used (free from interruption) for various purposes, such as examinations, singing, drawing (if there is no art room), and any assembly of a portion of the school without disturbing the remainder, for any of which purposes a central hall is not so convenient. On the other hand, a central hall is, before all things, adapted for good supervision, but is this of extreme importance in a school with an adequate and thoroughly qualified staff? Expressions of opinion from head masters and mistresses certainly incline me to think not. If, then, a hall is required to be used for all or any of the purposes I have just mentioned, a central hall does not appear to be the best arrangement which could be adopted; if, on the other hand, supervision of teachers and students is of paramount importance, then the claims of the central-hall plan cannot be disputed. The Board of Education, as I have already pointed out, is very definite upon this question, and in addition to the clause I have already quoted goes on to say:—"Where more than one floor is necessary, the upper rooms can be entered from a gallery which should be in full view of the hall."

I know of elementary schools planned upon these lines which have been found noisy and inconvenient; possibly the better discipline of a secondary school would prevent the former; if so, might it not also insure satisfactory behaviour without such elaborate provision for supervision? Fortunately, the Board of Education, while offering guidance, do not insist upon an abject submission to such guidance, and express their willingness to consider other suggestions in the following words:—"The Board recognise that, owing to the wide difference between the various grades and kinds of secondary schools, and pupil teachers' centres, it is undesirable to attempt to lay down any hard and fast rules as to the actual method of planning to be adopted except on points of fundamental importance." I think it will be generally admitted that the best interests of all concerned are likely to be ensured by a course which affords opportunities for the expression of differences of opinion in the planning of school buildings. Many examples of recent secondary schools certainly show evidence that all are not agreed upon the point under discussion.

As in the case of elementary schools, I will now proceed to discuss the points upon which an architect will need to be informed in planning a secondary school.

1. With regard to the number of children to be accommodated, the Board of Education makes no suggestion on this point; personally I know of no recent secondary school which accommodates more than 430 scholars in one department, and from 200 to 300 appears to be a very usual number.

2. In what number of departments is a school to be planned? As infants have no longer to be considered (except that a Kindergarten is sometimes provided in connection with a girls' school), only two remain. Curiously enough, the Board of Education offers no guidance as to whether a school shall be in two departments—a mixed school or entirely independent for boys and girls. As both are being built, there seems no doubt either that differences of opinion exist or that motives of economy have probably borne their share in a decision, as in the case of elementary schools.

An arrangement which appears to be a sensible one on both educational and economical grounds (at any rate so far as the cost of buildings is concerned) is to plan a school for boys and girls with hall and class-rooms separate for each, but with certain rooms for special instruction—such as chemical laboratories, lecture rooms, art rooms, gymnasium, &c., in common. It will be found that a time-table can be arranged which will permit of these rooms being used in turn by boys and girls, and economy is effected by not having to provide them in duplicate. The merits of "mixed" or "not mixed" education in secondary schools I think we may conveniently leave to educationalists to settle.

3. Upon the question of the number to be accommodated in the various class-rooms we find very clear instructions in the Board of Education Rules:—"In every school there must be class-rooms at the rate of four for every 100 scholars. There must be in the class-rooms, as distinct from the laboratories and other rooms, sufficient accommodation for the whole number of the scholars for whom the school is intended to provide. A lecture-room, however, if suitable for class teaching, may be counted as a class-room for not more than thirty or less than fifteen scholars. Class-rooms should be fitted with single desks, having a gangway of not less than 18 inches between the rows and between the desks and wall on each side, 1 foot between the last row of desks and the wall, and a clear space extending the full width of the room of not less than 7 feet 6 inches between the front row of desks and the wall for the teacher. The desks may be reckoned as occupying a space of about 3 feet by 2 feet in

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order to provide the requisite distance between the front of one and the back of that next in front of it.

"To provide for this a floor area of from 17 square feet to 18 square feet per head will be required, according to the size of the class. In cases where it is found difficult to provide this amount the Board will be prepared to accept a minimum allowance of 16 square feet per head, provided that the arrangement can be shown to be satisfactory. In this case the desks should be placed closer together in pairs, with a gangway of not less than 2 feet between the double rows of desks. Where fireplaces are provided they should be placed in the outer corner of the room, in order to avoid interference with the master's platform and blackboard. Stepped seating should not be used."

Intimately bearing upon this and the total accommodation of a school is an introductory note, which reads as follows:—"It is important to remember that as the actual numbers in a class can seldom be made to correspond closely with the various sizes of rooms provided, the nominal accommodation as shown by the plans should exceed the number for which the school is intended to provide." This means, of course, that as a general rule a school which has nominal accommodation in class-rooms for, say, 225, will only be considered as providing accommodation for, say, 200 children.

The charming inconsistency of the promoters of schools' competitions is very noticeable with regard to this point; invariably the question goes to them as to whether the cost of the building is to be based upon the nominal accommodation shown upon the plans or upon the number for which the school is intended to provide. It is scarcely necessary for me to say that the invariable reply is the latter. Now, if the price allowed per head is 40*l*. (which, by the way, it seldom is and more often should be), the difference amounts to 1,000*l*., and it is entirely absurd to ask for the extra accommodation without expecting to allow for it in the cost.

As to the number of floors, the Rules offer no guidance except in so far as they assume that more than one floor may be necessary in a clause I have already quoted in connection with the question of a central hall. It reads as follows:—"Where more than one floor is necessary the upper rooms can be entered from a gallery," &c. I think there is little doubt that a two-storey building is the most convenient. I am not acquainted with one consisting of a ground floor only, but there are many of more than two storeys. If the desirability of more than one floor is admitted, what then is the best apportionment of the various rooms to the separate floors? Personally I consider it important to have all class-rooms on the same floor as the hall, and this preferably the ground floor. Laboratories, lecture rooms, art studio, &c., all rooms which are occupied by each class in turn for a portion of the day, can be placed conveniently on the upper floor.

The general class-room accommodation in a secondary school is so similar to that of an elementary school that I need not spend time in discussing it, but the following comparative area, as required by the Board of Education, may be of interest:—In assembly rooms of secondary schools at least 6 square feet per scholar, and if the school is for less than 150, 8 square feet. In elementary schools not more than 4 square feet per child is allowed and 3½ square feet is considered sufficient.

In class-rooms of secondary schools 17 square feet or 18 square feet per head is required, while a minimum of 16 square feet may be accepted. In elementary schools 9 square feet is required for infants and 10 square feet for other children. I admit I find these differences somewhat puzzling; the schools are both for the same children (in the one case when they have, some of them, grown older); and the question naturally presents itself, Is the one too large or the other too small? In a small elementary school with a department for only 200, I think the latter, as even on the 4 square feet basis the hall will only be 800 feet in area. Now the children in an elementary school have to use this hall for drill in wet weather, and a space of 40 feet by 20 feet does not afford sufficient accommodation for one class.

If a secondary school has a gymnasium, the assembly hall is not used for drilling; nevertheless, it has twice the area of that in the elementary school.

(To be concluded.)

Mr. W. Giles, deputy town clerk of York, has been awarded an honorarium of 150 guineas by the Corporation for his work in restoring and cataloguing the city's ancient books and documents. The work was done in his own time during ten years.

WOODWORK.

(Concluded from last week.)

ALL through the seventeenth century English carpenters generally followed the traditional details and construction in use for the past 200 years, and the change gradually took place in the introduction of Classic detail, grafted on to the old methods of construction. The timber-fronted house of Sir Paul Pindar, which formerly stood in Bishopsgate Street, and is now in the South Kensington Museum, dates from about the middle of the seventeenth century.

The shape of the central bay window had been in use since the early part of the sixteenth century, but the ornament and the carved panels and details generally are 150 years later.

Few buildings of any importance were built of timber after the end of the seventeenth century, and up to this time they were doubtless designed as well as executed by the same craftsmen.

The treatment of the floors and ceilings of the Middle Ages must not be overlooked, as they formed an integral part of the construction of the buildings.

The floors of the rooms were generally formed of large square beams resting on wooden plates, which also formed the cornice of the rooms.

These joists and beams were frequently moulded and carved, and the spaces between filled in with plaster or wood.

In other cases the undersides of the floor joists were covered with boarding divided by ribs into panels with bosses at the intersections, carved with foliage, coats of arms, or other ornament.

Many of these old ceilings and church roofs bear traces of colouring, and, though dimmed by the hand of time, still bear testimony to the splendour of our old buildings when decorated from floor to ceiling with colour.

We can hardly realise to-day what the effect must have been in the coloured pavements, frescoed walls, the stained-glass windows, in the rood lofts and screens, the lower panels filled with paintings of the Apostles and Saints, in the sepulchral monuments, and finally in the roof itself.

As a rule, in the latter the colour was confined to the mouldings and carvings, and in flat roofs the panels were often painted and sprinkled with gold stars on a blue ground.

Doorways, again, were a frequent subject of decoration, and it was generally here, as in the fireplaces, that the craftsman exhibited most of his skill and power of design.

The earlier examples consist of ledges to which the vertical boards were nailed, a method of construction in use to-day. Very frequently the door was decorated externally with tracery planted on, in imitation of the stonework of the windows.

This was especially the case with the doors in the fifteenth century, when the craft of the smith was so inferior to that of the men who made the wonderful thirteenth-century hinges that there was no longer need to leave room for its display. Later the doors were divided up into small panels with moulded stiles and rails.

Turning to the inside of dwellings in mediæval days, we find the three chief methods of decorating the walls of rooms were by panelling, by hanging with tapestry, and by painting, the last being an imitation of curtains or tapestry hangings, or else painted with subjects of romance and legend.

Probably the earliest wood panelling was of deal imported from Norway; it was generally stained or painted green. A room was made like this at Windsor Castle for Henry III., and there is probably little doubt that till the middle of the seventeenth century much wood and stonework was coloured.

In the long gallery at Chastleton Hall, in Oxfordshire, at Hardwick Hall and at Bolsover Castle, in Derbyshire, the sixteenth-century wainscotting on the walls bears traces of colour and gilding, and numerous examples are to be seen in many houses in England.

The development of wood panelling is interesting, and is typical of the evolution of design in this country, and is dealt with exhaustively by Mr. Gotch in his work on Early Renaissance architecture. Before the sixteenth century it followed the Gothic manner, and was constructed on a substantial scale, the framing being formed of wood uprights and cross-pieces, some 4 inches by 3 inches in section.

The uprights were some 18 inches or 2 feet apart, and the cross-braces perhaps 4 or 5 feet, according to the height of the room.

The spaces between were filled with one piece of board let

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into the surrounding framework, which was sometimes splayed or moulded.

The panels in Gothic work were ornamented with cusping or tracery, or with paintings.

Gradually the heaviness of the framework was reduced, and the stiles and rails, though remaining the same width, became only an inch or so in thickness.

The panels again were made narrower, as it was easier to get boards 10 inches or 12 inches wide than double that width.

Moulding and splaying the margins of the wood framing was long retained. At first the moulding and splay on the horizontal rails dies out before it reaches the upright stiles; then it is mitred in the solid; and eventually we find it planted on separately, until in later years we have the large bolection mouldings so characteristic of Wren's work in the eighteenth century.

Thus we have the extension of panelling until it covered the whole walls of rooms and it became universal, and only died out when wallpapering came into fashion.

Just as at first in the so-called Gothic times we find the upper portions of the panels filled with tracery, so we see afterwards how this developed into the carved panels of Henry VIII.'s and Elizabeth's time, with heads surrounded by ornament, Italian in design and feeling.

Then we have the thoroughly English treatment of the linen panels, the decoration being something like a folded napkin laid on the panel.

In the panelling from Haddon Hall we notice the small moulding to the panels mitred all round out of the solid—mason's mitres—but this was difficult in that it required great accuracy in setting out and working to get the mitres to fit exactly, though by the end of the sixteenth century this treatment had entirely superseded the earlier forms of stopped mouldings. Gradually the panels themselves, at first decorated with tracery, linen patterns or carving, became plainer and simpler, and the ornament was confined to the frieze or upper panels.

The monotony of the repetition of rows of panels was broken up by the introduction of pilasters, on which most of the ornament was now lavished. They were either fluted or worked with patterns.

All this panelling formed the actual decoration of the rooms themselves and took the place of tapestry, and each room was a complete design in itself, and the intention was to convey a sense of continuous covering to the walls.

Sometimes the panels were filled with semi-circular arches, carried on pilasters with caps and bases, a treatment frequently met with in the oak chests of the period.

The long gallery at Haddon Hall has these in wide and narrow widths alternately.

Occasionally instead of carving the actual wood itself the projection was got by cutting the ornament out of another piece of wood and planting it on the surface, a method met with in Elizabethan and Jacobean work, as also the multiplicity of mitred mouldings, often covering the whole surface of the panels. Indeed, to specify even briefly the various treatments and designs in panelling at this period—the close of the sixteenth century and beginning of the seventeenth—would be impossible in our limited time.

England up to this period still retained the Romantic spirit of the Middle Ages, and was the home of Gothic architecture, just as Italy was the home of Classic architecture.

The first indication of the Renaissance or Classical feeling in the design of woodwork in this country dates from the commencement of the sixteenth century, in Henry VIII.'s reign; and the first important work in decoration by Italian workmen was at Hampton Court Palace by Wolsey in 1515, and in the tomb of Henry VII. in Westminster Abbey. The influence of these men was productive of much graceful carving and delicate detail, but the style was too severe for the English craftsmen to handle, and it was eventually through the medium of the Low Countries that it became grafted in this country later in the century.

Classical architecture was the mainspring of the design, whether it came from Italy direct or through the coarser channels of Germany and Flanders.

The beautiful panelling now in South Kensington Museum from Exeter clearly shows the evidence of Italian influence, if indeed it is not actually imported work; and whether it was the fact that the Italians are said to have favoured the South Coast, it is certain that we meet with much refined and delicate work in that part of England.

Perhaps the finest example of woodwork in this country, if not in Northern Europe, is the screen in King's College Chapel, Cambridge.

Mr. Gotch says it may safely be dated between 1532-6, as the arms and badges of Henry VIII. and Anne Boleyn are on it. It is thoroughly Italian in design, treatment and detail, and, although we have no record of the makers, it is so obviously foreign in character that there is no doubt on this point. Like the work of the Italians at Hampton Court and elsewhere, it is an isolated example and had but small influence on the English craftsmen at the time, and until the end of the sixteenth century the Gothic tradition still lingered on in this country, and for many years it was only in such small objects as tombs, screens, chantries and the minor details of larger buildings that the new style showed itself.

After the Italian influence died out the Flemings favoured the East Coast, and at first we find a mixture of crude Classic detail and grotesque ornament, applied without knowledge or much skill, yet at the same time possessing remarkably picturesque effects and a certain rough originality.

Some of the finest specimens of this essentially English type of work are to be found in the halls of the colleges and of our large houses.

As you know, the hall had been for many years the central feature of the house, and the entrance was generally into a space divided on one side from the hall by a screen, and communicating with the domestic offices on the other.

The hall was entirely panelled and the screen even more richly decorated, its doorways flanked with columns which carried an entablature, above which was the panelled front of the gallery, surmounted by a series of arches or crowned with the fantastic strap-work peculiar to the time; the spaces between the columns were panelled, and every panel again was filled with carving, coats of arms, or allegorical subjects.

Knole House in Kent, and Wadham College at Oxford, are examples of more or less simple designs, but the hall at Middle Temple and Trinity College, Cambridge, show this treatment in its grandest conception.

The walls above the panelling were hung with tapestry, or with modelled plaster-work, or left plain for the display of arms or even pictures, which by this time were much in fashion.

The roofs, until the general use of plaster ceilings, were still almost Gothic in form and construction, though the detail was Classic in character. The roof of the Great Hall at Hampton Court, built by Henry VIII., shows this very clearly; for whilst it is essentially late Gothic in construction, yet the pendants are composed of Renaissance detail, based on Italian models, and are almost identical with those to the screen at King's College, Cambridge, which was being done at the same time.

The doors, chimney-pieces and monuments, as in earlier times, were objects of very lavish treatment, and much elaboration was bestowed upon them, the chimney-pieces especially, and whether in wood or stone were generally treated in the same manner.

The fireplace opening was flanked on either side with columns or pilasters carrying an entablature of architrave, frieze and cornice; above this was another order of the same kind, and the space between filled with the coats of arms of the owner or carvings of arabesques.

Frequently the upper part was divided by arches and smaller pilasters freely treated with carving and ornament; but, while in keeping with the general panelling of the room, the chimney-piece as a rule was always made the chief feature.

There are elaborate examples at Cobham, Blickling, the Charterhouse, &c.

The one now in South Kensington Museum from Bromley-by-Bow, about 1603, is a remarkably fine specimen, and well worth studying as typical of the period.

The commencement of the seventeenth century, or even earlier, saw the last of the rich open roofs and wooden-beamed ceilings of mediæval days, and plaster ones took their place.

For many years these were based upon the flat-boarded ceilings of the late Gothic joiners, with moulded wood ribs and bosses at the intersections.

The wood ribs were now replaced by plaster, and as this material, being plastic, allowed freer handling, they gradually developed into ribands and strap-work, spirals and scrolls, and all the multifarious forms we find in the ceilings of old houses.

But this, though bound up with the decorative treatment of the panelled rooms, hardly comes within our scope to-night.

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Gradually, as the seventeenth century progressed, the German influence died out, and the wild exuberance of the Elizabethan craftsmen and designers merged into a more refined and dignified style, of better proportion and less lavish display of ornament.

With Inigo Jones came a broader and more scholarly knowledge of Italian architecture and detail, and though based almost entirely on Classical influences, yet the woodwork of this period retained a character essentially English and soon lost any traces of foreign influence.

The workmanship was of the best, the construction admirable and the design well suited to its purposes.

It is, in a brief paper, only possible to touch upon the influences that gradually changed the styles of woodwork in England, but broadly speaking they followed the contemporary architecture of the time and indeed formed part of it.

Towards the close of the seventeenth century Sir Christopher Wren had been for some years rebuilding London after the Great Fire, and he had gradually gathered around him a school of craftsmen and carvers, whose influence upon the work of the country was far reaching. It was indeed an age of constructive joinery and beautiful carving, and whether in oak or in deal one single style and tradition permeated the whole country.

Fortunately we are particularly rich in examples of this peculiarly English work, and in our City churches, country and town houses we can examine its construction and admire the knowledge and skill in its design.

The panelling and woodwork of Inigo Jones and Wren was designed from a different standpoint to that of the preceding centuries, and its arrangement formed part of the architectural scheme of the whole building, not of the individual room only.

In Wren's beautiful work at Hampton Court and in many of our City churches we can see how admirably this was done and how greatly this class of woodwork had gained in breadth of treatment and quality of design.

As instancing the enormous change in the spirit and design of woodwork that had come over the country in the space of some 300 years, we may compare the choir stalls of one of the Mediæval buildings with those of St. Paul's Cathedral. Both are superb examples of English craftsmanship, yet one is essentially Gothic, breathing the very spirit of religious fervour and mysticism; the other equally beautiful, but inspired by Classical motives and conceived from an entirely different standpoint.

Again, consider the carving of the thirteenth century, full of quaint suggestiveness and realism and interpreting the human feeling of the moment; on the other hand, the carving of Grinling Gibbons and the eighteenth-century school, equally full of vigour and feeling, but conventional in design and treatment.

This type of work continued until the beginning of the nineteenth century, after which, in design and detail, it lost its breadth of treatment and became thin and wiry looking, although the workmanship was still admirable. With the Victorian era the last lingering tradition in design died out and a period of chaos set in. Architecture was perhaps at its lowest ebb, and woodwork followed in its wake.

And this brings us back to one thing worth remembering, that throughout all the years when architecture flourished and was a living art, woodwork was the same and beautiful work was the result; but as soon as there ceased to be any real tradition in architecture, so at the same moment good design and workmanship in woodwork, as in all the other crafts, died out.

The two are inseparable; they always have been and always will be.

Up to the seventeenth century there is no doubt that the bulk of the work was designed, as well as carried out, by the same men. If a roof was required or a door had to be made there was a traditional way of doing it, a way which doubtless varied in different localities and with the skill of the craftsmen employed; but whether the work was in wood, stone or metal, it all formed part of the structure, and was conceived and executed in harmony with the spirit and feeling which dominated the entire building.

And that is one reason for my urging that you should study the noble heritage of beautiful work left us in the old buildings scattered throughout the country, not with any idea of imitation, but to help you to realise this great principle in old craftsmanship.

Do not think because I have dealt with great and noble works that in them only are to be found the best examples of the carpenter's art, for just as frequently you will find admirable instances in the old houses and wayside cottages, but wherever you find them you will see that their interest and charm depends upon the balance and relation of each part to the whole building.

In the previous lectures you have seen illustrations of much good work that is being done to-day, and I am therefore not dealing with that side of the matter, but as I firmly believe we have steadily growing up in this country a real living common-sense style of building and architecture, so also will a marked improvement in woodwork and carpentry grow up with it.

ANOMALIES IN BY-LAWS AND REGULATIONS WHICH AFFECT SANITATION.*

ON the invitation of the Croydon Association of Surveyors it was my privilege to read a paper on this subject at one of their recent monthly meetings. In the discussion which followed I was pleased to note the tone of general approval of the points the paper was designed to illustrate. Since the meeting the context of the paper has been freely circulated in the columns of technical journals which are read by those whose duties and business bring them in touch with the subject in various forms and degrees of interest. The same journals subsequently published letters from correspondents which tend to show that there is a general agreement with the necessity to remove some of the anomalies that are on all sides admitted to exist, and bring into line the principles and practice in the actual work with the fundamental principles which are taught in the technical schools.

In this relation it has been long a source of discouragement to those whose efforts have tended in the direction of increasing the practical value of higher and technical education to appreciate how far the existing conditions were responsible in preventing the full attainment of the objects of this educational movement.

There is, however, reason to hope that the general agreement on this subject will go far in effecting the desired result by enlisting the serious consideration of the points involved by the department of the Government which exercises control in these matters, but at a gathering composed largely of officials who administer laws and regulations formulated and approved by that department, it is unnecessary to point out that the desired reforms can much better and more rapidly be achieved in an upward direction than by commencing at the top as embodied by the department itself.

It is not intended to suggest that nothing has yet been done to bring the matter to the notice of the highest authorities of the Local Government Board. By the privilege of my position as a chief examiner in the department of technical education which includes the subjects which relate to all that affects plumbing and sanitation, under the authority which issues the syllabus, approves teachers, conducts examinations and grants certificates, I was enabled to bring this matter forward on the plea that the variation in local by-laws and regulations, and the errors in fundamental principles many of these contained, tended to weaken, if not oppose, the teaching of the technical classes.

The experience gained in association with municipal work as a sometime member of a young but very progressive Town Council and member of the several committees which administer these by-laws, combined with a long and varied experience as a plumber and the invaluable sources of information the position as President of the Institute of Plumbers placed within reach, all tended to add a little weight in securing in a most courteous manner the interest and consideration it was desirable to enlist.

As the points of the previous paper to which allusion has been made will doubtless have been read by most of those present in one or other of the journals, it will be unnecessary to do more than touch upon the main points it contained, and thus permit of an extension of the subject which goes beyond the sphere of domestic drainage, but is no less concerned with sanitation and by-laws.

The following extract from one of the contributions to the technical Press in support of my object will serve in a concise form as an introduction to the subject.

Anomalies of By-Laws.

The above paper not only deals with the anomalies that appear to be inseparable from local by-laws, but also compre-

* A paper by Mr. William Challoner, president of the Institution of Plumbers, read before the Midland Association of Local Government Officials on February 8.

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hensively covers the important omissions and ambiguous commissions as evidenced by the sanitary and building by-laws of most local authorities. No one who has had any practical experience of their total inadequacy for present requirements will have the slightest doubt that there is urgent need for revision, modernising, and unification of these by-laws.

It is scarcely necessary to give specific instances of the anomalous conditions as created by the administration of obsolete and effete by-laws. Cases are of daily occurrence where one section of the local administration condemns work that has previously been passed as satisfactory by another section of the same administrative authority.

It is to be hoped that the paper will be brought to the notice of the Local Government Board's leading officials, and that their progressive tendencies will cause them to put in motion the machinery necessary for the removal of the present legal obstructions to the progress of sanitation.

It would be of great material advantage to the public if the advice of practical men was obtained during the construction and compilation of by-laws that have such an important bearing upon public health.

It is claimed that there are few exceptions where any local conditions necessitate a variation in either the method or practice of executing the work, or in the material, form or type of accessories used in connection therewith to secure the objects of efficient sanitation in so far as such work lies within the curtilage of the owner's property, as distinct from the responsibility which falls to the local governing authority. This being the case, all that makes for a variation of standard must of necessity bring in its train varying degrees of efficiency in an object that can only be secured permanently by the highest point in this respect.

It has been contended in opposition to this principle that some such necessity may exist in the case of the hotel, country house or mansion, but that in the smaller house, cottage and artisan's dwelling, although perhaps desirable, the cost would be prohibitive.

It requires little to show that this contention provides the strongest argumentative proof of the necessity for a high standard of efficiency especially in regard to the smaller type of house.

The hotel has usually advantages in attention and the more or less temporary occupation of its inhabitants, as also the greater personal cleanliness of the class to which they belong. The country house or mansion, besides some of these advantages, has the additional ones of free circulation of air round and about, as also the benefits conferred by that greatest of sanitarians—fresh air and sunlight.

The cottage or small house, especially of the type common to our industrial towns, closely grouped as they are in long rows or streets, with the intersection in front of a none too wide street, and two rows of often ill-kept back yards and a back street behind, necessitate by the conditions of their environment all that science guided by common sense can dictate to secure the most permanent sanitary conditions, which must so far as possible be designed and constructed to require the minimum amount of attention on the part of their occupiers.

Whilst it is not admitted that the cost of securing these better conditions will be materially affected by the adoption of a better standard than at present obtains generally, there would be compensating advantages in a decreased cost in maintenance to the owner, and to the public rates would accrue any advantage consequent of the saving by this means in the care and treatment of infectious diseases, which are attributed to sanitary defects, and the cost and annoyance of reinspection which must follow any such outbreak. Beyond this is the consideration for the health of the most important section of the community who, by conditions inseparable from their position and surroundings, are susceptible to the origin and spread of preventible disease.

The existing lack of standard and absence of connected principles, consequent upon anomalies and variation in interpretation of which most existing by-laws admit, create difficulties of confusion to the employer and his workmen, and neutralise the confidence with which the inspector or official should inspire them, as also it detracts from the cordial co-operation between both upon which depends the success of their different duties.

This is emphasised when confronted with the technical training of the employer, workman and inspector, which have been on the same lines and possibly the same technical class, but which converge when put into actual practice.

The inspector is of necessity guided by the conditions and methods dictated in the by-laws and regulations peculiar to the district, and which, wholly or in part, do not synchronise with the teaching which secured his qualification; and the workman, by knowledge gained of experience, is fully aware that if the principles he has been taught are carried into actual practice they will not be approved by the authority which exercises power to condemn or approve his work.

The by-laws which regulate the capacity, construction and testing of domestic drains provide an excellent illustration of this point. In many districts the selection from the model by-laws prescribe that any water-closet or closets shall discharge into a drain 6-inch diameter, in others the size is 4 inches, but in many cases when the 6-inch drain is prescribed it is not insisted upon by the local inspector, who may very properly decide that a drain of smaller internal capacity will answer the purpose better. No variation of local conditions can possibly warrant so wide a selection of size in drains for this always similar purpose.

The principles taught in the technical classes tend to the minimum capacity of a conduit to convey putrefactive matter, to prevent fouling and the subsequent process of putrefaction in the conduit, and also to ensure that the air in the drain shall be displaced as frequently as possible. To illustrate this students are taught and examination tests made on the discharging capacity of pipes with different falls, running full and half-full, and when the student compares the volume of water which a pipe of 4-inch diameter, running half-full with a fall of 1 in 60, with the quantity of liquid which is limited by the capacity of the flushing tank of a water-closet, he cannot reconcile the necessity for even a 4-inch pipe to do its work effectually.

Where a 6-inch pipe is insisted upon for one or even a number of closets he cannot understand how fouling of the pipe is to be prevented or the necessary displacement of air is to be effected.

As pointed out, this in a less degree is liable to occur when a 4-inch pipe is used, and it will thus be found that even a smaller pipe may with advantage be substituted, so long as provision is made for removing obstructions which may occur through misuse before these pass out of easy reach at the point of their entrance into the domestic drainage system.

Although for fixed reasons it may be considered impracticable to use a pipe of less diameter than 3 inches for a soil pipe or soil drain, and 3 inches does not appear to be so much less a diameter than 4 inches, the internal area is not of the same proportion as the diameter, and with a 3-inch or even 3½-inch pipe the very desirable factor of pressure will come into force. It is needless to dwell upon the many advantages obtained when drains are worked under pressure in preventing sedimentation and fouling.

The material from which drain pipes are made, the method of laying and jointing, are also matters on which there is great variation in the by-laws or their interpretation in even adjacent districts.

In some districts glazed fireclay may be used; others require stoneware, and (unfortunately) only a few iron; some require sockets and spigots unglazed; others with these parts of special capacity with serrations to permit of caulking; similarly some insist upon joints made of cement with or without spun yarn; others bituminous compound; and others again are satisfied with puddle clay.

In regard to the last-mentioned but now almost obsolete method of jointing, it is somewhat surprising that there are to be found engineers and architects who claim for this method of filling the joints of even soil drains that it provides a flexible joint where the drain is liable to movement.

Unfortunately this opinion is consistent with many of those errors which operate against all that makes for permanency and efficiency in this and other parts of sanitary work, in so far that having selected a weak form of conduit it is necessary to provide a weak joint to prevent its breaking.

(To be concluded.)

The Report of the Board of Management of the Manchester Royal Infirmary states that there is provision at the new hospital for 592 beds, with all the conveniences and resources suitable for a twentieth-century hospital. The complete figures as to cost are not yet available, but the Board have no reason to anticipate that the estimate will be materially increased. During 1908 135,501*l.* was paid to the contractors, professional advisers, and others for the structure and fittings, and 7,951*l.* to contractors for furniture and so forth. The total expenditure on the new hospital, exclusive of interest, now amounts to 446,998*l.*

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THE OLD RECORDS OF YORK.

MR. WILLIAM GILES, deputy town clerk, who has been engaged for several years in the work of examining, classifying, repairing and restoring the ancient books and other records of the city, has now completed this work and has presented an interesting report to the finance committee, in which he says:—

The work of renovating and restoring the old books and other records of the Corporation, many of which were so much damaged by the great flood of October 1892, has been completed. They have also been classified and catalogued, in order that the Corporation might have a permanent record of the city's ancient and valuable documents, no such catalogue having ever before been compiled.

The records were at one time kept in the building known as St. William's Chapel on Ouse Bridge (now the site of Messrs. Boyes & Co.'s remnant warehouse), which was used for municipal purposes as well as a prison, &c., but about a century and a half ago removed thence to the Guildhall and there kept, some in a closet under the steps leading to the old Council chamber and others in an adjacent strong room built for the purpose and now absorbed in the more recently built muniment room.

Here they remained until they were removed to the strong room provided for them in the basement of the present municipal offices.

They had been there but a very short time when the flood occurred which inundated the basement of the building and saturated the greater portion of the records, doing considerable damage to many of them.

Irrespective of this damage, however, a large number of the documents, both books and MSS., had been for a long period in a very dilapidated condition, caused chiefly by damp of long standing, appearances undoubtedly pointing to the time when they were kept on Ouse Bridge. So much were some of them affected by this cause that they were gradually mouldering away, and the saturation by the flood referred to only made their condition still worse, and it was but a question of time when they would have fallen to pieces and been lost altogether.

When it was ascertained how seriously the documents had been affected by the flood, a request was made to the Chief Commissioner of the Public Record Office, London, to permit some gentleman connected with that Department to come down and advise as to the best method of treatment to be adopted for their restoration. This request was at once courteously acceded to, and Mr. A. T. Watson, of the Record Office, came down and gave his valuable advice and assistance.

It was deemed necessary to at once send a few of the more valuable books, as well as several other documents, to be repaired at the Record Office (permission having been obtained for that purpose), leaving the remainder to be dealt with here.

As the work of renovating the documents was of a special nature and it was deemed desirable that it should be done at the Guildhall, I offered to undertake the work in my own time, with the assistance of a competent bookbinder. The committee agreeing, I made arrangements accordingly.

The work has been long and laborious, owing to the large number of books and documents requiring to be dealt with and the dilapidated condition in which many (in fact most) of the records were in, as already mentioned.

A considerable number of the books were without backs or with portions of backs only, whilst many of the leaves were badly mutilated and dirty; some others were made up of so many sheets of paper folded together and then stitched through to a skin of parchment or thick paper for a back, exposing the leaves for some distance from the edges to dirt and mutilation. Some others had first been written on sheets of paper, then folded and sewn together, so that part of the writing was actually in the folds and could not be read. In these latter cases every sheet (many hundreds) had to be cleaned and repaired, and then carefully cut down the centre and rejoined so as to show the writing clear of the folding when the books were rebound. In fact, most of the House or Council books, as well as numerous others, have necessitated every leaf to be specially treated to preserve them.

In the case of the Chamberlains' books of accounts, some of them were so affected by the damp already alluded to and by the flood that the greatest possible difficulty was experienced in repairing them. The Chamberlains' rolls, written on parchment, were also difficult to deal with, and so of many of the other documents.

The treatment of restoration necessarily required the documents to undergo several processes, each involving considerable care and time.

No trouble or pains have, however, been spared to restore the documents as efficiently as possible and which their value as records demanded, and with proper care in their future keeping they will now last for centuries.

It is matter of great satisfaction to find that, notwithstanding the damage done in the past, both by damp and water, by far the greater portion of the books and other records, and those the most interesting and valuable, are now in a good state of preservation, the writing in many instances being almost as clear and distinct as when first written. This much cannot be said of the more modern documents, many of which, however, are of no great value as records.

Most of the books have had to be entirely rebound, owing to the absence or the dilapidated condition of the old covers, but where possible the old bindings have been re-used. The Chambberlains' books of accounts were originally kept in yearly volumes, but with a view to economy and simplification of arrangement several yearly accounts of the earlier series have been bound as one volume, all as uniform in size as possible. The later volumes of the accounts have been rebound in their original form and covers, their condition permitting of this being done. The Chamberlains' accounts on long rolls of parchment have also been arranged in sections of years and placed in suitable cases, labelled and numbered for easy reference.

1. *Charlters and Letters Patent.*—There is a unique and valuable collection of Charters (some fifty in number) granted to the city by various monarchs, the earliest extant being one granted by Henry II.—between 1155 and 1162. This is, however, certainly not the first Charter granted to the city, inasmuch as mention is made in it of one granted by Henry I., and doubtless others were granted still earlier. This Charter of Henry II. granted to the citizens "all their liberties, laws and customs, and by name the Gild of the Merchants and Hanses in England and Normandy, and their Lastages, throughout all the Coasts of the Sea, quit as they ever most freely and best had them in the time of King Henry our grandfather; and We will and firmly command that they have and hold the aforesaid liberties and customs with all the liberties belonging to their aforesaid Gild and to their Hanses, as well and as peaceably and as freely and quietly as ever they best most freely and most quietly had and held them in the time of the aforesaid King Henry our grandfather." Many subsequent Charters practically confirmed these rights, privileges and immunities, though couched in different terms, and, in later times especially, in much lengthier documents than the earlier ones. Others relate to the manner of electing mayors, sheriffs and other officers and the common council; the transaction of business of the Corporation and other matters; also to the fee farm payable by the city, the freedom of the citizens from arrest or prosecution by outside persons, to the markets and fairs of the city, the river Ouse, the reparation of the bridges over the Ouse and Foss, and to many other subjects. There are also "Pardons" to the citizens, with restitution of liberties, &c., which they had forfeited for some act of displeasure to some particular monarch; and there are others which relate to Guilds (or Gilds) formerly existing in the city—for instance, Corpus Christi, St. Christopher and St. George. More modern legislation has, of course, rendered nugatory most of these charters.

2. Three volumes contain entries of various events and other matters connected with the city from an early period and are amongst the most valuable and interesting of the records. Drake and other historians have quoted from them. The volumes also contain a good many of the ordinances of the gilds of the city.

3. *Corporation House or Minute Books.*—These contain the minutes and proceedings of the Corporation, and commence with the year 1476 and continue down to the present time. They are valuable and interesting in their narration of the doings of the Corporation and of events connected with the city, and help largely to make up the city's history. It is satisfactory to know that these House Books have been preserved without a break for so long a period, when other documents have long ago been lost. I have arranged these books in two series, viz.:—First series, from 1476 to 1834-5 (forming fifty volumes), representing the period of the Old Corporation; second series, from 1835 to the present time, representing the new (or reformed) Corporation under the Municipal Corporations Act of 1835.

4. *Freemen's Rolls or Registers.*—These volumes contain

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the names of the persons admitted to the freedom of the city. They commence with the year 1272 and continue to the present time, there being eight volumes. Doubtless there would be "freemen" long before the year mentioned (1272) and rolls or registers kept of them, but if so the records have been lost or destroyed long ago. It may be mentioned that in the earliest volume of freemen there is a list of mayors and bailiffs (now sheriffs) of the city from 1272 to 1670, as also various other entries of matters relating to the city.

In connection with the Freemen's Rolls there are several register books of apprentice indentures, one commencing in the time of Edward IV. (1461) and continuing, with certain omissions, to about 1502; another from 1573 to 1688; and then a series from 1721 to the present time.

5. *Chamberlains' and Bridgemasters' Rolls and Books of Accounts.*—There are altogether about 450 rolls and ninety-six books. They represent the accounts of the Corporation in earlier times, and were kept on rolls of parchment and in books, each year having its separate roll and book. The rolls commence in 1398 and continue down to 1835, but not in a complete series, inasmuch as many rolls have been lost at some time or other. The books commence in 1446 and continue to 1816, but here again a number of them have been lost. The rolls themselves were signed by the Chamberlains and were audited in proper form, whereas the books were neither signed nor audited. Yet in many instances more details of the items of receipt and expenditure are given in the books than in the rolls. Numerous original bills and memoranda relating to and explanatory of the accounts were kept loosely with the books or in bundles, a considerable number of which I have, after infinite trouble, collected, collated and inserted in their proper places in the various volumes. These rolls and books of accounts are interesting in their way.

6. A number of volumes of manuscripts and other papers and memoranda relating to the city, the Corporation and its business and other matters.

There is also the original letter from Sir Martin Bowes, Kt. (dated 1549), presenting the sword to the city which is usually carried before the Lord Mayor except on State occasions, when the older and larger sword is used.

Besides the foregoing there are many title deeds relating to properties, as well as other books and documents, all more or less of value and interest.

Altogether the house books, chamberlains' books, freemen, quarter sessions and other books number upwards of 400 volumes, and the various other documents also number many hundreds.

The catalogue which I have prepared of the records will afford easy reference to them, the classification and letters or numbers therein corresponding with similar letters or numbers on the various documents and books themselves.

As regards the charters, which vary considerably in size, I would suggest that they be placed in drawers to avoid rolling up.

The muniment room, built a few years ago outside the Guildhall, is not in a suitable condition for the keeping of these records, owing chiefly to dampness, and it would not be prudent to put them there until the room is made perfectly dry, it being absolutely essential to keep these restored documents free from damp. Until this is done they should remain where they are now placed, viz. in the closet adjoining upon and opening into the muniment room.

GENERAL.

The London Topographical Society will hold their annual meeting on the 19th inst. in the Lecture Theatre, Burlington Gardens, when Lord Rosebery, K.G., president, will deliver the annual address.

A Triptych with paintings upon oak panels in the sanctuary of the parish church, Oldham, was dedicated last week. The paintings represent Our Lord seated upon a throne of gold in the midst of seven golden candlesticks and having seven stars in His right hand. On either side are kneeling figures of the B. V. Mary and St. John Baptist. The four archangels, with a host of angels playing musical instruments, surround the throne. Below are groups of figures representative of the Church's history. The paintings, which contain upwards of seventy figures, are by Mr. E. Stanley Watkins, of Ealing.

A Bust has been presented to Bournemouth of Mr. C. Crabbe Creeke, the first surveyor to the town, who many years ago laid out the open spaces, &c.

Mr. Edward Augustus Gruning, F.R.I.B.A., F.S.I., of 3 Holland Park, and of 25 Gresham House, Old Broad Street, architect, who died in December last, aged seventy-one, left estate of the value of 188,377*l.* By his will he left to his assistant, Herbert Pelly, the lease of his offices and the contents thereof, the benefit of all contracts and book debts subject to the payment of business liabilities, so that he may be able to carry on for his own benefit the testator's business without using his name, except for public announcement that he has succeeded to the business. To his clerk, Edward Dodd, an annuity of 52*l.* To each other clerk of two years' service three months' wages.

The Court of Common Council have granted the request of Archdeacon Sinclair for authority to take steps to enable the Dean and Chapter of St. Paul's to carry out the terms of the bequest of Mr. H. C. Richards, K.C., who left 5,000*l.* for the restoration of St. Paul's Preaching Cross, or the erection of a memorial of it.

At the Meeting of the Waterford Corporation last week the Mayor reported that Messrs. Baker & Hurtzig, engineers, were willing to submit plans and estimate—not detailed contract plans—for a bridge over the Suir suitable to the requirements of Waterford, to be laid before the Privy Council on appeal for a fee of 250 guineas. Giving evidence in support of these plans and estimate would be based on a personal fee of 15 guineas a day to Mr. Hurtzig. The evidence would be restricted to the plans, and the firm would not undertake a criticism of the plans submitted by the Viceregal Commission. The Council decided to accept the offer of a ferro-concrete firm to submit a plan and estimate free of cost, as well as to obtain the plans and estimate from Messrs. Baker & Hurtzig.

Messrs. W. H. & P. B. Strudwick, the quantity surveyors in connection with the enlargement and improvement of the Barrow Hill Road school (Marylebone) have asked the London County Council that they may be allowed a fee of 2½ per cent. in respect of the bill "exterior painting and repairs," amounting to 501*l.* A request has also been received from Mr. C. W. Brooks, the quantity surveyor in connection with the enlargement of the "Oliver Goldsmith" school (Camberwell), that he may be allowed a fee of 2½ per cent. in respect of the bill "works to existing buildings," amounting to 292*l.* 11*s.* 2*d.* The ordinary fee in each case is 2 per cent., but, in view of the nature of the work, the education committee are of opinion that the claims should be allowed.

Sir Henry Tanner, of the Office of Works, has written a letter to the Westminster City Council stating that the new buildings at the east end of the Mall would be completed by about the end of 1909, and that it would then be possible to open the road through to Charing Cross.

Mr. Thomas Brock, R.A., has practically finished the plaster model for the statue of Sir Henry Irving, and all that now remains therefore is the casting of the figure in bronze, which is of necessity a matter of time. There is every reason to hope that the statue will be erected on the site arranged for it at the back of the National Portrait Gallery in Charing Cross Road during the autumn of the present year.

Messrs. Swinburne, Cooper & Baillie have joined with Messrs. O'Gorman & Cozens-Hardy. The new firm is entitled Swinburne, O'Gorman & Baillie, and will continue to practise as consulting engineers in electrical, automobile and general work at 82 Victoria Street, S.W.

Mr. W. R. Cooper, A.M.I.C.E., has severed his connection with Messrs. Swinburne, Cooper & Baillie, and will continue to practise as consulting engineer in electrical and mechanical engineering and experimental work at 82 Victoria Street, S.W.

The Triennial Competition open to Great Britain for the Alexander Thomson Memorial Studentship, value 60*l.*, under the management of the Council of the Glasgow Institute of Architects as trustees, has this year resulted in favour of Mr. David Robertson, a second prize of 20*l.* being awarded to Mr. Alexander Thomson Scott, both of Glasgow. Five sets were submitted. The winner is in the office of Messrs. Stewart & Paterson, Blythswood Square, Glasgow, and the second prizeman is with Messrs. Campbell Douglas & A. N. Paterson, St. Vincent Street, and both are students of the Glasgow School of Architecture.

Mr. E. Russell Taylor, architect and surveyor, of Castle Street, Liverpool, at a meeting of the executive committee of the Conservatives and Unionists of the county borough of Lancaster, was adopted as the Parliamentary candidate for the borough at the next election.

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The Architect.

THE WEEK.

THE remarkable prices obtained at the BENSON collection of coins cannot fail to direct the attention of the general public to the beauties of Greek art, and the more so as this valuable collection seems to have been formed with an appreciation of the artistic excellence rather than the rarity of the specimens included. It takes but little to direct the current of taste amongst the Philistines, and the fact that an eminent London publisher has thought it well to bring out a translation of a French work on Greek vase painting, mainly a monograph of one particular artist, seems further to indicate that amongst those whose business it is to feel most skilfully the pulse of the general public there is a belief that Greek art stands an excellent chance of becoming fashionable. If this be so, and it seems more than likely, architecture, reflecting as it always does the feeling of the age, may be expected to embody, let us hope, rather the spirit than the forms of Greek work. The days are gone of archæologically correct plagiarism of the details of the Parthenon, the Erechtheion, and the Choragic Monument of LYSICRATES, that was the aim of the nineteenth century revivalists of Greek architecture, and Professor BERESFORD PITE has already shown us how Greek feeling can be expressed in a modern building without slavish copyism. The works of Greek THOMSON, though their author is now departed, still teach us the same lesson.

THE Liverpool Corporation (Streets and Buildings) Act, 1908, confers on the Corporation of the city of Liverpool further powers for the better regulation of buildings, the formation of streets, and the laying-out and development of estates within the city. The Act requires all new streets or the widening of existing streets to be in accordance with plans previously approved by the Corporation. It gives the Corporation power to determine what new street shall be a main thoroughfare, thereby entailing a width of eighty feet, or by paying compensation to require any new street to be of any width they see fit. In any new street the person who forms the street is to suggest the building line, which is then subject to the approval of the Corporation. In any existing street the Corporation may set back the line of frontage and require all buildings projecting beyond that line to be pulled down, compensation being paid to the owners. They may similarly widen the street by requiring the owners to give up the land between such line of frontage and the street, paying compensation only in those cases where the increased width of the street is more than the width the Corporation are entitled to prescribe under their by-laws for a new street. The Act also provides that no new street shall be laid out exceeding one hundred and fifty yards in length without at least one intersecting street in every one hundred and fifty yards, and that not more than thirty houses shall be erected on either side of any new street between any two consecutive intersecting streets. In the laying-out of new streets the Corporation may require the boundaries of any adjacent estates to be rearranged by mutual exchange, or by payment of money by one owner to another with the consent of the vendor, or by purchase by the Corporation. Provision is also made for the formation of public gardens or recreation grounds, and the ornamental laying-out of parts of streets.

THE terrible theatre disaster at Acapulco, Mexico, emphasises, first of all, the strictness of supervision necessary for cinematograph entertainments, the popularity of which we see in London is undoubtedly already great. Many such entertainments are now being given in places that are under no sort of control, particularly in the suburbs where the authority of the London County Council does not reach, and parish halls, church rooms, and schoolrooms of considerable seating capacity but with primitive and insufficient exits are occasionally devoted to a cinematograph show, invariably attracting a crowded audience. We have in our mind particularly a lecture hall in a London suburb in which, at the very time that the theatre at Acapulco was blazing, an audience of some five hundred people were enjoying an amateur cinematograph entertainment. The hall in question has a wooden roof with matchboarded ceiling, matchboarded dado, and wooden floor. The only doors into the hall are the public entrance, through a short corridor, with a doorway 4 feet 6 inches wide, and a 3 feet doorway to the lecturer's ante room, and these conditions may be found in scores if not hundreds of other instances. All architects who have to plan such buildings should regard the theatre regulations of the London County Council as their standard, morally if not legally. The Acapulco catastrophe further gives point to the opposition of the members of the Progressive party to the relaxation of their regulations brought forward by the present Theatres and Music Halls Committee of the London County Council.

BY the death of Dr. RUSSELL STURGIS, New York has lost not only a well-known and able practising architect, but one of the most accomplished of modern writers on architecture. As an architect his work is to be seen in several of the Yale University buildings and in many large office premises and residences in New York and the Eastern States. As an author his works have been largely intended to inform the layman as well as the professional student, and include "A History of Architecture"; "A Dictionary of Architecture and Building"; "European Architecture"; "How to Judge Architecture"; "The Appreciation of Sculpture"; "The Appreciation of Pictures"; "Bibliography of Fine Art"; "Decorative Windows in England and America"; "Ruskin on Architecture" (an introduction to the Ruskin volume in the World's Great Books); "Michel Angelo" (in JOHNSON'S Universal Cyclopædia); "A Study of the Artist's Way of Working."

THE British School of Archæology in Athens is engaged on a very interesting excavation of the site of the Temple of Artemis Orthia at Sparta. This was the temple at which the well-known curious ritual of the flogging of the boys was practised, and seems to have maintained a remarkable continuity of existence. The earliest building, of the ninth century B.C., was of brick with timber framing, and its interior was divided lengthwise by a row of wooden columns. This was destroyed at the end of the seventh century, and was replaced at the beginning of the sixth century by a new building superimposed on the remains of the older, and itself rebuilt in the Hellenistic period. A fragment of an archaic Doric capital of the sixth century temple was found, and a votive stele with a representation in relief of the Temple of Artemis, showing this to have been "distyle in antis." These discoveries go far to decide what has hitherto been mainly a matter of conjecture—the wood or stone origin of the Doric order. There can now be little doubt that the early Doric temple had walls of rough material, brick or rubble, with pteromata ended by wooden antæ, and between these "in antis" two sturdy Doric columns, built like our own Norman piers, of very massive proportions in small stones, the whole crowned by a wooden roof, whose construction was afterwards traditionally copied in the Doric entablature of stone or marble. Thus we have also an explanation of the universal divergence in Greek work of the form of the anta cap and the capital of a column, the former being like the entablature a traditional survival of a former wooden feature, whilst the latter was always of stone. Besides the architectural data obtained from these excavations, the smaller objects found, ivory carvings, cast-lead figurines and pottery prove that artistically Sparta was at its zenith in the eighth and seventh centuries, and decayed in the sixth and fifth with the development of military strength and enthusiasm. Especially is the evidence clear that what has hitherto been regarded as Cyrenaic ware must now be recognised as Laconian. The decline of the art of Sparta at the time when that of Athens was approaching its highest excellence may perhaps account for the employment of the Athenian ICTINUS in the building of the Apollo Temple at Bassae.

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THE ETHICS OF COMPETITIONS.—II.

HAVING considered the ethics of competitions in the abstract, we can now turn our attention to the question of the manner in which they are conducted as a matter of fact.

Admitting that in the abstract open competitions are desirable and right, do we find that they are at present conducted with the minimum of wasted labour and money to the unsuccessful competitors? There is no doubt that the answer must be decidedly in the negative. In almost every open competition, particularly in these slack times, when the number of competitors is so largely increased by the prevalent dearth of remunerative employment, the cost to the architectural profession as a whole of the competition drawings exceeds the profit that the successful architect can hope to obtain from carrying out the work; in many cases the cost of the drawings submitted exceeds the gross amount of the fee received by the architect who erects the building, and sometimes, as in the case of a competition for a new church in Exeter some few years ago, the competitors, at a modest computation, actually spent on the preparation of their drawings a sum greater than the entire cost of the building. From a business point of view the toleration of such a drain on the resources of the architectural profession is simply madness, and it is no wonder that there are many architects who, for this reason, would advocate the entire abolition of the competition system.

Our experience in this country is not singular, for our American *confrères* labour under the same incubus. Mr. Cass Gilbert, the President of the American Institute of Architects, in his opening address to the recent annual Convention of that Institute, estimated that the architects of the United States annually expend over one million dollars in competitions from which they receive no return.

Such a state of things can in no way be considered right. It is certainly wrong that the public should receive the advantages of the open competition system at such an enormous cost of unpaid labour to the architectural profession as a whole. We believe that the British public is no less fair-minded than the American, and that the words of Mr. Gilbert would apply equally in this country as in the States when he said:—"If fault there be, it lies in ourselves. The correction is in our power. The public is eager to understand and ready to accept the professional man's point of view if it—that view—is sane and consistent. The public does not know, and cannot understand this great waste. It is well that we should understand it and take serious thought."

How is this great waste to be avoided? One effectual method is to adopt the principle of limited competitions, with the essential proviso that each competitor shall be paid an honorarium that will at least cover his out-of-pocket expenses and give him some reward also for the exercise of his skill and ability. This method naturally is usually approved by those who are already distinguished and well known, those, in fact, who may reasonably expect to be invited to take part in a limited competition. But a limited competition, after all, is but an extension of the principle of direct commission, and precludes the abstract advantages of the open competition. A private individual is fully justified in giving a direct commission either for reasons of friendship or from his admiration or partiality for the work of some particular architect. He might be unable to decide between the claims and merits of a number of architects, and would then be perfectly right in inviting them to a limited competition, paying them for their services. With certain limitations such bodies as the committee of a church or chapel, the board of directors of a limited company, are in a similar position and equally justified in giving a direct commission to some particular architect. Being to a certain extent in a fiduciary position, they could not rightly select an architect merely because he happened to be the son of the chairman, but they might quite correctly do so if they believed that the interests of their subscribers or their shareholders would be safe in his hands. Hence, also, they might arrange to decide their differences of opinion as to the selection of the right man for their work by the help of a limited competition. The private individual or a quasi-private body of individuals is then correctly within his rights, both morally and legally, in adopting the principle of limited competition.

Public bodies administering public money are, however, on quite a different footing. It is their duty to expend public funds to the best advantage of the public, and this includes not only the erection of the most useful and most economical building in any particular case, but the advancement of the art of architecture. For them, as the Royal Institute of British Architects has affirmed, open competitions are the only right course.

Within the last few years a new method of limiting competitions has been adopted by some public bodies, limitation by geographical measurement. Competitions for public buildings have been restricted to architects residing or practising within a given county or within a certain radius or other geographical area. As we cannot suppose that the object of this method is merely to diminish the number of competitors the arguments in favour of it appear to be two:—First, that those architects who, as ratepayers, contribute to the cost of the building, should alone have the opportunity of employment; second, that the cost of travelling expenses to be paid by the public would thus be minimised. The first argument ignores the fact that in our system of national finance local public bodies are State-aided by the credit of the country, even when actual money grants are not made from the national exchequer, so that when the county of Cornwall raises a loan for public works, the architect who lives in Newcastle and pays his income tax is assisting in procuring favourable terms for that loan. The second argument has more validity, but the end desired might be as readily achieved by limiting the allowance for travelling expenses to a moderate amount.

The geographically limited competition has already increased the employment of "ghosts," either in the form of paid extraneous assistance or in that of *sub rosa* partnership, and this is the natural corollary of the system. Then again this adaptation of the boycott is likely to lead to reprisals, and if the London architect is barred from earning money in Lancashire he will be tempted in his turn to bar Lancashire manufacturers and tradesmen from work in his clients' buildings. On all counts therefore we may consider the geographically limited competition wrong in principle and injurious in effect to the promoters as well as to the art of architecture.

We have now to consider whether the great waste in the practical working of open competitions can be obviated or minimised. Something has already been accomplished in this direction by dividing competitions into two stages, the first open to all, the second limited to the authors of the most promising designs in the first, and carrying with it an honorarium for each of the contestants in the final essay. Our German colleagues have attempted the elimination of the great waste by other procedure. They have reduced the scale of plans, elevations, and sections to the smallest possible, effacing all detail from the two latter classes of drawings and leaving them merely to express mass and composition. Perspectives, too, are similarly restricted to the broad representation of general effect. The German architects have also succeeded in inducing their public to offer premiums far more numerous and far more valuable than is the case with us, so that besides the actual winner a due proportion of the competitors receive payment that not only defrays their out-of-pocket expenses but would be very fair remuneration if the designs they have prepared were produced in response to a direct commission.

It seems to us that the great waste in open competition might be almost if not entirely eliminated by a combination of these methods of procedure. Let every open competition be conducted in two stages, the scale and number in the first being determined by the assessor and reduced by him to the absolute minimum he may deem necessary to enable him to judge which of the schemes submitted gives promise of a suitable design. Admitted that this would increase the number of competitors and of drawings that are utter rubbish, the work of unfledged and untrained ambitious office boys, there

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would still remain a considerable number that although perhaps not good enough to be allowed inclusion in the second stage, still merit some consideration and payment. Let a considerable percentage on the cost of the building be at the disposal of the assessor to defray the out-of-pocket expenses of the most worthy of the unsuccessful competitors. All the participants in the second stage should receive an honorarium sufficient to cover the cost of their drawings in both first and second stages, and the premiums should be sufficient to reward those nearest in merit to the winner with an adequate return for their skill and ability.

Our suggestion may be met with the objection that its adoption would be possible only in Utopia, but we are completely in accord with the views propounded by Mr. CASS GILBERT, and believe that the British public is quite prepared to deal fairly with the profession of architecture if it is only properly awakened to the ethics of competitions. We commend this view to the consideration of the Competitions Committee of the Royal Institute of British Architects.

STEELWORK.—V.

By C. V. CHILDS, A.M.I.C.E.

Stanchions.

THE usual type used in England is the plain joist for light loads, or for heavy loads compounds, i.e., one or more joists with plates rivetted to the flanges. In America the stanchions, or, as they are called in that country, the columns, are usually built up of plates and angles or Z-bars; each firm has more or less standardised its own type, e.g., the standard column of the Carnegie Steel Company is the Z-bar type, built up of four Z-bars rivetted with two rows of rivets to a central web plate, flange plates being rivetted on, for heavier columns.

The reason joist sections were not more utilised was partly because the American I-beam (Anglicé, joist) is lighter in section than English ones of the same depth; the main reason however was, that when steel stanchions were first coming into general use and displacing cast-iron columns, there was a combination among the chief rolling-mill owners, known as the "Beam pool," to keep up the price of I-beams and channels; for years the price of plain beams was quoted at 3.1 cents. per lb. (equivalent to about 14*l.* 10*s.* per ton), but when hard times came, the strain was too great and mistakes (so they were called) became so frequent in the estimates, that the "pool" came to a timely end. The effect however was that sections, other than I-beams or channels, were used in preference to these shapes, the price of which was not governed by the "Beam pool," such as angles, plates and Z-bars; but before the pool was dissolved each firm had settled on and standardised its own form of column.

Of all these the Z-bar column was probably the most convenient for use in buildings. It is practically unknown in this country owing to the English mills rolling but few sizes, and these being too large in section.

Apart from stanchions a word might be said in favour of Z-bars for another use, viz., roof purlins, as they are the best of all sections for this purpose, being stiff in all directions and easily trussed where purlins of long spans are desired.

Even of more importance than that the section of a stanchion should be economical as regards carrying capacity (i.e., having a large radius of gyration), is that it should be of such a form that splice plates, connections and brackets can be easily and effectively rivetted to the shaft.

As in the case of a bridge, the weakest part is most probably to be found in some joint, rather than in the main members, so also in a stanchion. The ideal point of applying the loads is directly to the axis of the shaft; the farther the bearings of the girders are away from the central axis, so much the worse for the stanchion; eccentricity of loading makes it become the most uneconomical member an engineer is called upon to design, viz., a beam and strut combined.

Taken all in all, the joist or compound is as convenient a form of stanchion as any other. It is easy to make; the joists and plates are largely stocked, which means quickness of delivery; they can be simply spliced, so as to form a continuous stanchion from basement to roof; brackets to carry the girders can be rivetted on in any position, or at any level; they are easily built and bonded into the walls, or cased in to form isolated stanchions; their size can be kept within reasonable dimensions; their strength as a beam is serviceable in withstanding eccentric loading; brackets, rivetted to the webs, bring the girder loads very close to the axis of the stanchion, and in the case of those rivetted to the flanges, the transverse resistance is greater in this direction.

Other forms there are in general use in London, of which two may be mentioned, the Differdange beam, and the solid steel column. The Differdange beam is the enlarged joist section with very wide flanges, rolled by a universal mill process to as large a size as 30 inches deep by 12 inches wide; their chief advantage lies in the fact that a large amount of area is obtainable in one section, without the trouble of the drilling and rivetting necessary to obtain the same amount in a compound. A more than counterbalancing disadvantage is that they are only obtainable from abroad and that the steel contractor is dependent on one firm alone for its supply; whereas with the standard sections, he has the choice of many mills from which to secure what he needs. He can thus place his orders for the plain sections to suit the rolling programmes of the various rolling mills, a consideration where quick delivery is desired. The section itself is hardly compact enough for stanchions; if tested to destruction, it would probably fail in a similar manner to some full-sized Z-bar columns tested at the Watertown Arsenal, which were found to give way by twisting spirally, owing to the extremity of the flanges receiving insufficient support from the body of the section. It may be mentioned that the tests referred to above were made on full-sized steel columns to test the accuracy of the straight line formula, on which the strength of the Carnegie standard columns was calculated. The test showed that this formula was somewhat on the weak side, and gave too high an allowable stress especially for columns, whose ratio of length to radius of gyration was large.

The solid round steel column is more of a favourite with architects than with engineers; it is by no means an economical section, weight for weight with a compound section; its carrying capacity is somewhere in the neighbourhood of thirty per cent. inferior; the bases and caps are exceedingly heavy; connections of girders to the columns, unless the bearings are all at the level of the caps, are difficult and costly to make, and splicing is almost out of the question.

Their advantages lie altogether in their occupying the minimum of space; hence they are frequently used for isolated columns in shop windows to support the girders carrying the main front walls. Columns and stanchions in such a position—in fact, all isolated ones that support the main walls of a building—are the most important feature of the building; its entire safety depends on these stanchions. For this reason, as a safeguard against damage in case of a fire, the building laws might well be altered to insure their protection by compelling such stanchions to be encased with an absolutely fireproof material; preferably with interlocking casings, made of fire-brick, having an air-space between the casing and the column. No doubt casing stanchions in with solid concrete is a great protection; but nothing short of the best should be used in such cases; girders may buckle and still cling to the stanchions, but if these latter should fail, then it is a case of "when the tree breaks," in the nursery rhyme. The greatest danger to which firemen are exposed is that due to falling walls; for this reason all that is humanly possible should be done to protect the wall supports from destruction in case of fire.

Of the number of formulæ for designing the sizes of stanchions there appears to be no end; some are fairly simple, others are extremely complicated; some, when plotted with co-ordinates of stress per square inch against length divided by radius of gyration, give a straight line, others curves, reflex and otherwise.

The fact is an exact formula is an impossibility; the best is more or less guess work; two stanchions, similar in all respects, may give very different results when put to the test; any slight deviation in the centre of pressure shows considerably in the result of a test. The use of a stanchion formula is more to indicate the limits within which it is safe to work than to be slavishly adhered to. There are other considerations, besides a fractional amount of area, to be taken into account, such as how to build up the sections so that the upper stanchions can be easily spliced to the one beneath, or that the girders can be connected to them in a simple manner. The unsupported lengths of stanchions do not vary much, as they are generally tied in at the floor levels by the girders and the floor itself. Ten to 15 feet is about the average length in building work.

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A very simple method, it can hardly be called a formula, is to allow as the safe load on a stanchion as many tons as the stanchion weighs in pounds per foot run; this is equivalent to 3⅓ tons per square inch on a joist section, or 3½ on compound sections (allowing five per cent. for rivets). For ordinary lengths, as stated above, this would be a fairly close average for the stress in all stanchions, just about right for the heavy joists and single joist compounds, rather too high for the smaller joists, and somewhat too low for large compounds. At any rate, it forms a basis for quickly calculating the entire weight of stanchions in a building, e.g., add the total load in tons together for each floor, multiply these by the heights of the respective floors, adding these totals together and allowing a percentage (from fifteen to twenty per cent. would be a fair average in ordinary cases) for bases and connections; the result is a very close approximation of the weight in pounds of all the stanchions.

If there is a large proportion of heavy loads, the average stress would probably be nearer four tons per square inch, in which case no percentage for bases and connections need be added; the difference between the 3⅓ and the 4 tons stresses automatically adds the percentage required.

There is one thing that has been wanted in the matter of formulæ, and that is a reduction in their number down to one recognised formula that will satisfy the requirements of the local authorities; then the designer will be in no doubt as to how to design stanchions for special buildings, the steelwork for which has to be approved by their engineers.

The system of running the stanchions in one length through two floors is not only good construction, but economical as well. The load on a single stanchion from one floor is usually not sufficient to require a pair of flange plates, e.g. supposing one floor load is 18 tons, equivalent to 1½ cwt. over a space 15 feet by 16 feet, this would require about 5 square inches of section; too small an amount to be conveniently added by stock sections; but two floors can be easily dealt with by two 10 inch by ½ inch plates or their equivalent, making 10 square inches for the two floors combined. The additional metal in the upper floor stanchion is more than compensated for by the labour and weight of the splicing, that would otherwise be necessary. The writer originally introduced this principle into American design, and it was first used either for the Mutual Reserve building, or the Savoy Hotel of New York; a further improvement has since been made by making alternate stanchions break joint at alternate floors, and this has now for many years been the approved American practice.

On the principle of probabilities, i.e., that the greater the number of floors the less likely they are to be fully loaded simultaneously, it is the custom in America to deduct a percentage off the live loads, sometimes as much as forty per cent. in the lower storeys, before designing the sections of the stanchions. It is questionable whether this is good practice; the saving is not as vast an amount as it may appear to be, the dead load of a building, especially an office one, being considerably more than the amount allowed for the live load. Moreover, stanchions are the most important members in the whole of the construction, and, once built in, are buried out of sight for future inspection, so that a little extra metal may not be considered wasteful in such a case; certainly these deductions affect internal stanchions more than exterior ones; but then, again, the latter receive a certain amount of lateral support by being bonded into the walls.

(To be continued.)

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

A MEETING of the Institute of Architects was held on Monday evening last, at Conduit Street, W., Mr. Edwin T. Hall, vice-president, in the chair.

Mr. Alexander Graham, hon. secretary, announced the decease of Mr. Edward Augustus Ould, of Liverpool, Fellow, elected 1900.

Mr. H. V. Lanchester read a paper illustrated by sketches and lantern views, entitled—

Town and Country—Some Aspects of Town Planning.

He said it was his conviction that as a nation we regarded the relationship between town and country as the most important factor in town-planning. The average Englishman valued the country far above the town, and tolerated the latter only on account of its uses and convenience of intercommunication. The importance of ordered dignity and grace in the towns had never been appreciated by us as it was on the Continent, where the city took first place in the minds of all classes. It was characteristic, therefore, that such efforts as had been made towards the amelioration of town life had been rather in the direction of importing little scraps of the country into the town than in any studied method of expressing the city as such.

Valuing the country as they did, towns could only be considered in their relation to the surroundings, and in consequence more attention would be devoted to that relationship than to the actual embellishment of the city itself. The axiom might not be endorsed by the architect; it required some effort to accept it, but the author felt that it was by advancing town-planning on those lines that developments would result, and if architects as a profession admitted it they would not be prevented from making headway in other matters they had at heart. The superiority of the Continental peoples in the "grand manner" of city design was evident, and it seemed hopeless to attempt to emulate them by enlisting the general public. In the relationship however between town and country the sympathies of the nation were all assured, and Mr. Lanchester suggested that if as architects they could show that they were as the profession ought to be, reliable advisers, their views would be received with greater respect and confidence when proceeding with other projects. The deplorable character of the average suburb was so clearly comprehended by all who had devoted the slightest thought to the question that any remedy or amelioration offering itself would be eagerly studied. The central area of larger towns afforded a certain degree of satisfaction by reason of the dignity of buildings that had in the course of centuries accumulated there, but beyond those towns the country was broken up to give place to monotonous ranges of inanely designed and badly built houses, the slums of the future.

For the improvement of English towns there must be first the provision of worthy routes connecting the centre with the open country. Mr. Lanchester said he had examined a number of thoroughfares that had either failed or succeeded in satisfying him æsthetically, with the result that he believed it was possible to lay down a rough-and-ready rule. Either the height of the buildings should not exceed two-thirds of the width between them, unless it was at least one and a half times that width. Any proportion between those was unsatisfactory, though less so in the case of irregular streets, and with buildings having broken sky-lines. The narrow proportion was unsuited to residential districts and therefore the former one should be the limit, but in closely built commercial areas there would doubtless be many streets of the narrower type, though in the English climate it would be well to avoid them on an alignment east and west. If such a narrow street existed every effort should be made to open it up to the sun on the south side by recessing frontages and reducing the heights of buildings at certain points.

Mr. Lanchester then gave an imaginative sketch of an ideal realisation of town-planning ten years hence in any of our larger provincial cities. The buildings devoted to government, to recreation, to education were all properly grouped. The streets were wide, though without studied decorative effect. Open spaces and squares however were set out with monuments and groups of sculpture placed against suitable backgrounds, and where possible forming part of the composition of a building or group of buildings. All this arrangement would be controlled by an advisory committee of architects. New thoroughfares were opened up and radiating tubes in reinforced concrete, some 40 feet deep underground extended to docks and warehouses. Continuing towards the outer suburb they would pass a zone mainly occupied by residential hotels and the better class of tenement blocks. These had mostly been built under by-laws regulating the cubic amount of building that might be put on a given area, thus securing good gardens and open spaces between the six and seven storey blocks. Though the gardens were not all public property, it had been found convenient to place them in charge of the municipality. The inevitable tendency towards segregation had resulted in a certain amount of class grouping in that zone, but there were fortunately no hard and fast lines, and the districts mainly inhabited by the working classes differed but little in general appearance. The buildings were simpler in design, and a larger proportion of the open spaces was laid out as playground, but in other respects there was no perceptible difference. Beyond these was a great water avenue providing a convenient location for water sports. At the city end a circle a hundred and fifty feet in diameter was surrounded by a raised terrace formed by boat-houses, &c., with a terminal and two flanking monuments. From this there was an uninterrupted stretch of over three-quarters of a mile with two bridges, and then a wider basin surrounded by a

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terraced embankment. The other main avenues out of the town would be more varied in character and linked up at intervals by cross roads and arcades with the main one. Duplicate streets with single-way traffic was the remedy against congestion on overworked routes. Following the water avenue they would reach on the south side of the road the university and group of buildings connected with it. The residential facilities of the educational group had been greatly extended, enabling undergraduates to have every opportunity for the cultivation of ideal studies without continual interruption by too close a contact with the business and commercial aspects of life. Immediately beyond the university group was the new museum and a park devoted to zoological and botanical collections. The park formed one of a series of inner parks all within two miles of the heart of the city. In laying out the inner parks their entrances and forecourts demanded careful study in order that they should accord with the treatment of the park, and with the character of the approaches. In some cases the forecourts would be designed in conjunction with a group of public buildings, and with one or more commemorative monuments, giving an opportunity for imaginative treatment unattainable where the buildings were of a commercial or domestic character. Passing from these to the larger and more remote parklands, they came to selected strips of country retaining as far as possible its rural character. There were also suburban villages gradually being reclaimed from the influence of the speculative builder. In other directions there would be a number of garden suburbs helping to raise ideals in the grouping and surroundings of small houses. Beyond the village suburb there would be some broken common on the far side of which the river had been dammed to make a spreading lake.

In his imaginary description Mr. Lanchester said he had endeavoured to be thoroughly practical, suggesting nothing that would not be easily within the powers of any of the great municipalities if once they realised the great desirability of such an achievement. Even if the possibility of some of the suggestions might appear to be open to doubt the claim that they ought to throw all their energy into an advance on the lines indicated would admit of none. England with its antiquities and traditions carefully preserved, its cities clean, convenient, and filled with noble and interesting works of art, with all the beauties of its countryside linked up with those of the town, would by reason of the variety of its scenery and shortness of its distances be in its way a complete garden. Its trees and hedgerows, and the brilliancy of its greenswards and meadows would, if only the works of man could be brought to a corresponding standard, make it a very jewel set in its surrounding seas, and a fit gathering place for all the great peoples springing from its soil.

Mr. SPEAIGHT said he was afraid that, although the paper was brilliant in its conception, the facts were rather in the clouds. He presumed that architects were desirous of bringing about public improvements on national lines, and suggested that endeavours towards that end often failed by making the schemes too fanciful and impracticable. In order to reach a successful issue such schemes should always be accompanied with a financial statement showing that the proposals were possible and financially sound, otherwise, no matter how well arranged and planned, they would not be carried out. They must remember that schemes for town improvement had to be submitted to shrewd business people before being adopted, and unless the plans were rational from the financial standpoint, and convincing in their practicability, they would never be realised.

Mr. W. H. LEVER, M.P., said he felt his sympathies were largely with the last speaker's views, but with one qualification. We were not in this country familiar with the best examples of town-planning in other parts of the world, and when practical schemes were attempted there was the opposition of town councillors and the engineer or surveyor attached to those bodies to be overcome. He was positive that if they could show to English people the much happier condition of those who lived in other countries we should be dissatisfied with our present lot and remedy it. They were influenced by the fact that from one end of England to the other, with the exception of Edinburgh, we had not a single example of how an important town should be properly planned. London had had great possibilities which were never realised. If they could keep great ideals before the people and gradually develop them he believed that within another fifty years, without serious expenditure of money, the character of the towns would be happily transformed. If they were willing to make their plans in advance, and had powers to control building operations, schemes for improvement could be undertaken without financial difficulty. Mr. Lever said the ignorance shown by town councillors and engineers in this respect was astonishing, and he quoted in support of his contention the case of a main street between Birkenhead and Chester, the opportunity for improving which by an 80-feet roadway was not taken because of the cost of maintenance. The speaker contrasted the planning of the cities of Sydney and Melbourne, and said the former exemplified the English influence, whereas Melbourne was laid out on the American plan with good wide streets. In Adelaide there was a combination of the two styles, and the city offered an example of a model arrangement.

Mr. A. TAYLOR, L.C.C., said he hoped they would all live ten years longer and see the ideas put forward in Mr. Lanchester's paper carried out. He had attended the meeting hoping to get some suggestions of what would be useful to the London County Council. All the members of that body were very much interested in the question and desirous of improving London. They had not been able to do very much because they were awaiting the publication of the town-planning scheme of Mr. John Burns. They hoped, however, to improve and extend London and its suburbs, and he was strongly in favour of the idea for promoting competitions amongst architects for that purpose. The borough councils would be asked to co-operate in the planning schemes, and for an area of twenty miles round London it was suggested the lines of development should be ruled by one general plan. Those of the members who had visited Vienna last year for the Congress would have realised how very much behind we were in town-planning and the effective arrangement of buildings and monuments.

Mr. RAYMOND UNWIN remarked that it was important to consider the suitability of the formal and the informal arrangement in town-planning, and he cited the Germans as having the most experience in schemes of that kind, and who were now departing fundamentally and entirely from the arrangement known as the "grand manner." Perhaps the Germans were going to the other extreme, for certainly in some recent undertakings they seemed to be losing the sense of scale. There was, however, a great deal, he thought, to be learnt from the German point of view, and he would have been glad therefore if the paper had dealt with the relations between formal and informal work. It was certainly a great problem to decide the relative importance of both methods.

Professor C. REILLY proposed a vote of thanks to Mr. Lanchester for his paper, and to Mr. Rickards for the sketches which illustrated it. Mr. DELISSA JOSEPH seconded the motion, and suggested that the appointment of a Minister of Fine Arts would aid towards the development of town-planning. Mr. G. T. BROWN supported the vote of thanks.

BLACKPOOL LIBRARY COMPETITION.

THE report of Mr. G. H. Willoughby, architect, of Manchester, the assessor to the Blackpool Town Council in the competition for a Carnegie Central Library, has been adopted by that body. It is as follows:—

Gentlemen,—Acting on your instructions, I have made a most careful examination of the whole of the drawings submitted for the above important public building, and herewith have pleasure in laying before you my adjudication on same. Before doing so, I feel called upon to emphasise the remarkable response the architectural profession has shown to your invitation, many able and carefully thought out schemes having been sent in; consequently the difficulty of arriving at an equitable assessment has been greatly increased.

Every design has received my most careful study and investigation, and as a result of my anxious deliberations, extending over many days, I have no hesitation in awarding the set of drawings numbered 41 the honourable position of first place. The author of this design has shown conspicuous ability in successfully dealing with the problem, both from the points of arrangement, construction and design. The scheme is an excellent one, and admirably adapted to the several purposes of your intended structure as set forth in your "Particulars, instructions and conditions of competition."

For a practical working library of the character you contemplate erecting, and providing complete oversight and control to every department, with economy of administration by a limited staff, the general arrangements of the premier

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design would be exceedingly difficult to improve upon. The author has thoroughly mastered the essential points to be striven for in successfully planning a town library, and the strength and refinement also shown in the internal, as well as external treatment, clearly indicate he is master of his craft. The architectural conception of the elevations is scholarly, dignified, simple and appropriate for execution in brick and stone. Monumental in character, a symmetrical façade is obtained to each street, flanking the main entrance doorway, which is wisely placed (as suggested by you) at the corner of same.

The doorway is made the principal feature of the design, being marked by a low dome, surmounting a handsome colonnade of polished red Aberdeen granite. Ample provision for efficient light and ventilation has been carefully made; also the utilising of all roofing to its utmost capacity should be noted. Taken as a whole, the premier scheme (No. 41) is an economical one. The prices per foot upon which its author has moneyed out the cubical contents ought to be adequate to erect the building (as designed) in a satisfactory manner, and in accordance with your particulars and instructions, due care being exercised in the detailing generally.

Respecting my decision as to the awarding of the second and third premiums, I experience a grave difficulty in advising you. Although many good designs, carefully conceived and conscientiously developed, have been sent in, yet in every scheme certain blemishes and points of weakness are to be found when compared with No. 41.

There are, however, five designs which I have finally chosen, after a most exhaustive scrutiny—viz. Nos. 47, 38, 62, 10, and 104, each of which contains certain merit of its own, either in arrangement or design, or both, coupled with a sincere and earnest effort to faithfully solve the problem. To each of these I have felt called upon to award the commendable position of "equal second." Whilst doing so, there are several most able designs (including Nos. 133 and 117) I have been compelled to disregard consequent on their excessive cubical contents. With your definite instructions as to cost clearly before me—viz. Paragraph No. 3, "The total estimated cost of the building must not under any circumstances exceed the sum of 12,500*l*., and all designs submitted must be prepared on this basis"—I had no alternative but to reluctantly pass over same.

The profession's remarkable response to your invitation (140 designs), which at the lowest estimate I compute have incurred an expenditure of 3,500*l*. to produce, emboldens me, as your assessor, to respectfully suggest that under such exceptional circumstances your Council favourably consider disbursing the whole of the premium money, viz. 100 guineas, equally among the authors of the five designs next in order of merit to the premier one, whose author, I trust, will be appointed architect for the work. It would be a generous act on behalf of your Council, and some return to the competing architects for the enormous amount of labour and money fruitlessly expended by them. My adjudication, therefore, is:—

First—No. 41, to be appointed architect for the work on the terms agreed.

Equal second—Nos. 47, 38, 62, 10, and 104, each to have a premium of 20 guineas.

Nos. 60, 128, 103, 83, 18, 110, 21, 36, and 120, I consider are all worthy of "honourable mention."

I can only affirm that should your Council accept my awards and adopt scheme No. 41 for examination, in my judgment they will secure the best design submitted, and one that most fully and adequately embodies their requirements, taken as a whole.

Remembering the importance of this competition to the profession generally, and that doubtless schemes have been prepared by architects practising in all parts of the kingdom, I would earnestly ask the Council to arrange for the whole of the designs to be publicly exhibited for at least one full week. This would give every competitor the opportunity of personally inspecting same, as well as perusing also a copy of my report, upon which the adjudication has been made. In conclusion, I desire to express my sincere thanks to his Worship the Mayor, the town clerk, and the borough engineer for the admirable arrangements made to assist me in fulfilling my difficult task; also for the absolute privacy and entire immunity from any interference or distraction I enjoyed throughout my somewhat lengthy examination.—Your obedient servant,

GEO. H. WILLOUGHBY.

Parr's Bank Chambers, Manchester, February 1.

First Premium.

41, Messrs. Alex. Cullen, Lochhead & Brown, Brandon Chambers, Hamilton, near Glasgow.

Equal Seconds.

47, S. B. Russell & T. E. Cooper, 11 Gray's Inn Square, W.C.; 38, David Thomson & Christopher Bristow, 7 Cranwich Road, Stamford Hill, London; 62, Cooper & Slater, 13 Richmond Terrace, Blackburn; 10, Charles H. Potter, 20 Cross Street, Manchester; 104, H. R. Gardner, Reigate Road, Leatherhead.

Honourable Mention.

60, C. Harrold Norton, 14 Bedford Row, London; 128, Briggs, Wolstenholme & Thornely, Richmond Terrace, Blackburn; 103, Edward Cratney, High Street East, Wallsend-on-Tyne; 83, Hatchard-Smith & Son, Finsbury Pavement, London; 18, Walter Hanstock & Son, Branch Road, Batley; 110, Herbert Wade, 27 Birley Street, Blackpool; 21, J. Myrtle Smith, 128 Cheyne Walk, Chelsea; 36, F. E. & A. Milne, 136 Wellington Street, Glasgow; 120, Hy. Lord, Deansgate, Manchester.

"Most able Designs."

133, J. H. Mangan, 3 Guildhall Street, Preston; 117, J. B. Thornley, Birley Street, Blackpool.

ROYAL ACADEMY LECTURES—ARCHITECTURE.

THE fourth and last of the series of lectures delivered by Professor Reginald Blomfield, A.R.A., on "Early French Renaissance Architecture," dealt with "Domestic Architecture to the death of Francis I." The Court of Francis I. was rarely in the same place for six consecutive months. The monarch himself built hunting boxes on a grand scale almost promiscuously. La Muette was of brick and stone in six storeys, with a terraced roof for the purpose of allowing the King to watch his hounds at work in the forest. The new manner which was in favour in these and other buildings showed little individuality and no strong impulse in architecture. The workmen were not at home when they tried to follow the instructions of fashionable amateurs. Indeed the master-masons and tradesmen resisted it as far as they dared, and they were in some cases supported by conservative members of the aristocracy. These latter were unwilling to sweep away the buildings with which their family history was connected, and insisted on special portions being preserved in the scheme of remodelling, as at La Rochefoucauld and Chateaubriand. In the reign of Francis the determining factor seems to have been whether or not the noble lord had been in Italy and whether his builder had or had not come in contact with any wandering Italian artist.

Ancy le Franc was considered unique in the history of French Renaissance on account both of its completeness and of its association with Serlio and Primaticcio. But the building has been restored and altered to such an extent that it is now difficult to do justice to its original design; it is a great lump of building seriously handicapped by its site. The age of Francis I. was perhaps the greatest house-building age of France; moreover it was not confined to the great nobles. Next to the monarch, the chief builders were an informal syndicate of wealthy persons who controlled the finances of the kingdom, the first being Semblancay. The ideal of these men did not as a rule rise beyond lavish ornament. The result is that few of these buildings (in spite of their richness of detail) have individuality; not one stands out as the embodiment of a great architectural conception. It is but one more instance of the deep-rooted fallacy that architecture consists in the heaping-up of detail. The French ornamentalist had no idea that sculpture has a definite function in relation to architecture. Nobody as yet was engrained in a tradition of neo-Classic.

There are signs, however, of a real advance towards the end of the reign, for it produced the Hôtel d'Ecoville at Caen. This building is not faultless, but it showed its designer was really an architect, a man who was capable of leaving a wall alone and of relying for effect on rhythm and proportion and refinement of detail rather than on inordinate profusion. But the advance in technical knowledge was not wholly to the good. The tendency of neo-Classic was to ignore materials and to concentrate on abstract design. On the other hand, the same instinct for pure form led French architects of the seventeenth century to skilfully develop the admirable mountainous roof which was purely French in origin and a legacy of mediæval tradition.

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A careful examination of the buildings erected in France in the first fifty years of the sixteenth century reveals that the positive contribution of that age to architecture was small. The only advance was in house-planning—the fortified house was definitely abandoned. A real advance was made when the designers arrived at the plan which grouped rooms and corridors round a central staircase—the central block at Chambord being an example. But scientific, or rather imaginative, planning did not exist. In this respect French Renaissance fell far behind contemporary architecture in Italy. Judged by those standards which are set by acknowledged masterpieces of the world, the art of Francis I. when tried is found wanting. Yet it had done its work. Out of this welter of experiment there emerged a purer and more masculine art—that splendid version of French neo-Classic which was to reach its full maturity at the end of the seventeenth century.

THE ART OF MR. WALCOT.

By MAX JUDGE.

MR. W. WALCOT'S second exhibition at the Fine Art Society's Rooms in New Bond Street fulfils certain expectations created by the first, held a year ago at the same Gallery, when his architectural studies showed that he possessed the keenest sympathy with the buildings he chose to depict. Then London was his chief theme, and of the many Londons, the London of Portland stone the dominant factor in the scenery of the Metropolis. Primarily London's stone—what Pentelicon was to Athens—Mr. Walcot managed to convey the multitudinous effects wrought upon it by the atmosphere of the city with a reality that brought out the true expression of the most famous buildings of Inigo Jones and Wren and their followers.

The present exhibition is devoted to London and Rome, and perhaps because Italy is not England there is noticeable a distinctly broader touch in his art, his sympathy with architecture, treated though it be almost as landscape, being none the less in evidence notwithstanding. London, too, has by no means exhausted its possibilities for Mr. Walcot, we are gratified to see, and there was nothing in his first collection to beat the river-front of Somerset House, the study in brown of Inigo Jones's vase in Lincoln's Inn Fields, or the drawing of the St. James's Club in Piccadilly—an excellent picture of one of the most picturesque Portland stone fronts in the West End.

Another side of London for which Mr. Walcot shows a decided predilection is also equally evident in this exhibition, and that is a sense of the pictorial in street traffic, and the purely unarchitectural features of a street, such as the shop-signs, lettering and hoardings. There is a drawing of the Strand with the new Gaiety block and the first building to be erected on the London County Council desert beyond, together with the hoardings that have come to be looked upon as permanent landmarks of this thoroughfare. This study will have a greater value when all that vacant spot is forgotten and the Strand once more a humdrum roadway, as in the days of Holywell Street and the "Opera Comique," if perhaps a little better built. And already Mr. Walcot's picture serves to show how effectually the Colonial Government building, rising triumphant on the line of sight, shuts out the legitimate view down the Strand and ruins a large piece of the skyline of the beautiful island church.

Farringdon Market (with St. Bartholomew's Hospital) is another masterly study bringing out the values of the Portland stone; and what we are inclined to regard as the gem of the present exhibition, at least so far as London is concerned, is the little picture of *A Stonemason's Yard, Chelsea*, in which the subject, composition and expression seem symbolical of the spirit that pervades each individual building that has appealed to Mr. Walcot's instincts of what is good.

A word or two of Rome must suffice. There is a large drawing of the *Arch of Severus*, as good as Ruskin's best studies in this field, and two smaller drawings, *The Temple of Minerva* and *The Gardens of the Villa Medicis*, suggest in miniature some of those holiday sketches of Sargent's in which pure sunlight seems to have been caught and fixed with a certainty telling at once of instantaneity and truthfulness of impression.

The Piazza Trevi shows an animated corner of Roman life out of doors, and in this, and in the drawing of Cardinal Rampolla's house more especially, we can seem to detect the characteristic effects of the atmosphere of the Eternal City on those softer building materials no less than our own vivid glimpses of blackened and bleached walls against a rare blue sky on one of London's happy days.

We may point to the drawing of *The Piazza di Spagna* for the excellence of Mr. Walcot's perspective—a little view of the swooping steps with the flower-sellers below. It is full of delicate colour and interesting—the house where Keats died is on the left as you descend the steps. Our last mention must be of *The Steps of St. Peter's, Sunday Morning*, the crowd in front of the portico being more than typical of Mr. Walcot's extraordinary success in dealing with crowds, people enlivened and invigorated with all the qualities of a crowd.

The exhibition is so uncommon in nature that one is bound to remark the peculiar technique by which the artist has gained his effects, and Mr. Walcot would, one is led to think, be very successful in oils; in fact, he seems to miss altogether the characteristics of pure water-colour work as represented by the best work of the English School, and to achieve something distinctly new; something, too—and that is more to the point—fresh and awakening a love of architecture in those who have, to their regret, outgrown an earlier enthusiasm, or forgotten the once all-powerful influence of "Modern Painters" and the "Seven Lamps of Architecture."

THE INFLUENCE OF MATERIALS ON DESIGN IN WOODWORK.

MR. F. W. TROUP, F.R.I.B.A., delivered an interesting lecture at Carpenters' Hall on February 10 on the above subject. After lucidly describing timber houses—those in our own country in what is called "half timber" construction, those in Norway, Switzerland, and other northern countries in pine and, of course, usually "whole timber," i.e. built of solid logs—the lecturer went on to say that when in doubt the designer cannot do better than refer to the old examples in our museums and unrestored buildings, and if you are wise you will take the craftsman into your confidence and you may be able to learn something of him, and at the least you will know what he is equal to, and perhaps find it advisable to modify the design to suit his capabilities, or, better still, leave something for him to modify as the work proceeds. Young architects are told to get to the bench and work with their hands. Now it may seem to them impossible and impracticable to give up the time to acquire even a smattering of half the crafts that go to house-building, but if the young architect does but learn the rudiments of one craft or trade he will find that it gives him an unexpected insight, a kind of instructive knowledge of the others, that will surprise him and reward him for his labour. In designing, above all things avoid being clever merely for the sake of effect. Cleverness is not an art—more often it is mere licence and a want of restraint. Be certain of this, that your best work is not that part in it which you most admire yourself, and you will be safe ruthlessly to cut out that part from the design. Choose to be what critics call commonplace, rather than attempt the clever, the smart, the up-to-date. As a last resource, if in doubt, do what you believe to be right, constructively right and true to the nature of your material, and the result will look right, or at any rate it will be the best that you are capable of.

In conclusion, the lecturer said the design is so completely governed by the material that it is really little more than the resultant of two main forces, the inert material with all its possibilities on the one hand, and on the other the aggressive tools of the craftsman with his infinite capabilities for good or evil—these two forces, the one passive, the other active, brought together by the craftsman and guided partly by his knowledge and experience of what is possible and what is best, and partly by his skill and practice in the use of the tools themselves. These produce the main lines, they effect the assembly or bringing together, the building-up of the whole. That which remains for fancy and imagination to play with is comparatively unimportant. There is indeed a right and a wrong way of letting loose the fancy in carving, painting, or whatever form of gaiety the craftsman allows himself to indulge in, and the right way is always subservient. As soon as indulgence in the fantastic, the *tour-de-force* or attempt to imitate other materials, begin to get the upper hand, so surely does "debased art" become the true and only description of the work. The theatrical, the inessential, the superficial, rules and leads on to the same end that has been described by a great writer as the vile torrent of the Renaissance.

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NOTES AND COMMENTS.

THE Japanese are exploiting the combination of volcanic ash with Portland cement, claiming that it not only increases the tensile strength but also produces a mixture more dense than ordinary cement mortar and capable of resisting the percolation of water, thus rendering the combination highly valuable for the construction of reservoirs and for the preservation of iron in reinforced concrete. There can be no doubt that the last word has not yet been said on the influence of various sands on the properties of cement. Experimenters are at work testing the behaviour of cement with many varieties of sand, and vastly different results are obtained from the same cement, so that there is nothing improbable in the claim made on behalf of volcanic ash. As a matter of practical experience we know that the same proportion of ballast, sand, and cement will on one occasion give a waterproof concrete and on another one that leaks like a basket. It is highly probable that the nature of the sand used has very much to do with the difference of result, and architects cannot be too careful in making sure that all the conditions are the same when relying upon their past experience. When one has to deal with poor sand, that is, sand which, by reason of its geological origin, its peculiar composition, or its excessive fineness, gives a low result in a test with cement, the best and cheapest remedy is usually, with concrete at any rate, to increase the proportion of cement. The extra expense is not by any means alarming, for in the cost of concrete the share contributed by the cement is not large, ranging as it does on the average from 7 per cent. in the case of concrete with one part of cement to three of sand and six of ballast, to 14 per cent. with one part of cement to one and a half of sand and three of ballast. Thus an additional amount of cement will be cheaper in Britain than imported volcanic ash from Japan, the Philippines, or even Sicily.

SOME of our unemployed younger members of the architectural profession, so numerous just now, ought to find and seize an opportunity in Canada, where there appears to be a coming boom in building during the present year. We learn that in Winnipeg alone plans are being prepared in the offices of architects of that city for two million dollars worth of work. The young architect who goes from England to Canada cannot, however, hope to succeed unless he has pluck, push, ability, a moderate amount of capital, and a readiness to put his pride in his pocket till he has learnt in a subordinate position to understand the ways of the country. He must not stay in the east and wait for work but push on to the growing cities of the west, and seek for a job. It is also essential that he be an all-round man, well trained in every branch of architectural work—not merely a specialist.

ARCHITECTS frequently have to include in specifications pavings of such a character that leads them to employ asphalte, but this material is not without its disadvantages, chief of which are slipperiness and cost. Both of these may be reduced by the use of an asphaltic macadam, consisting of a mixture of two-thirds crushed stone, varying from $\frac{3}{4}$ inch to $\frac{1}{4}$ inch in size, in approximately equal proportions of $\frac{3}{4}$, $\frac{1}{2}$, and $\frac{1}{4}$ inch, one-sixth of stone screenings, and one-sixth of sand, half coarse and half fine but sharp. This aggregate should be compounded with from 8 to 10 per cent. of an asphaltic cement of low melting point, stability under temperature changes, and small loss under the evaporation test. The aggregate should be heated to a temperature of 300° to 350° Fahr., and mixed at that temperature with the asphaltic cement at similar temperature. The mixture should be laid hot and well rolled with a top dressing of coarse sand.

THERE is no doubt that we are reverting in a sense to the era of cave dwellings, and that the owners of our most up-to-date buildings being restricted to the height they can ascend above ground are endeavouring to cheat the ground rent by burrowing below, and already we have basements and sub-basements. In Chicago, having fully developed the sky-scraper, they are now going into the bowels of the earth, and in the MARSHALL FIELD retail store have constructed a building 151 feet by 161 feet on plan with three storeys below the street level. The basement is a sale-room, the sub-basement a packing-room, and the sub-sub-basement contains the machinery that keeps the establishment going. The lighting of these subterranean caves is easily possible by the help of electricity, but the ventilation is another matter. The system here adopted may be described as a compromise between the plenum and zero-potential, in that while fresh air is supplied by blower fans of centrifugal type, the foul air is exhausted by fans of approximately 20 per cent. less power than the apparatus supplying fresh air. The fresh air is supplied at the top of each room and the foul air extracted at the floor level, an arrangement that is possible where electric light is used, and desirable when fresh air is warmed to the pitch that is considered necessary in the States. The interior volume of each subterranean floor is approximately 380,000 cubic feet, and the air is changed, or rather the apparatus is capable of changing the air, three times an hour in the lowest floor and four times an hour in the other two. The air supply is drawn from the roof level to the sub-sub-basement, where it is water-washed and in winter heated.

WE are glad to see in a recent number of *Berliner Architekturwelt* and in the supplementary number of that publication, *Moderne Wohnräume*, as well as in the latest issue of our friend ALEXANDER KOCH'S *Innen-Dekoration*, that a more rational spirit characterises the latest work of the New Art in Germany. Simplicity and restraint have to a large extent taken the place of eccentricity and extravagance, the improvement being most marked in the designs for interiors, and particularly furniture, and still somewhat to seek in roof treatment and sky-line. German architecture has always displayed a tendency to forms of roof more curious than beautiful, and one may perhaps regard this as a national trait rather than as a result of the inversion of principles that at first dominated the New Art. The recognition of the beauty of simple form and untortured natural surface in wood and stone compensates, however, for insobriety of sky-line.

ILLUSTRATIONS.

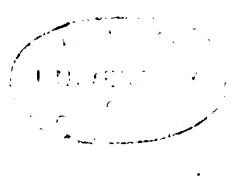
1.—FIRST PREMIATED DESIGN FOR GLAMORGAN COUNTY HALL, CARDIFF.—ELEVATIONS—PLANS.

THE plan is a rectangle, 142 feet by 125 feet, with an open area, almost square, in the centre over the Council chamber and the semicircular ante-room on the ground floor. The Council chamber is approached in a direct line from the main entrance in Central Avenue. The principal elevation has one order to impart an appearance of dignity. On the three other elevations the design depends for effect on its simple masses. Internally the rooms are approached on both floors by corridors, which are arranged around the open area in the centre, thereby forming a plan of the simplest possible description. There were 190 designs submitted in the competition. This design, which was awarded the first premium of 100*l.* by Mr. W. D. CARÖE, the assessor, was submitted by Messrs. E. VINCENT HARRIS & T. A. MOODIE, architects, 8 New Square, Lincoln's Inn, W.C.

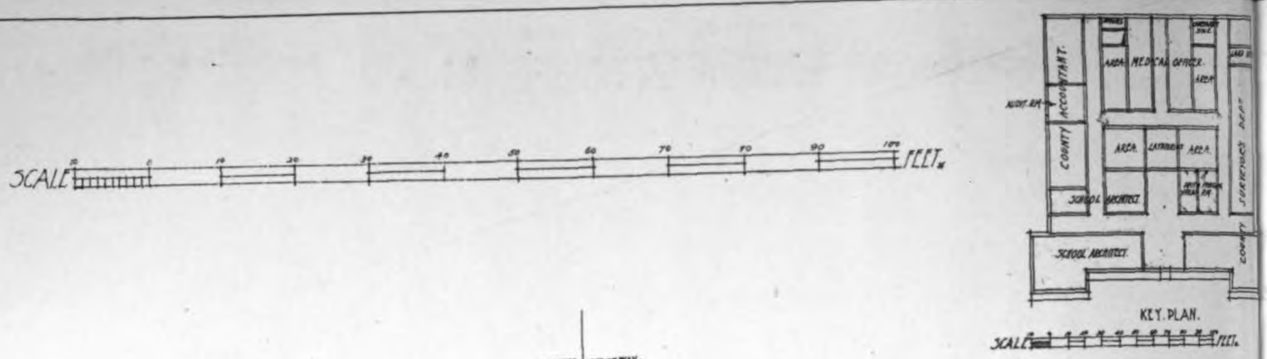
2.—DESIGN FOR GLAMORGAN COUNTY HALL, CARDIFF.—ELEVATIONS AND SECTIONS—PLANS.

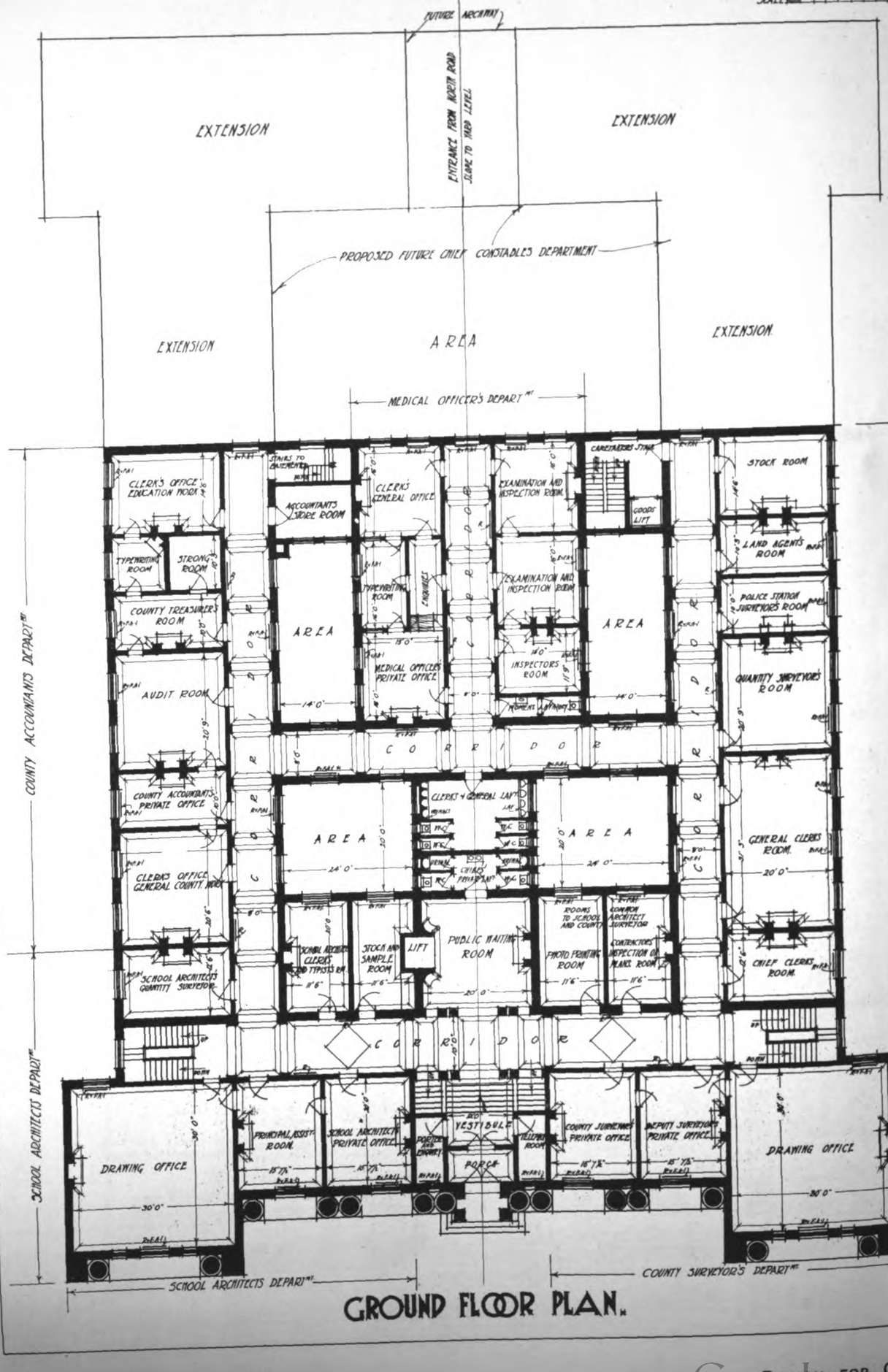
THE main points in the design for this competition were apparently the position of Council Chamber and County Clerk's Department. It was thought that the first floor was the correct position for Council Chamber, with the County Clerk in close proximity, as a lift for use of infirm members was asked serving all floors. The building was approached from Central Avenue and North Avenue, motors driving straight into the building from North Avenue and depositing at back under Council Chamber near to lift, the elevations being treated in a bold style not to clash with existing buildings. This design was submitted in the above competition by Mr. P. HUBERT KEYES, A.R.I.B.A.

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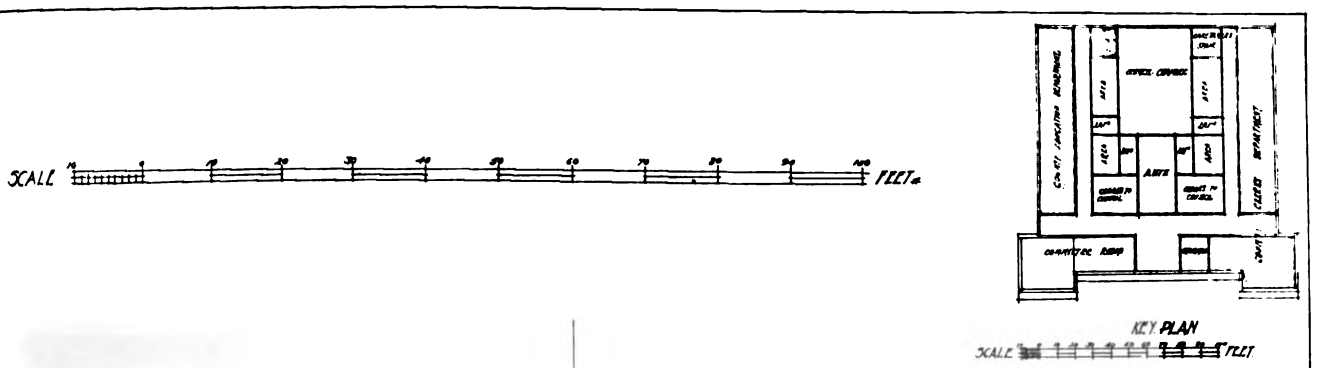
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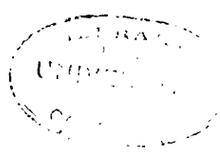
GROUND FLOOR PLAN.

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FIRST FLOOR PLAN

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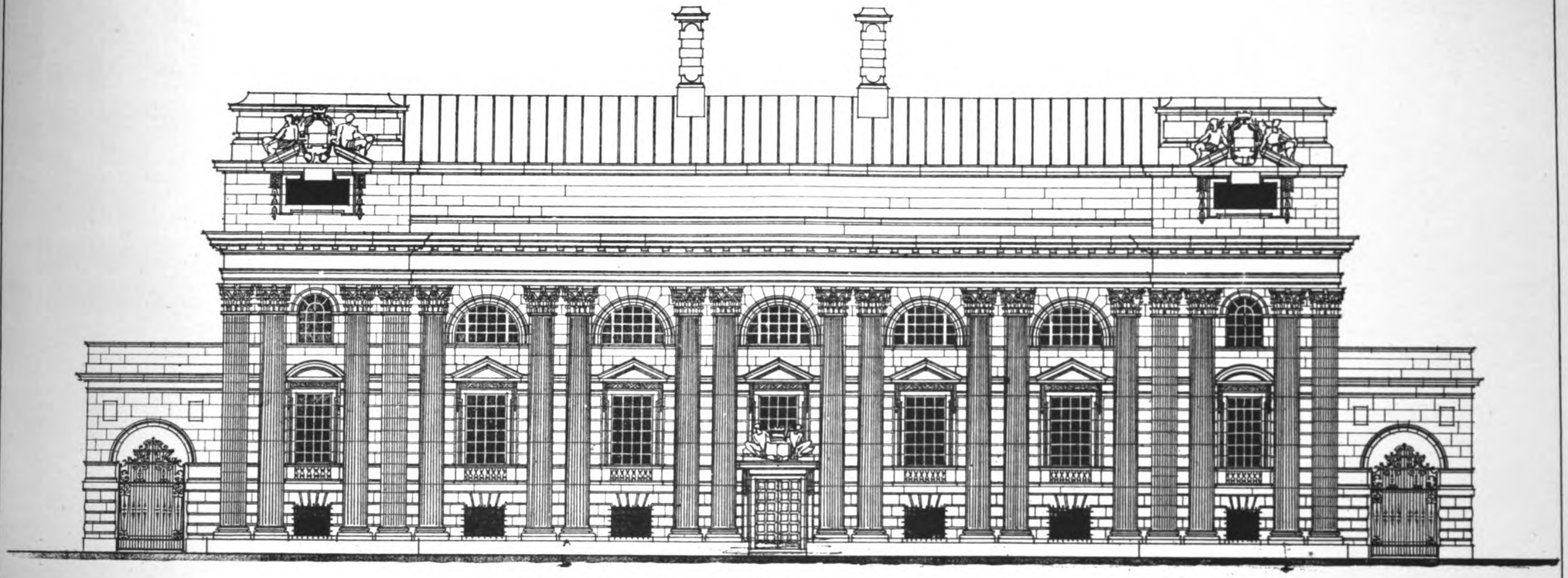
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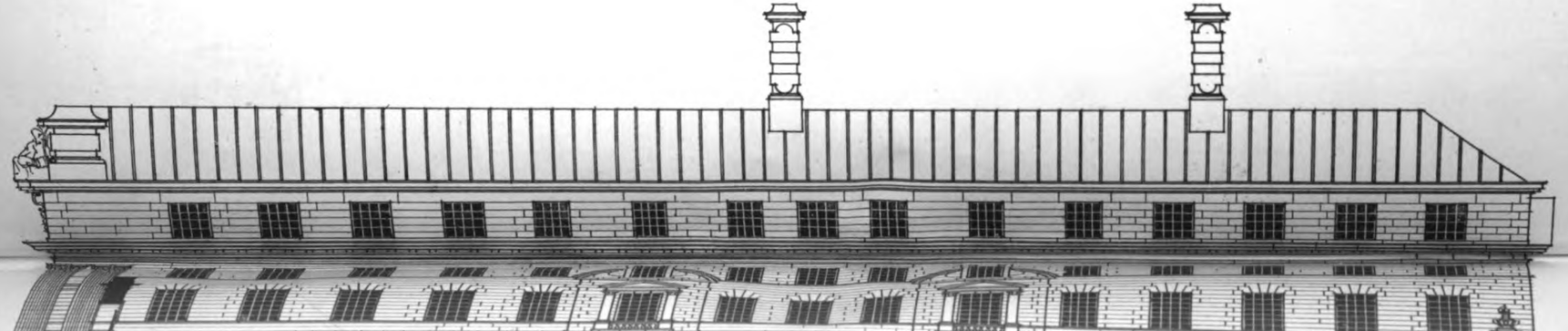
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GLAMORGAN · COUNTY · HALL

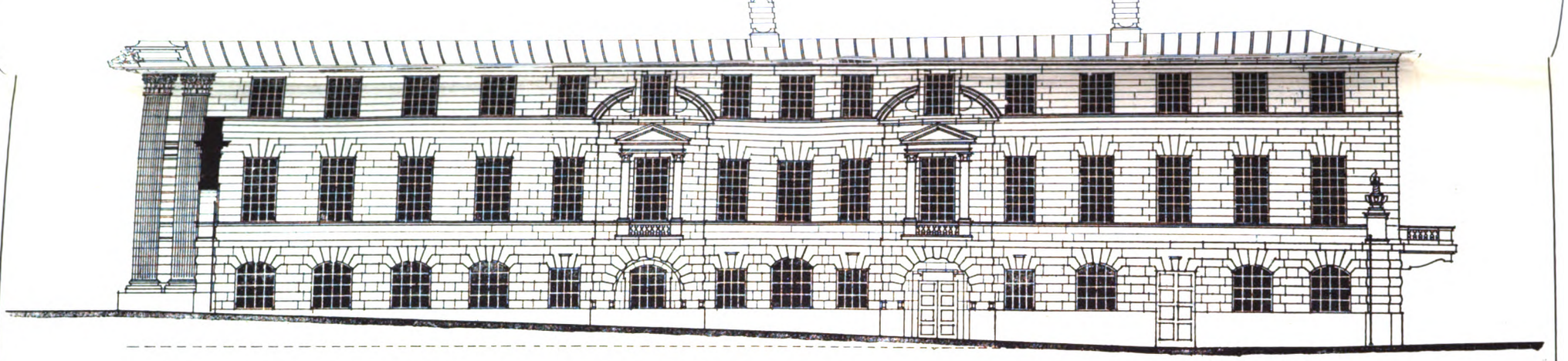
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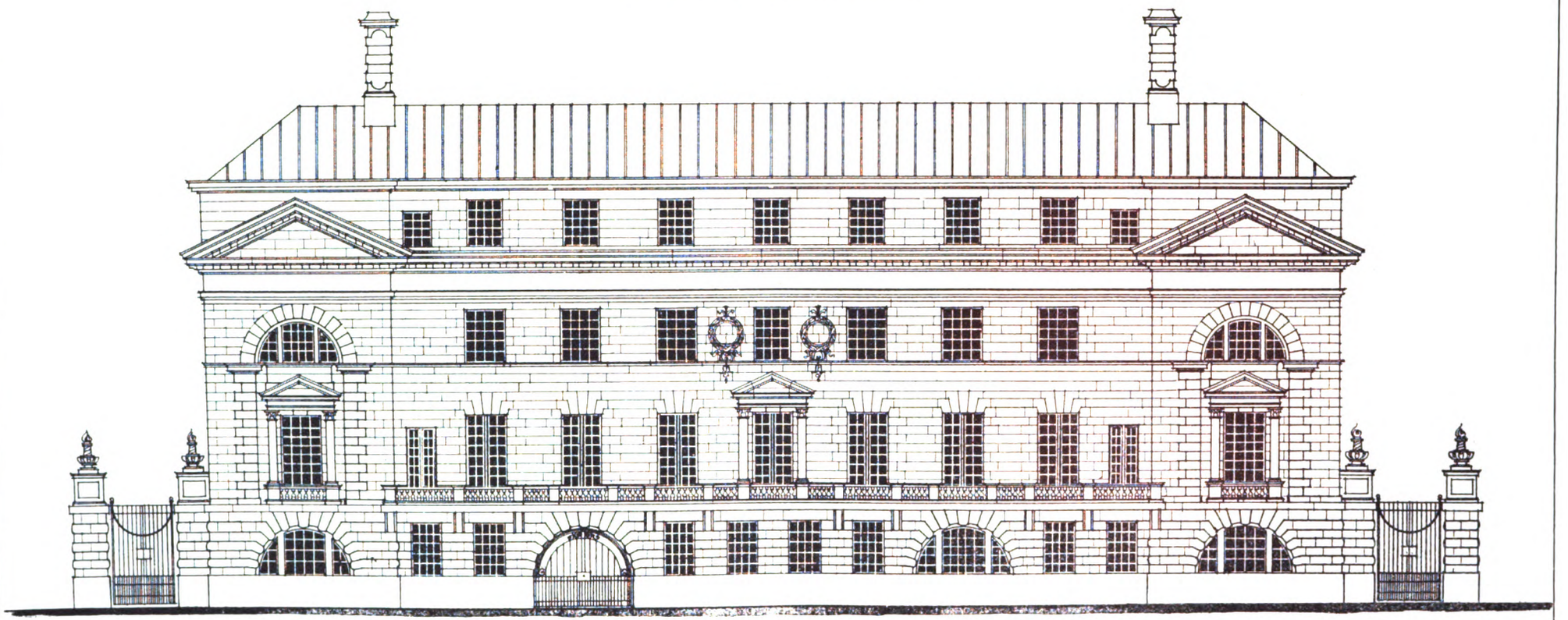
CENTRAL AVENUE ELEVATION.



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SIDE ELEVATION.



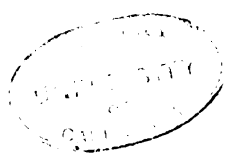
DRILL YARD ELEVATION.

FIRST PREMIATED DESIGN FOR GLAMORGAN COUNTY HALL, CARDIFF: ELEVATIONS.

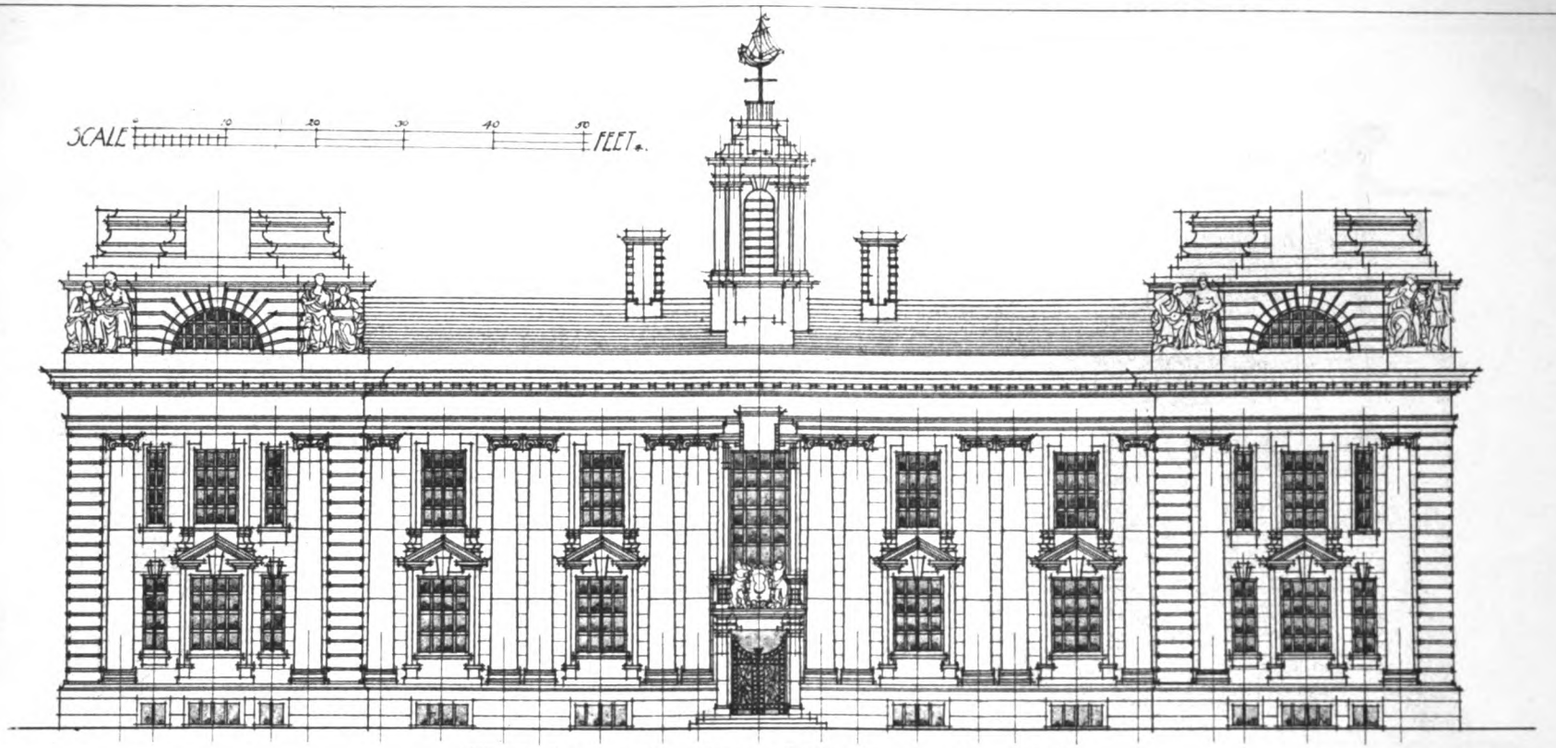
Messrs. E. VINCENT HARRIS and T. A. MOODIE, Architects.

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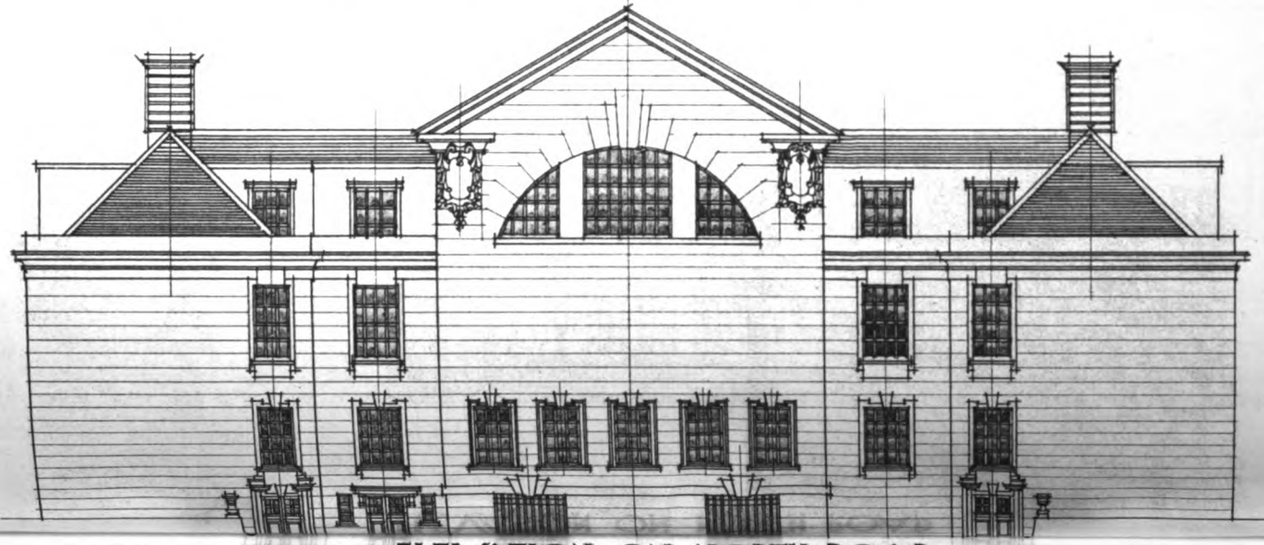
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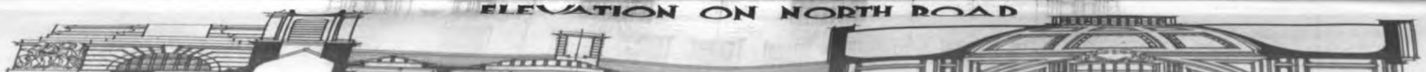
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ELEVATION TO CENTRAL AVENUE.

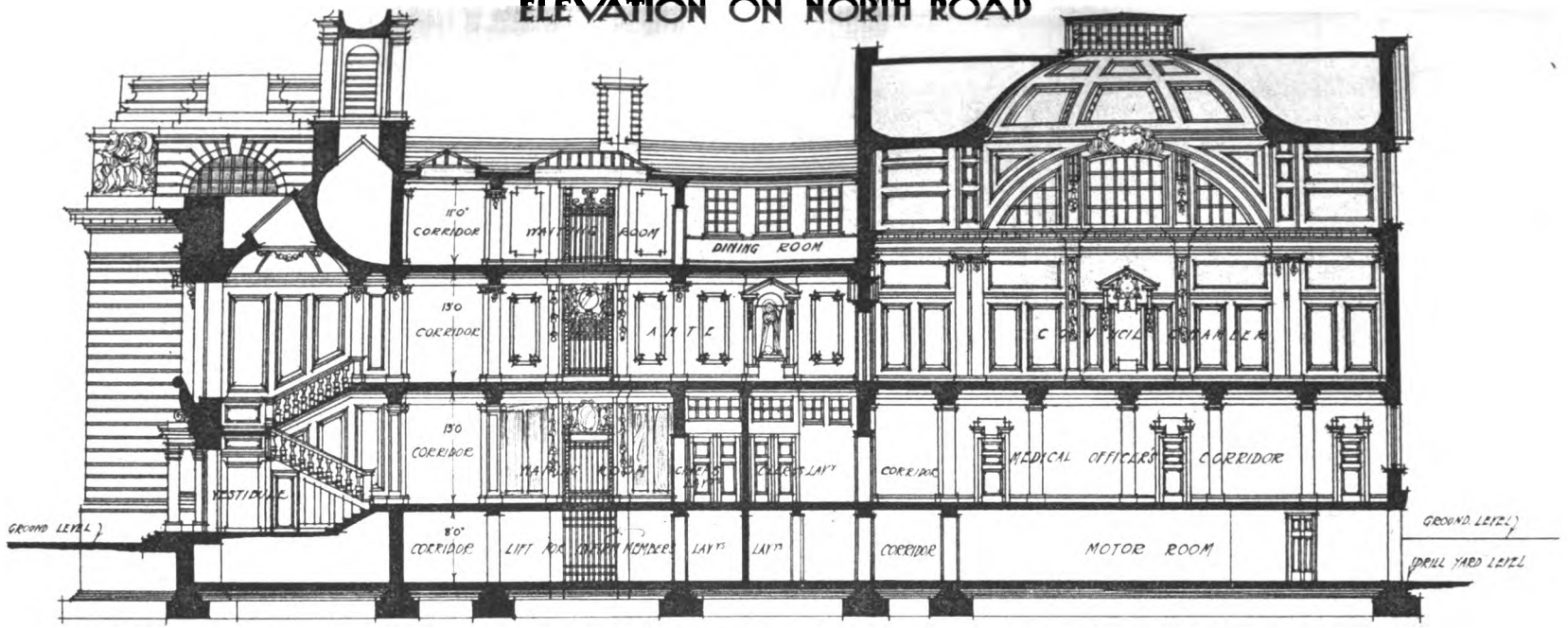


ELEVATION ON NORTH ROAD

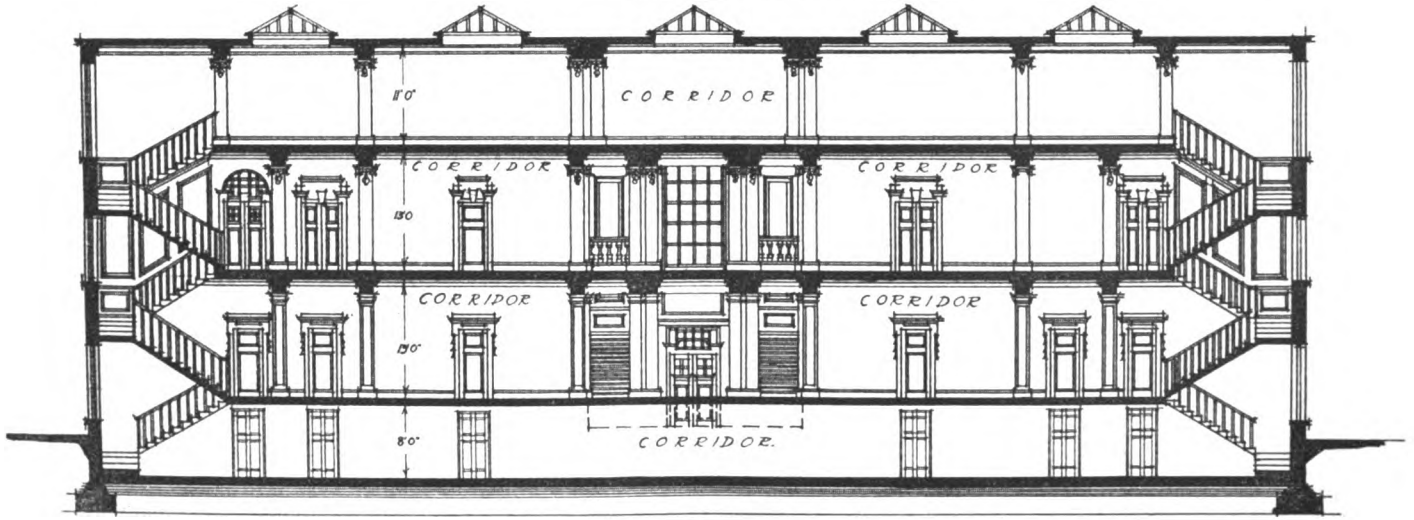


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ELEVATION ON NORTH ROAD



SECTION A.A.



SECTION B.B.

DESIGN FOR GLAMORGAN COUNTY HALL, CARDIFF: ELEVATIONS AND SECTIONS.

By P. HUBERT KEYES, A.R.I.B.A.

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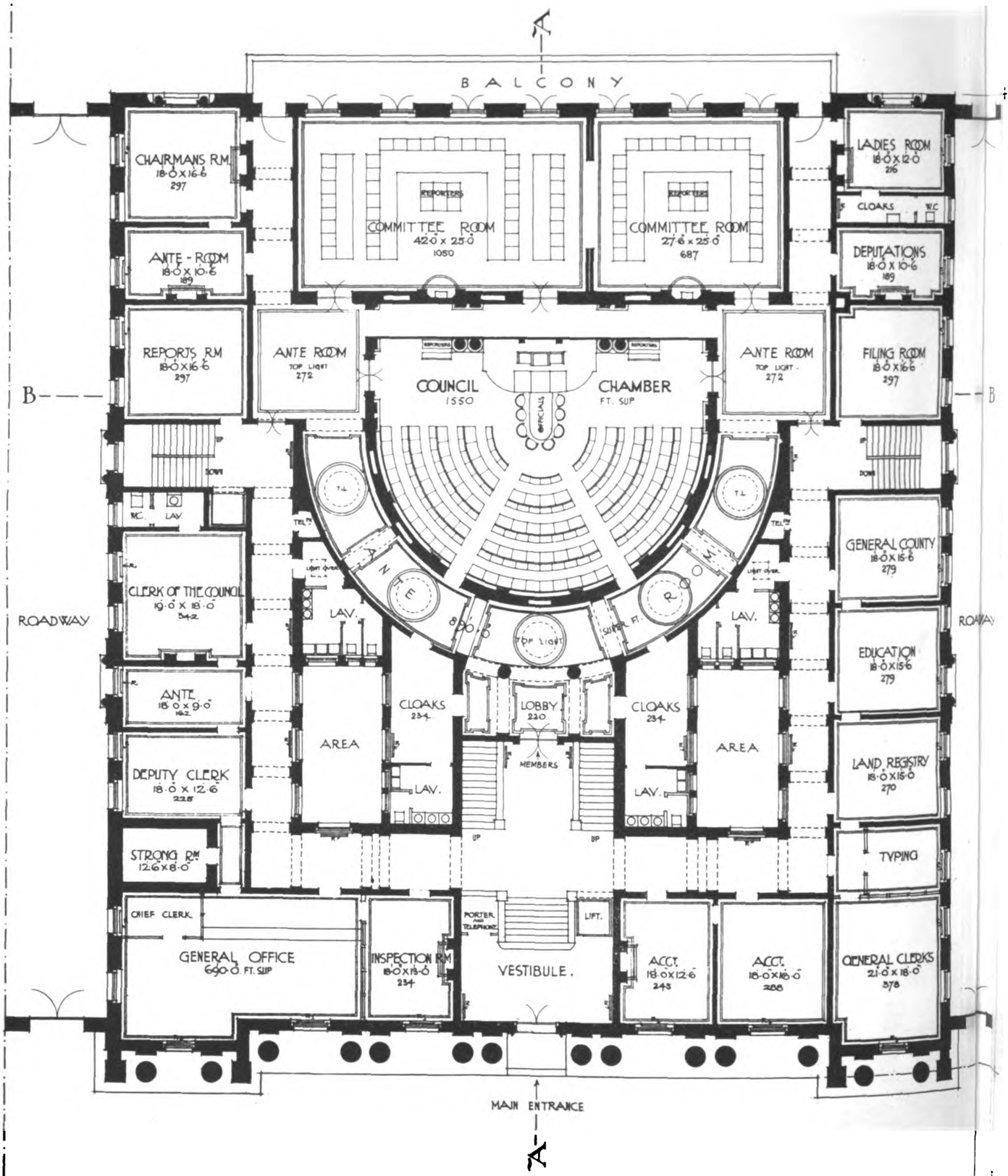


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GLAMORGAN CO

Scale

DRILL YARD.



GROUND PLAN.

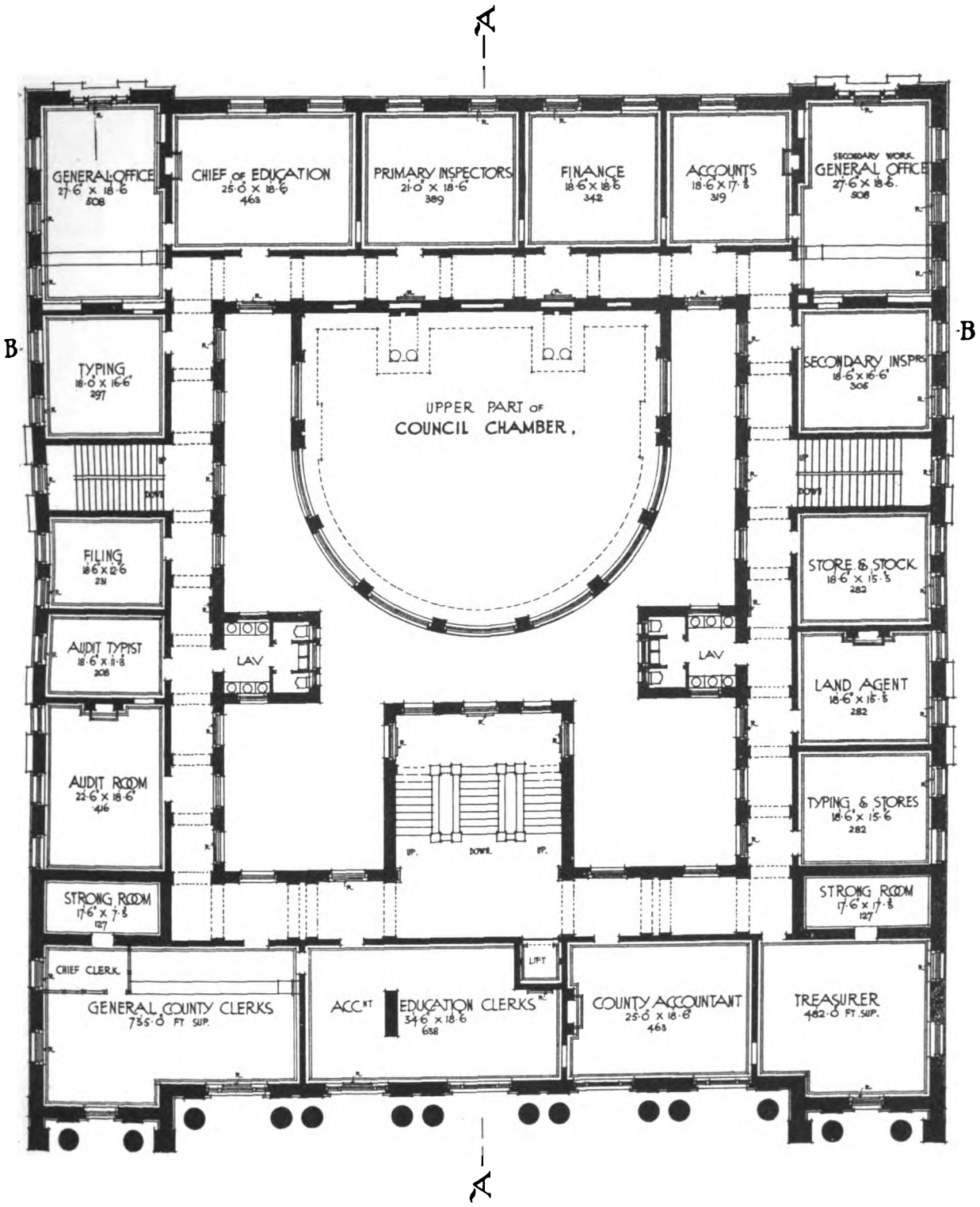
FIRST PREMIATED DESIGN FOR GLAMORGAN

Messrs. E. VINCENT HARRIS

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COUNTY · HALL

for Feet.



FIRST FLOOR PLAN.

N COUNTY HALL, CARDIFF: PLANS.

A. MOODIE, Architects.

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SCHOOLS.*

(Concluded from last week.)

WITH a view of taking more than one class in a room for certain lessons, the provision of a lecture-room is desirable; this the Rules state should accommodate not less than thirty scholars, and may be large enough to hold more; it should be constructed as far as possible on the principle of a theatre, with rising seats. There must be a floor space of not less than 14 square feet per scholar for the first thirty scholars, and 12 feet square for each scholar above that number. This room, as previously stated in the clause relating to class-rooms, "if suitable for class teaching, may be counted as a class-room for not more than thirty scholars."

It is not within the scope of a paper like this to go into details with regard to the various rooms which are needed for what one might call special instruction. I shall therefore only attempt to touch upon points which seem to present matter for discussion. Upon the subject of laboratories the Rules say:—"A physical laboratory should be free from vibration, and for that purpose placed on the ground floor, where possible, and should be capable of being darkened." This instruction with reference to the position of the physical laboratory is fairly definite, and has severely exercised the mind of many a beginner in the planning of schools. But is it of vast importance? If so, why are so many physical laboratories placed on an upper floor? As a matter of fact, the teaching of physics in a secondary school is not of such an advanced character as to demand the extreme freedom from vibration which can only be secured on a ground floor. On the other hand, a point very lightly touched upon in the Rules is the balance-room. These are the words:—"If there is no balance-room a separate place in the laboratory should be assigned for balances." It is, I think, very generally agreed that a balance-room is essential, as it is important the balances should be kept free from the chemical fumes. One of the advantages to be gained by placing the various rooms for special instruction on the upper floor is the improved lighting which can usually be achieved; it is scarcely possible to get too much light in laboratories, and very frequently if these rooms are on an upper floor, light can be obtained from more than one side by judicious planning. If good light is essential in laboratories, it is more so in an art room. The chief function of an art room, if the Rules of the Board are to be interpreted literally, is to defeat the object of its own teaching by utterly spoiling the architectural design of the building in which it is placed. In speaking of the advanced art room, this is what will be found:—"This room should be lighted from the north side by a single large window square at the top to give as much light as possible."

If one is lucky in the matter of aspect, one may be able to get this single large window square at the top, facing an area, or concealed from view by roofs; but if the aspect is not favourable, and one of your important elevations faces north, you will need the skill of a Michel Angelo to make the type of window an art mistress sighs for harmonise with the scale of your building.

And is this north light in such abundance the one and only light which will enable the scholars in a secondary school to benefit by the teaching given to each class for an average of eighty minutes per class per week? I put the following question to the headmaster of one of the first art schools in the kingdom:—"From which quarter would you prefer the light of an art room?" His reply was:—"I don't much care from what quarter it comes so long as I can get plenty of it, and still have enough if I have to shut out some when the sun gets in. I prefer some sun, as I may need a class to study the effects of sunshine on various objects; flowers and foliage under sunshine have new revelations for us." A north light for a studio painter of large pictures is, I believe, a *sine quâ non*, but a secondary school is not dealing with such, and I question whether sacrifices in the design of a building should be demanded where the need does not really exist. For all practical purposes, in my opinion, a well-lighted class-room with ordinary windows, possibly from one side and one end, or two sides, will serve admirably for the kind of art teaching which is given in a secondary school.

A point with regard to dining-halls and the kitchens in connection with them, which is perhaps worthy of note, is the desirability of providing a separate entrance for trades-people; this will generally, I think, be found a great convenience. A library in a secondary school, although not insisted upon by the Board, is certainly a very desirable attribute. As far more time is spent by teachers in secondary schools in preparation work, correcting papers, &c., than is the case in elementary schools, larger and more comfortable rooms for their use will need to be provided, and the headmaster will require a really spacious room, as books and papers with which he has to deal will occupy a lot of space.

In cloak-rooms twice the length of hanging space is required as compared with elementary schools, and in neither should lavatory basins be placed in the cloak-room.

A point which will materially influence the architectural treatment of the elevations is the large area of window lighting required by the Rules, which state that "the area of window glass should approximate to one-fifth the area of the floor space in rooms used for teaching, and in other rooms not less than one-eighth." I doubt if so much is often given or really necessary. It is hardly necessary to mention that light is required to come to the left-hand side of the scholars. A point of importance is emphasised in the following clause:—"Unless the top of the windows be more than 12 feet above the floor the plan should show no space more than 20 feet from the window wall in any room used for teaching."

With regard to sanitary accommodation, it is suggested that the girls' offices should be in the main building, and those for boys completely disconnected and at a short distance from the school. In a girls' school some headmistresses advocate the distribution of a small number of water-closets on the various floors in addition to a main block of offices. Automatic flushing for closets is undesirable, and each closet should be fitted with its own apparatus. In elementary schools an automatic flushing system is almost universally, I think, adopted, although I understand that many educationalists advocate the employment of an independent flushing apparatus, with a view of inculcating habits of decency from the earliest moment. In one case I know of where efforts in this direction were made in an elementary school, the result was not satisfactory, and an automatic system had ultimately to be installed.

If the planning of elementary and secondary schools does not present many points for great differences of opinion upon general principles, and in the main I think it does not, one has not far to seek for matter to provide quite adequate discussion. If I thought any heating engineers were present, I do not know whether I should have the courage to mention the word "ventilation" for fear of the discussion I might provoke. I want, however, to touch upon it from the point of view of the architect, and not of the expert. Of its importance there can be no question, since the only real departure from accepted methods of school planning owes its origin to a desire for the natural system of ventilation. I refer, of course, to the Staffordshire school, so well known to all. The question at issue appears to be whether efficient ventilation can be secured for comparatively crowded rooms without the employment of mechanical agency.

Dr. Reid, the county medical officer for Staffordshire, maintains it can; others that it cannot. Whether each mean the same thing by efficient ventilation is open to doubt, if we define it as "an adequate supply of fresh air of a proper temperature, admitted in such a manner as not to cause a perceptible draught." Sufficient movement to obtain a change of the air in a room is the main essential in any system of ventilation, and whatever means may be employed must be directed to this end.

In the case of the Staffordshire schools the movement of the atmosphere is relied upon to effect the necessary change, and a through draught is facilitated by means of open windows on both sides of the rooms, in addition to a ventilation grating at the back of the heating radiators; the windows are so arranged with a hinged, glazed screen at the base, which it is claimed gives an upward direction to the entering air; and the same arrangement serves for exhausting the vitiated air, the window on either side acting as an inlet or outlet, according to the direction of the wind. Time will not permit me to go into all the claims made by Dr. Reid in support of the type of plan he advocates; his main contention, however, to quote from his report, is:—"That if the central hall type of school is to be maintained, it is only by employing mechanical means that anything approaching adequate ventilation can be obtained, and even with such means the result is not satisfactory; and that the solution of the question is to be found in the plan which is described as the Staffordshire type." Whether such a plan as this is, as Dr. Reid claims, "quite compatible with educa-

* A paper by Mr. H. T. Buckland, read at the last meeting of the Architectural Association.

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tional requirements," is open to question. One central hall for three departments, of necessity, as was pointed out to me by a prominent educationalist, does away with the morning assembly of two of the departments, and the need for a head master and mistress as such almost disappears if their personal intercourse with the children is reduced to a minimum. It is open to discussion whether such a sacrifice is worth making on the assumption that a satisfactory method of ventilation cannot be secured, even by mechanical means, in a school planned with the class-rooms round a central hall. One is justified in assuming that Dr. Reid is only familiar with one method of mechanical ventilation, viz. the "Plenum" system, as his report at the outset remarks:—"All systems of mechanical ventilation, moreover, present a shocking object-lesson to the children from their inherent need for having all windows permanently closed."

So far as the "Plenum" system is concerned this is true, and the argument is a weighty one against its use. Personally I have found a majority of the teachers in "Plenum" ventilated schools adverse to it, and this is particularly the case with lady teachers.

Bearing upon this question, the opinion of Mr. Felix Clay, architect to the Department, as recently given in evidence before a consultative committee appointed by the Board of Education, will be of interest. "The 'Plenum' system," he said, "has many strong supporters, who are able to show that, chemically, a fairly pure atmosphere is maintained by it." Mr. Clay, however, was strongly adverse to its use for school purposes. "In the 'Plenum' system warm air is introduced under pressure into the upper part of the room; this, being at a higher temperature than that already in the room, spreads over the ceiling, and, being under pressure, produces a gradual downward movement, passing out of the room at the floor level. Certain objections to the system are the warming of the rooms by hot air only; this requires raising the incoming air to a temperature that seems to destroy some of its invigorating qualities and produces a somewhat enervating effect. Perhaps the chief objection is that, for the proper working of the system, it is absolutely necessary to keep the windows closed, and, in order to insure this, the windows are not as a rule made to open; this has a very serious disadvantage in accustoming the children to sit in rooms with the windows shut." Any system which meets with such strong condemnation from different quarters will find it hard, I think, to endure. One has not far, however, to seek for an alternative, which appears to provide the advantages of a natural system with open windows, without necessitating the abandonment of the generally approved central hall type of plan; a system of mechanical extraction will, I think, be found to meet the case. Such a system is practically the reverse of the "Plenum"—the foul air being sucked out and the fresh air drawn in, instead of the fresh air being pushed in, forcing the foul air out. This system was employed in the secondary and elementary schools at Rotton Park. In that case, fresh air is admitted to the various rooms by means of gratings at the back of the radiators and through the windows, in which the lower portions open as hoppers and the upper casements swing; the foul air is drawn from the rooms through a grating fixed in a riser extending the whole width of each class-room; this riser is in front of a duct which communicates with the main underground ducts all running to the extract tower, at the base of which are fixed two large centrifugal fans driven by electricity. In addition to the grating at the floor level there is a small grating near the ceiling, at the head of a flue which communicates also with the underground ducts; this is for the purpose of drawing off the extra heat and fumes arising from the gas lighting. The whole of the windows may be kept wide open if required. No chemical tests have been made of the air in these schools, but so far as the evidence of the senses and the testimony of the teachers is concerned, I have every reason to be satisfied that it is such that both teachers and students find it stimulating and comfortable to work in. It certainly has the merit of being almost entirely under control. Doubtless satisfactory results have elsewhere been achieved by similar methods.

Of the methods of heating at one's disposal we now have many. Low-pressure hot water is still so dear to the hearts of many that one is loth to disparage an old friend; but it will, I think, generally be found difficult to obtain really adequate heating in conjunction with a proper air supply without resorting to some more rapid system of circulation.

The various systems of forced hot-water circulation, although differing in method, all have the same end in view, viz. acceleration, and it seems obvious that the oftener you pass the water through your boiler the warmer you are likely to keep it, assuming your boiler can supply the requisite heat.

Atmospheric steam has been largely used of late years, and my experience of it in large buildings is certainly favourable, but my impression is that the tendency among heating engineers is distinctly in the direction of accelerated hot-water systems.

A weighty argument always advanced by the advocate of ventilation by natural as compared with mechanical means is the question of cost—not only first cost, but also cost of maintenance. Ventilating engineers may have some reply to this; I have none, except that if efficiency is required it will need to be paid for. As regards the question of first cost, Mr. Clay, in the evidence already quoted, estimated the cost of installing the "Plenum" system at from 1,500*l.* to 2,000*l.* in a school of 1,000. I am inclined to agree with this, if the figures quoted represent the cost over and above a natural system—i.e. to say I consider the "Plenum" system adds from 30*s.* to 2*l.* per child to the cost of a school for 1,000 children. A system of mechanical extraction such as I have described adds less, as the size of the ducts does not require to be so great or the finish so good as in the case of the "Plenum." This naturally brings us to the whole question of cost of school buildings.

My own experience is that an elementary school cannot be built for a reasonable number—say, from 750 to 1,050—at less than 10*l.* per head, and to achieve this the site must be level and have a good foundation. The school at Acocks Green, which was shown, will cost, I understand from the architect, rather less—probably not more than 9*l.* 15*s.*; but this is an exceptionally large school and has classes each for sixty children. One education authority in the Midlands which has promoted several recent competitions allows 14*l.* per head; for this, I think, a very decent school may be expected if no mechanical system of ventilation is required. Of course a good deal depends upon whether a school is in two or three departments. Ten pounds per head for a three-department school is very low.

The Staffordshire schools in three departments, but with only the one central hall, cost 10*l.* 10*s.* 4*d.* per head.

Of "Plenum" ventilated schools I know of one in two departments which cost 15*l.* per head. A really well-built school with three departments and three central halls, a mechanical system of ventilation, and some regard to an architectural treatment in design and materials, cannot, I think, be built for much less than 17*l.* per head. For that amount boundary walls, 14 inches thick, or walls and railings all round the site, and a caretaker's house, may be expected to be included.

These figures represent prices per foot cube, ranging from 5½*d.* to 7*d.*, and as boundary walls and play-grounds are included in the prices mentioned per head, these items have to be priced separately and added in making up an estimate. In discussing the cost of secondary schools, I find myself at variance with the accepted method of pricing at per head. In elementary schools, given a certain number, there will not be much variation in the size and number of the rooms; but in a secondary school, although the number of class-rooms and children accommodated may be the same, the rooms for what I have called special instruction may vary considerably. Education authorities seem to lose sight of this fact, and in some cases invite plans in competition, stipulating for extra large laboratories and art rooms, swimming-baths, and many other things which do not form part of another school upon which they base their price per head. Thirty-five pounds is a favourite figure to quote, but a quite insufficient one unless the accommodation in laboratories, art rooms, dining-rooms, gymnasium, &c., is kept within modest limits.

Of the plans I have shown, the school at Bishop Auckland, by Mr. Reynolds, is estimated to cost 15,000*l.*; and for the one at Bromley, by Mr. Burke Downing, the sum of 8,000*l.* was mentioned in the conditions of competition. The accepted estimate for the schools at Barnsley was 18,672*l.* Of the schools at Rotton Park I am unable to separate the cost of the secondary portion, as this and the elementary school were all in one contract. From 6*d.* to 7*d.* per foot cube will, I think, be found reasonable working figures, with further allowance for playgrounds and boundary walls.

My paper, I regret, has run to a far greater length than I originally intended, but my subject must be my apology, and it adds to my regret that I have treated it, I cannot help feeling, somewhat inadequately.

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Mr. F. J. OSBORNE SMITH proposed a vote of thanks to the author of the paper, and said that many of the points raised in it were probably new to those architects who practised in London, since they were not accustomed to the single-storey schools. They had seen illustrations on the screen of schools in which the children appeared to be packed rather closely together, and in one class of sixty he felt some pity for the scholars when he heard the whole of the ventilation was on the "Plenum" system. He was bound to say that he had not found one school ventilated in a satisfactory manner, but he wished to mention that he considered the question from the children's health point of view. A short time ago there was an International Congress held on school hygiene, and Sir Lauder Brunton then stated that defective ventilation had a most exhausting effect upon children, and predisposed them to succumb to any active disease by which they were likely to be attacked. They knew also that when adults had to live and work in closely packed areas they became debilitated and sickly, and hence it was vitally important that their children should at school work under the most favourable conditions. In towns, therefore, special attention should be given to ensure that children enjoyed fresh air and sunshine. London and Birmingham evidently were parallel cases as regards restriction of sites, and in Birmingham the authorities had adopted the wise plan of single-storey buildings. The beneficial results of open-air schools proved there was a necessity, especially in large towns, for introducing very much more air into the interior of school buildings than architects as a rule made provision for. The Staffordshire type were admirable examples in this respect. The matter of ventilation was, however, largely left in the hands of teachers, and although special systems and arrangements might be introduced into a building, a great deal depended on their common sense for its ultimate efficiency. For sunshine he would agree with the paper that the south-east aspect was best, and that was an important point in planning. No doubt aspect as regarded the admittance of light was a good deal of it sentiment, but doctors who had studied the subject condemned working in shadow as injurious to eyesight. There were always conflicting views, however, and it seemed best, therefore, for architects to confine themselves to the practical part of school planning, which was to safeguard the health of the children.

Mr. OWEN FLEMING seconded the vote of thanks, and spoke of the movement towards the establishment of open-air schools around London and the encouragement the County Council had received. For ordinary school buildings he suggested there was a limit to the development of the open-air idea in the class-rooms. In the large manufacturing towns in the North it would mean a new class of school altogether. If the windows of buildings in some of those towns were kept open all kinds of impurities would enter. There was another development which might change school planning within the next ten years, and that was the encouragement given to physical training. In Germany and Sweden, the pioneers of educational work, every school had a gymnasium, and gradually the importance of physical training in schools was being recognised in England, and the result would probably lead to an adoption of the foreign arrangement, and they as architects should be ready to meet it.

Mr. T. J. Bailey contributed some notes on the paper, which in his absence were read by the HON. SECRETARY. Mr. Buckland, he said, only deals with two kinds of school, the ordinary elementary type and the secondary school. To make the subject complete I should have expected some reference, at any rate, to be made to the higher elementary type on the one hand, and the schools for mentally and physically defective, of which there are several requirements, on the other. To take his remarks on the elementary school, he naturally begins with the site; as his remarks evidently only refer to large schools in towns, it is manifest that the educational body has very little choice. It is not always possible even to obtain the 30 feet of unbuilt-upon playground space which is regarded as a minimum by the Code of the Board of Education. In London, at any rate, considerations of rehousing obligations operate largely in the choice of a site. In the paper I read at the R.I.B.A. some years ago I gave my observations on this subject, and can only repeat that the only ideal site is to be obtained in a not altogether built-upon suburb. No doubt the Board of Education is right in laying down the axiom that a three-storey type should not be followed if space allows for the buildings to be one or two storeys high. The question of the desirability of a central hall has gone beyond the line of argument, and also, I am glad to say, has the question of whether each department should have its central hall or whether there should be one common to two or three departments. As the hall takes the place of a corridor, giving access to the various rooms, it is obvious that great confusion would ensue if the hall was used by another department than that to which it was attached, and, if built as a separate block, each department would need corridors and connections with the hall, thus rendering the cost prohibitive. In a school of the size referred to in the paper—viz. 1,000 to 1,200 children—the point raised as to its being built as a two-department school—infants and mixed—is worth notice. It would not do to provide more than about 380 infants, and this would give a mixed department of 700 or 800—manifestly too large. The mixed department would therefore have to be divided into two, senior and junior, possibly under one head teacher—preferably not. In large towns the position of the school with regard to the social position of the families supplying the children would probably determine the question of mixed or separate departments—the lower the grade, the more danger in mixing. With regard to the sizes of the class-rooms, the lecturer appears to favour classes of from fifty to sixty. In the paper I referred to I dealt with that subject, and am glad to be able to say that all new schools and alterations to old ones in London under the County Council have a unit of forty for the class-rooms, any variation of that being in favour of a smaller number, thirty or thirty-five in the graded departments and not exceeding fifty in the infants; and I would here emphasise my view, expressed at that time, that no seats should be more than 20 feet from the window wall, and I wish the Code would be altered accordingly; for elementary schools it is equally as important as secondary. Mr. Buckland makes no reference to the desirability of providing any other rooms for teaching purposes than the ordinary class-rooms. In my opinion and with the experience I have gained in building the schools of London for twenty-five years, I consider it very desirable that there should be a room for general science—not advanced work—and also a room for art teaching in the boys' departments and rooms for teaching domestic subjects in the girls' departments, and I would have these attached to all schools; also a room apart from the main building in the boys' department for manual training work in wood or metal, or both. I am afraid the remarks on secondary schools do not give much guide to either the requirements or the points of planning, but I would remark concerning them:—(1) The number to be accommodated. Mr. Buckland knows of no recent secondary school which accommodates more than 400 in one department. I am building five secondary schools for girls in London, accommodating upwards of 500 in each, and I certainly do not agree with him that a central hall is not the best arrangement; with nine class-rooms or more on a floor it is surely better that they should discharge into a large hall than into corridors, and it is manifestly the cheapest arrangement for building, and I can answer for it that there is not only no inconvenience, but it is appreciated. There are many requirements in secondary schools which are not touched upon, but the variety of subjects taught and the needs in such an educational establishment need more than a passing reference. As regards the number of departments in a secondary school, it is best that, in large towns, they should be built as separate schools; of course, in country districts combined schools may be desirable, having regard to the smaller numbers to be provided for. Finally, and the only matter the lecturer touches upon in detail—on the question of ventilation—the remarks are all a criticism of the "Plenum" system, and, as I understand it, a condemnation of it. This I cannot agree with. In my opinion a really good modern installation on this type is the best that can be had, but there are so many prejudices against it that public bodies hesitate to adopt it on this account. I have installed it in five or six cases some years ago with great success. I have also installed it where it has been continually complained of. If I were to instal it in a building now I would only have it in operation in the winter, leaving the open windows to ventilate in the summer; but the extra cost on the building for ducts and flues renders the cost prohibitive where there is a desire to keep down the cost of a building to the lowest point. Experts favouring both systems would argue the respective merits for a week, and would probably leave the hearers confused and unconvinced. I can only speak from my own experience. A head teacher told me the other day in a school where the "Plenum" system was installed ten years ago that in foggy and frosty weather they are practically in the Riviera, and I have never heard any complaints from that school that the

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windows could not be opened in the summer. As regards the system of warming by low-pressure hot water as compared with steam, it is well to remember that the latter probably means the employment of an engineer for working it in the winter, as it is too dangerous to entrust to the ordinary schoolkeeper, with his multifarious duties about the school, whereas the former can easily be attended to by him. In his remarks on sanitary accommodation, Mr. Buckland refers to automatic flushing. This means troughs, which are pretty universally condemned by the faculty in these days. Besides, all towns have their sanitary by-laws, and I doubt if any at the present time would approve these, certainly not in London; it is surprising news to me that even in a single case independent flushing "was not satisfactory, and an automatic system had ultimately to be installed." It would be interesting to hear where this occurred. The reverse is my experience, and is the cause of constant disputes with Borough Councils in the case of old schools which are working satisfactorily. The general remarks touching lighting, desking, &c., are truisms which need no comment, but I would like to place on record my opinion that the requirements of the Code as to the areas of central halls—viz. a minimum of 6 feet per scholar in secondary schools and a maximum of 4 feet in elementary schools—is incomprehensible, especially considering that in a properly equipped secondary school there is a gymnasium and dining-room in addition.

Mr. BUCKLAND, in reply to the vote of thanks, said he could not have covered all the points which Mr. Bailey had wished him to do within the limits of an evening's paper. The question of the desirability of providing a central hall had not, he thought, gone beyond the line of argument, and so far as secondary schools, he was certain it had not. With regard to the "Plenum" system, he had not, he said, expressed a personal view, but merely the opinions of others, though he could say he had never found a school ventilated on that system the air of which reminded him of the Riviera.

MANCHESTER ROYAL INFIRMARY.*

IN order that there may be no misunderstanding as to the scope of my subject, I wish to make it clear that this will be treated only from the points of view with which the Sanitary Institute is more particularly concerned. It may not, however, be out of place to say that the architectural conception of the design has been to so plan the buildings that the respective parts adapt themselves to the various purposes for which they are required, and that in such a way that all may be seen to be naturally and harmoniously related; the many integral parts emphasising the unity of the whole.

The principles on which the design is based are divided under three heads:—Hygienic, Sanatory and Æsthetic.

Let us first consider how hygienic conditions prevail in the design of the New Royal Infirmary, and begin with the essential of:—

Fresh air.—Attention should be drawn to the block plan of the buildings (see *The Architect*, January 11, 1907. It will be seen that the relation of the whole to what may be termed the main air routes are that, on the west Oxford Road runs past a frontage of about 508 feet of the site; on the north, Nelson Street passes a frontage of 268 feet; on the south, York Place skirts a frontage of 512 feet; on the east, another street runs up to the boundary. Lying within these air channels is the site of about thirteen acres of land, and on this site are in all forty-eight buildings of various kinds. Every building is kept detached from every other so that air currents pass all round and over, and, in the case of the medical and surgical pavilions, under each, and considerable areas of grass and paved spaces left open on the north and south are reservoirs of air. By means of the many cross routes of varying breadth currents are induced. There is not a single enclosed court or area in the whole of the hospital.

The distance between each pair of pavilions is about 60 feet, and many buildings are separated by greater distances. Judged by the population standard, the Infirmary when full will not have more than about seventy to the acre. All the buildings are necessarily connected together for administrative purposes, but the connecting corridors are all partially enclosed on both sides on all storeys, and are so designed that the apex of the roof of each is well down below the floor of the upper storey, allowing the air to pass through in an uninterrupted course. The roofs are of glass, with wide projecting eaves over the passage way, and these projections, with the iron close balustrade, effectually protect the pedestrian from normally inclement weather. The communication of fire or smoke from one building to another is impossible, as any flames escaping from a building would break the glass roof and isolate a fire.

The air around the Infirmary, although sometimes—perhaps generally—charged with smoke or carbon, is practically pure in that judged by the carbon-dioxide test it contains only about five parts per 10,000 as against three in the mountain wilds of Scotland, and the currents passing round every side of all the buildings are admitted directly into every room, ward, or other compartment, by means not only of windows, but of other openings which, if windows be closed, will give an abundant supply of air for every occupant.

Pure Water.—It is now a good many years ago that a crusade against storage cisterns in weekly tenement houses was started, and the external standpipe off the main for common use became an institution. Inconvenience sometimes arose in case of a burst main or a sudden frost, but another standpipe was available at no great distance. In a large hospital the loss of a water supply from either cause would be a calamity, and so cisterns of large capacity were considered a necessity, to provide not only for current use, but for storage during a reasonable period to cover the maximum possible stoppage of public supply. In the Infirmary, however, we tried a better way, and obtained supplies from three separate mains coming from different sources. We connected all three to a large ring main in the warmed subway within the hospital. The concurrent failure of all three supplies is practically an impossibility. There are no cisterns at all for any of the ordinary purposes, and every sink, lavatory, bath, water-closet, fire service, standpipe, &c., is supplied directly from the main with fresh and pure water. This incidentally saved the cost of all cisterns, service pipes and their fittings; all ball-valves and overflows, safes and cistern housing; as well as the maintenance of all and the periodical cleaning out.

In this connection another sanitary arrangement may here be referred to. The overhead flushing cistern for w.c.'s has been abolished. The cistern of white glazed ware with glazed lid, has been placed on the closet under the window, and the apparatus is actuated by the door. Instead, however, of the usual iron rod and lever mechanism, a wired tube is substituted. The mechanism ensures that the flush shall occur only on the alternate opening of the door, saving 50 per cent. of water as compared with the old system. It should be stated that all pipes used for cold water are either cast-iron or tin-lined pipes, and for hot water cast-iron, copper, or nickel pipes.

Sunlight.—Every pavilion has its axis practically north and south. Every large ward has windows all round three sides—east, south and west. The distance apart of the two-storeyed pavilions, between the large wards of each, is about twice the height from the lowest window sills, so that direct rays enter the lowest window when the sun is 24° above the horizon; and where there are three-storeyed pavilions, in the same rank, the diminution on *one side* only, as compared with two-storeyed wards, is at the equinox only a loss of one and a third hour. One three-storeyed ward has all the sun's rays when it is 5° above the horizon. The out-patients' department is isolated, and the sun's direct rays enter every part when the luminary is 7° above the horizon on the east, and 24° on the west. The septic pavilion is so isolated as to have all the sun's rays. Every room in the administration and teaching blocks has direct sunlight.

The Nurses' Home is broadly a U-shaped block open to the south, with horns on the east, and every room on ten of its eleven faces has direct sunlight. The laundry is detached, and open to almost every ray of sunlight, and the workshops face west. The kitchen department has direct sunlight on every part, except to the larders which all face north. I have now only to mention the theatres. These are each units of seven rooms. The theatre proper intentionally faces north, but every other room has direct sunlight.

Drainage.—We now come to the last branch of hygiene: the removal of sewage and other deleterious matter. The problem in so large a place as the Infirmary is akin to that of a village within a town. We have within the curtilage 4⅓ miles of drains. Two main drains run east and west into the Oxford Road sewer, and one into the York Place sewer.

* Abstract of a paper entitled "Manchester Royal Infirmary from the Hygienic, Sanatory and Æsthetic Points of View," by Edwin T. Hall, V-P.R.I.B.A. (Member of Council), read at sessional meeting of the Royal Sanitary Institute, Manchester.

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These are efficiently disconnected from the public sewers, and are all ventilated in such a way that it is impossible for sewer gas to collect. They are divided into sections with inlet and outlet ventilators to each, and some sections have special shafts fitted with hydraulic fans for air extraction. Every building has its complete system of drainage disconnected from the main drains, all separately ventilated, so that nothing can be communicated underground from one to another. The manholes at frequent intervals are specially made of the same glazed ware as the drain-pipes. The bottom sections, with all the various branches at the required angles, are in one piece, each having been made from a separate drawing. The branches are about three-quarter pipes in sections, and the benchings have steep slopes. Every drain can be swept between two manholes. All gullies from sinks, lavatories, and baths are taken into the soil drains and are ventilated. The rain-water drains are separate from those for soil, and are disconnected from the soil manhole, into which they ultimately discharge. It is a usual practice to put flushing tanks at the head of soil drains, but the expense of water is great, and this expense has been obviated here by inserting on the rain main drain just before its entry into the soil manhole an automatic flushing tank, so that instead of a small and regular stream trickling through, the rain-water discharges in volume and at considerable velocity, and so scours the soil drain. All manholes in rain drains have gridiron covers, so that the pipes are always open to be sweetened by fresh air.

Soil pipes are of lead, and all branches are of the same internal diameter as the traps of closets, while every one of the traps is separately ventilated. Lavatory, bath and sink stack-pipes are carried up above the roofs as ventilators.

Smoke abatement.—In the Nurses' Home, a building of about 250 rooms, there are only coal fireplaces in the sitting rooms, about a dozen in all; and there are none in the general servants' bedrooms in the centre block, or in the men servants' bedrooms. In the large teaching block in Oxford Road there are only about ten. The general heating in all these buildings is by hot water.

Heating.—Until recent years the method of heating a large congeries of buildings such as this was by placing a calorifier, supplied by live steam, in each building, the circulation within the building being by gravitation. The expense of this in plant and maintenance and in steam is great, and the labour involved in the supervision of such mechanical calorifiers at a distance is considerable.

Some ten years ago I introduced a new system into a large hospital by which the whole heating was done by one calorifier adjoining the steam boiler house under the eye of the engineer, and pumping the circulation all round the buildings.

This system has been adopted in the new Infirmary. From the calorifier duplicate ring mains run in reverse directions all round the subways. Off each of these subsidiary circulations are taken which supply half the radiators in each building, so that in the very rare occurrence, on a low pressure system, of a broken joint, no building can be without heat at any time. With a broken joint the circulation in the affected ring main is not stopped, but by means of three way valves the water is merely shunted on to the other main while the repair is made.

The supply of all hot water to baths, lavatories, sinks, &c., is on exactly the same system from an adjacent calorifier. The steam mains on the boilers are in duplicate. The total length of water and steam pipes in the buildings is about nine miles. A considerable economy has also been effected by collecting all exhaust steam and condensed water, filtering and re-using both either in the calorifiers or in the boilers.

Artificial Lighting, &c.—The electric supply for lighting is taken from two separate Corporation stations, the light in each pavilion and theatre being divided between the two sources of supply. The same power is used for lifts, machinery motors, sewing machines, refrigerators, mincing and coffee grinding, and other culinary apparatus, for ventilation, and for other purposes. In every building we have also placed emergency gaslights, and it may be added that all gas for these, for cooking, &c., is taken off two separate Corporation mains and connected to a ring main as before described.

We next come to the second or Sanatory branch of our subject, or that pertaining to therapeutics—the healing of the sick. The province of architects is to provide means for the utilisation of hygienic conditions to assist in restoration to health.

The Pavilions.—Having sketched the hygienic environment, it becomes important to show what are the buildings provided and how they are designed for sanatory purposes. A description of one pavilion will be sufficient for all.

This is detached, and each floor is entered from the north, whence a wide corridor of glazed brickwork leads to the main ward. On either side of the corridor are small wards, a kitchen, and various stores. By large opening fanlights above the doors, reaching to the ceiling, and similar fans over the external windows, cross currents are obtained for constant æration of the corridors. The large ward is a parallelogram giving about 130 feet of floor area, and about 1,800 cubic feet to each bed. Its floor is of linoleum, its walls painted and varnished. There are no ledges, and all angles are concave. All doors are of polished wainscot with sides in plain unpanelled sheets. It has windows all along both the east and west sides and at the south end. The ratio of window to floor area is one to four.

All windows are designed to open to their full extent. Every window has, in addition to a pair of sashes, a fanlight reaching to the ceiling, opening inwards with guarded cheeks, and adjustable to suit the velocity of the wind.

To maintain the purity of the air inside the wards, all gas lighting, except emergency fittings, has been excluded.

The open window is sometimes not possible, and provision should be made for an adequate supply of fresh air even if all windows be closed. The provision here made is for fresh air to enter at the back of the hot water radiators under the windows in such volume that at a low velocity the atmosphere of the room may be changed three times per hour. The admission is controlled by a valve to regulate the volume. At a higher velocity this change may be increased in frequency at discretion. The air passes over the radiator, so that the ward may be heated to a temperature of 60°.

For extraction there are two shafts from every large ward fitted with electric fans, which even on the stillest of days ensure the passage of air through the ward. There is one fireplace, all of faience, at the south end for cheerfulness.

At the same extremity of the ward are the detached sanitary towers, the one containing bath, &c., the other w.c.'s and sink room. Both towers are heated. For bathing a glazed ware bath is provided of special design, with a wide flat anti-splash rim on which a patient may sit. All baths and lavatories are discharged into open channels, and insanitary horizontal pipes are avoided. Provision is made for bedpans to be kept warm, ready for use.

For the quiet of patients the floors are sound-proofed by hollow floors and through wind currents.

Freedom from anxiety as to fire is afforded by hydrants fitted on every floor, with hose ready for use, and from every pavilion there are alternate egresses on each floor directly to the open air.

For *fresh air or sun baths* each pavilion is furnished with two sun balconies wide enough for beds, facing south, but otherwise sheltered from cold winds.

Out-patients' Department.—This contains a hall 120 feet by 41 feet, the floor of which is of patent stone, the walls of glazed brick and stone, and the ceiling is semi-elliptic in section. It has channels in the floor to enable squeegees to be used all over. It has windows on all four sides (all made to open), and a skylight at the apex of the ceiling. Fresh air is brought into the hall near the floor level behind the radiators, and in the turret is an electric aspirating fan.

Surgical Theatres.—The theatre units on the surgical side are in detached blocks to the north of the pavilions, where they are quiet and free from all distraction. Each unit consists of seven rooms, of which the anæsthetising room, the theatre, and the sterilising room are cut off by a cross corridor from the others. These have terrazzo floors, marble walls and opal glass ceilings; all can be washed down by a hose or wiped by hand, there being open floor sinks to take away all liquids. The doors, like those of the wards, are of smooth polished wainscot slabs without panels. The day lighting of the theatre is by windows and skylights on every floor, all having double panes of glass, and steel casements. The inlets of fresh air are protected by specially designed filter screens and the extract at the roof is by an electric fan.

The heating is by steam for purposes of rapidity, and so designed that temperatures from about 60° to 90° may be obtained to suit the operator. All lavatories, sinks and shelves are in the sterilising room attached, and are either of glazed ware, marble, or glass. The fittings, to avoid the dust of cleaning, are of nickel plate, and so are the supports of the glazed screen which partially separates the students' gallery from the theatre. This gallery is of marble and has a separate entrance. The electric lighting of the theatres

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has received a great deal of attention from the surgical staff and varies in each to suit separate requirements. A low tension service for head lamps and instrumental work is laid on to all.

Reference should be made to the filtration of water for drinking, &c. Attached to every ward, to every theatre, and elsewhere, are twin simple filters, one for hot and one for cold water, connected by an arch with a bib outlet on which is a thermometer. Filtered or sterile water can thus be obtained at any required temperature for drinking, fomentations, poultices, &c.

Dietary.—In addition to the hospital kitchen each pavilion floor has a ward kitchen, with a gas kitchener and hot closet, specially designed, and so arranged that, without disconnection of the service, it can be wheeled out of the fireplace for keeping the recess clean.

The hospital kitchen, an apartment 60 feet by 35 feet by 29 feet high, and two large adjacent sculleries, of white glazed brickwork throughout, are fitted with a complete plant of every kind of apparatus for varied dietary, the caldrons tipping to pour out as simply as a cream jug. The gas fires on the tables are automatically turned on or shut off when saucepans are placed on or taken off, effecting an immense saving in the gas bill. Adjacent is a room for teaching cooking to the nursing staff. As part of the same block we have stores for all the varied goods required for nearly 1,000 people, and adjacent are the dining-rooms for all the varied sections of the staff and servants. (See *Architect*, Jan. 11, 1907.)

Safeguards against bacteria.—The obvious precaution against infection is the provision of a septic pavilion for the segregation of persons suspected of infection. This is to the south-east, there being a minimum zone of open ground of 40 feet, which has been shown to be effective, except in the case of smallpox. That disease will, however, probably be treated elsewhere. In this pavilion provision is made for the residence of the nursing staff and servants. At the out-patients' department there is an external ward to which an infected case can be at once transferred, and thence taken to the infectious hospital.

The doors of larders which face the windows are open panelled, and these panels and the windows are filled with copper gauze to exclude flies.

A steam disinfector capable of taking several mattresses at a time, is installed in the covered way at the entrance to the laundry, the infected side being absolutely shut off from the disinfected side. This is accessible through the open air from any building in the Infirmary. There are steam sterilisers in every theatre unit, for dressings, &c., and also for instruments.

Scalding sinks are fitted to every pavilion floor for cleansing vessels after use. A destructor for burning all infected food or other septic waste is installed near the boiler-house.

And lastly, the mortuary is a building containing thirteen double cubicles all refrigerated, so that decomposition or dissemination of noxious gases or germs are prevented.

Housing of the Staff.—In the home at the Infirmary (see *The Architect*, Jan. 4, 1907) every nurse has her separate bedroom, with a minimum of 1,000 cubic feet, ventilated and warmed. The exhaust ventilating flue from every bedroom is fitted with an adjustable valve. All upcast flues are collected into main trunks on the roof, ending in a vertical shaft in which is an electric fan; and the same principle is adopted in the servants' quarters. There are separate sitting rooms for sisters, nurses, and probationers, common recreation and reading rooms, a class room for lectures, besides separate quarters for assistant matrons and night superintendents. There are a large number of bathrooms and other conveniences, and all these are in towers or wings away from, but convenient for, all bedrooms. There are in this building five staircases affording alternative exits in the event of fire, and four of these staircases go to the flat roofs, whence extensive views are obtained. In the nurses' quad, open to the south, a tennis-court is provided, and there are ample stores for bicycles, &c.

The nurses' dining room, a large detached apartment with separate small tables, is so arranged that on special occasions it can be converted into a concert room. The servants are also located in ventilated and warmed bedrooms, and they also have separate sitting and dining rooms for every grade. The resident medical officers are quartered in the administration and teaching blocks, each with a sitting and a bedroom, in addition to common rooms. The offices consist of general and medical board rooms, each about 50 feet by 20 feet. The general superintendent's offices are in close proximity, and he has a comfortable residence in one wing of the building, the lady superintendent and the housekeeper being located in the other, with the general servants on the upper floor.

Teaching.—Another important sanatory adjunct is teaching, which is provided for in the north-west block in Oxford Road. (See *The Architect*, Jan. 18, 1907.) This contains separate common-rooms for male and female students, a large reading-room, a library, a museum, and a lecture theatre to seat 200. The theatre is ventilated by the admission of fresh air at many parts to change the whole atmosphere of the place at least three times an hour, with an extract fan in the double dome. Further provision is made for students in galleries in all theatres and in the consulting rooms of the outpatients' department.

Every member of the honorary staff on entering the Infirmary presses an electric button, when his presence is announced by means of indicators in every part of the hospital with which he is connected, including the out-patients' department. It hardly needs to be mentioned that every building is in telephonic communication with the others, and it should be added that electric clocks are installed everywhere, controlled and synchronised by a master clock, so that the same time exists throughout the Infirmary.

I now come to the last division of my subject.

The Æsthetic.—The superficial man may say, what has the æsthetic to do with the healing art? Is it not the science or art which deals with the beautiful, that which appeals to the senses? It is in this appeal to the senses, and I would fain hope to the imagination, that its curative value should be considered. I think the science of æstho-physiology deals with the organs of sense, of sensation and the influence of externals on the nervous system. The Greeks in surrounding themselves with objects of art had no doubt a keen sense of their value, not only in giving pleasure, but in their power to refine and cultivate the mind and raise it above sordid and morbid thoughts, above the trials and petty worries of life. The raison-d'être of our art galleries is based on these considerations. Their value to the people is undoubted.

In the Infirmary (see *The Architect*, July 5, 1907) the aim has been to make the external design impressive with dignity and stability, expressive of spaciousness and hospitality, appealing to the sick who enter to do so in hope, to feel that there is room and welcome for them in the place that generous hearts have raised for their especial care; and having entered to find in the ordered symmetry of the buildings with their air of repose, their sunlit rooms and pleasant quiet surroundings that which soothes their jarred nerves, stimulates their minds, and makes them responsive to the scientific skill that tends their bodily infirmity.

In the patients' wards themselves the colour scheme is simple—warmth suggested in the dado, while the pale green above is restful to the eye; the sense of freedom and expansiveness is given and felt in the ample and all round window lighting with the grass and trees beyond.

And last of all the buildings is the chapel (see *The Architect*, October 30, 1908). The æsthetic aim has been to mark a place apart where peace prevails; where harmonies in colour and in music may play their part; where the graces of faith, hope, and charity divine, so brilliantly depicted, may make their own appeal; where all may reverently join in prayer and praise and learn the allegory of the sanctuary rail: that from the hardest cross with patience borne shall spring the fairest flowers of character, and the weary soul shall be refreshed by communion with the source of strength.

LONDON COUNTY COUNCIL ARCHITECTURAL PRIZES.

A NOTICE was inserted in the *London County Council Gazette*, and information was sent to the polytechnics and technical institutes, with reference to the award of prizes for museum and architectural studies. One prize of 10*l.* and two prizes of 5*l.* each are offered for sets of carefully executed drawings of buildings, churches and of artistic objects in museums. The drawings for which prizes are awarded become the absolute property of the Council, and the work must have been executed since Easter, 1908, and not previously submitted in another competition. The examiners report as follows:—"The drawings submitted this year are admirable. Fifteen students in all competed and the quality of their work is higher than ever before. We recommend for the first place (prize 10*l.*) Helen Consey, for the second (5*l.*) John E. Tarbox, and for the third (5*l.*)

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Eva Dunn. We wish also to commend highly the drawings of William H. Broad, and to recommend that they be purchased for 5*l*. Excellent drawings were also submitted by Dora Bard, Elfrida Dadd and Mary Gilbertson, but they sent only one drawing each." With regard to the purchase of the drawings of William H. Broad, the education committee do not consider it advisable to carry out the examiners' recommendation, as the purchase of the drawings is, in effect, the same as the award of an additional prize of 5*l*., and in view of the importance of maintaining a high standard they think it undesirable to increase the number of prizes.

The Council on April 15, 1908, had before it a report dealing with the competition for the prizes in that year, and resolved that in the educational year 1908-9 one prize of 10*l*. and two prizes of 5*l*. each be offered for museum and architectural studies, and that the question of the continuance of the award of the prizes be considered in 1909. In view of the favourable terms of the examiners' report, the education committee recommend that, until further order, the award of prizes for architectural and museum studies be continued, and that one prize of 10*l*. and two prizes of 5*l*. each in respect thereof be offered annually.

Correspondence

[The Editor will not be responsible for the opinions expressed by Correspondents.]

Steelwork.

SIR,—I have just read the article by Mr. Childs in *The Architect* of January 15, and with your permission I propose to comment upon the statements therein put forward.

At the outset I think your readers should be made acquainted with the fact that Mr. Childs is professionally interested in a fireproofing company, one of whose specialties is an ingenious variety of reinforced concrete floor. Consequently his opinions and arguments cannot be accepted in quite the same manner as those of an independent engineer.

On reading the article for the first time I wondered why the representative of a reinforced concrete firm should think it worth while to try to disparage the value of that material, apparently to the detriment of the business conducted by his company. But after a second reading it became obvious that the article was only directed against the use of reinforced concrete for purposes other than the construction of indoor floors. Arguments of the kind are perhaps legitimate in commercial prospectuses, but I scarcely think they are appropriate to the columns of a professional journal, especially when the interested status of the author is not announced.

The figures upon which Mr. Childs relies for support of his pleading are approximately correct up to a certain point, although they tend slightly against reinforced concrete, and, as I will show, they are not correctly applied. Thus, while the extensibility of plain concrete is one 10,000th or 0.0001 of its length, the elongation of steel for the tensile stress of 7 tons and the usual value of the coefficient of elasticity of 30,000,000 lb. per square inch is one 1,900th or 0.000523 of its length, instead of one 1,700th of its length, as stated.

Then in a beam where the maximum tensile stress of 7 tons per square inch is developed in the steel at the middle of the span, the steel will elongate at the same point 0.000523 of its length, and the concrete, after elongating 0.0001 of its length, must further elongate or open out in some way to the proportionate length of 0.000523−0.0001 =0.000423.

Mr. Childs probably knows, but omits to say, that the maximum tensile stress due to bending moment obtains only at the middle of the beam and progressively diminishes towards the ends, where the value is zero. It is important that this variation of stress distribution should not be overlooked, because the strain in the concrete diminishes from the middle of the span in like proportion, and also because it shows that the maximum stress cannot extend along "a two-foot length of the beam," as Mr. Childs implies. The variation of stress intensity in a two-foot length might be small, and for the purpose of a supposititious computation it may be neglected. But it is manifestly incorrect to suggest that the uniform elongation of a steel bar could exert force so unequally as to cause only one crack to open in a two-foot length of the embedding concrete.

The investigations of Considère in 1902, those of Mesnager in 1903 and the second series by Considère in 1904 showed that reinforced concrete was capable of elongating without cracking from ten to twenty times the extent possible in the case of plain concrete. This conclusion was accepted by authorities such as Emperger, Hatt and Sanders, but Talbot and Turneaure in America afterwards succeeded in detecting very minute and numerous cracks in reinforced concrete beams, where the concrete had apparently elongated in the manner observed by Considère and the other authorities mentioned.

While the correctness of Considère's results has never been disproved, it is tolerably certain that very small cracks appear on the surface of practical beams after the concrete has elongated beyond the proportion of 0.0001 of its length. These cracks, however, are invisible without the aid of a microscope, and, as Talbot and Turneaure state, are numerous and quite well distributed.

Consequently, instead of one fissure in a two-foot length of a beam, there are probably hundreds of invisible hair-cracks, by which, as Professor Turneaure says, "the steel develops the full extensibility of a non-homogeneous material that otherwise would have an extension corresponding to the weakest section."

If there really were but one crack in a two-foot length its width at the level of the steel would be (0.000423×24) =0.00105 inch, or one 100th inch, instead of one 70th inch, as given by Mr. Childs, and even assuming ten hair-cracks per inch length of the beam, the width of each would be no more than (.000423 ÷ 10) = 0.0000423 inch, or one 23,600th inch. Thus the single large crack imagined by Mr. Childs for the purpose of trying to demonstrate the dangers of reinforced concrete, when not applied in the particular manner favoured by his own firm, is 330 times wider than the probable width of fine hair-cracks such as those discovered by Talbot and Turneaure.

Of course, the hair-marks would develop into wider, longer and deeper cracks if excessive strain were put on the reinforcement, and if the concrete were of poor quality or badly prepared it might fracture at one point in a beam. Diagonal cracks may also appear in beams which are not properly reinforced against tension on diagonal planes. I hope no unhappy contretemps has led Mr. Childs to suggest the creation of a single crack as a normal feature in a two-foot length of a beam; my own experience of numerous well-designed and carefully constructed reinforced concrete beams being that no cracks of any kind are observable under test loads involving stresses up to more than 10 tons per square inch in the steel.

Having now made clear the actual extent of any hair-cracking tendency that may develop in properly constructed reinforced concrete beams, I should like to add a few words relative to the probability, or rather the improbability, of corrosion on the surface of the steel bars.

The rusting of steel does not occur except in the simultaneous presence of water, oxygen and an acid. If any of these agents be absent very little corrosion takes place, and what is more important still, the presence of an alkaline compound will prevent the process of rusting.

Although air would naturally gain access even to the interior of a crack so small as one 23,600th inch wide, and moisture might work its way in against the pressure of the confined air by capillary attraction, there could be very little chance of the moisture penetrating to the top of so minute an aperture, and the presence of acid would be a still more remote contingency. If all three agents were present there might be the risk of corrosion over an area measuring, say, ¼ inch by one 23,600th inch on each bar of the reinforcement. Your readers can decide for themselves whether the possibility is one justifying the alarming prophecies of Mr. Childs.

But there are further reasons for dismissing his gloomy forebodings. They are to be found in the facts (1) that the Portland cement around the steel is an alkaline compound abundantly capable of neutralising any infinitesimal quantity of acid that could find its way into an invisible crack; and (2) that the water mixed with the concrete combines with the surface film of rust always present on the bars before use, forming an insoluble, impenetrable and permanent compound, which effectively protects the metal from corrosive agencies.

Beams used out of doors in the ordinary way are practically as well protected from moisture as beams in a building. The under side is generally shielded from water, and the proportion of moisture and acid gases contained in the air is much smaller than that in any building occupied by human beings and animals and in many buildings used for industrial purposes. If Mr. Childs's arguments were valid

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it might even be said that the steel in reinforced concrete beams employed indoors is in greater risk than the steel in similar members situated in the open air. Mr. Childs is playing with what he probably imagines to be edged tools in a way that would be dangerous to his own interests if the tools had any edge in reality. Of course, in the case of compression members, which are very largely used in reinforced concrete construction, no question of the kind discussed by Mr. Childs can possibly arise.

In conclusion, I wish particularly to express my conviction that what Mr. Childs has written has been put forward in perfect good faith, but I am afraid that he has been influenced, quite unconsciously, by environmental influences. On the other hand, he may possibly consider me to be one of those referred to in his article as "enthusiasts" possessed by the "craze" for reinforced concrete construction. That point and the subject generally, however, are matters which I am content to leave to the judgment of your readers.—Yours faithfully, W. NOBLE TWELVETREES.

London, S.W.: February 13, 1909.

Consett Schools Competition.

SIR,—I have no doubt you have been interested in the above competition. Conditions were sent out to architects for competitive plans, the award made, and now "circulars" have been sent out to the "unlucky" architects asking if they object to the plans being returned "minus the strainers." I think it hardly fair, after all the trouble taken in the preparation of the plans, having them returned in this fashion just to save expense. Some architects go to a great expense in competitions, and if this is how their plans are to be returned, it is time competitions were "off." COMPETITOR.

St. Paul's.

SIR,—As the central object in London, everyone's attention is called to the cathedral, and a few remarks upon it may not be uninteresting to your readers. It often struck me how picturesque and scenic it was, and I used to wonder that it was not more used as a subject by artists. For instance, I cannot call to mind a picture of it by Turner, or any of the great artists, and yet everyone must be struck with the beauty and picturesqueness of the views of it from every side. It is so wonderfully broken up and divided into separate views and pictures. This is not at all a characteristic of Greek, Roman, or Renaissance architecture, but is distinctly the character of Gothic. The great western façade is divided into two storeys by two rows of columns, and curiously there was no necessity for this, as it is neither a two-storeyed building nor are there any side aisles necessitating this, as in a Gothic church. I remember noticing this when I saw the great pillars of St. Peter's at Rome stretching right up to the top of the main building, and in temples like the Parthenon at Athens the Doric columns rise from the floor, and carry in one piece the entablature and the pediment. In fact, the great columns in Westminster Abbey and the French cathedrals are more Classic in feeling than Wren's internal and external columns. It is curious to note how Wren's pupil Gibbs, in the church of St. Mary-le-Strand, follows his master in designing a two-storey Renaissance building, but afterwards in St. Martin's-in-the-Fields gives us a purely Classical one-storey temple. John James, in Marylebone and St. George's, Hanover Square, gave us good examples of how noble and grand a single row Greek temple façade of columns, in height reaching to and carrying the entablature, can be made. As Goethe says:—"So largely designed and carried out, I do not know how it came about that Wren, a Renaissance architect, came to build in the Gothic spirit." Whether it was his own fancy or imposed upon him, some of your readers may be able to tell us. I am glad to have had the opportunity of calling their attention to the fact.

H. W. FAWCUS.

Walden House, Marylebone, N.W.

Mr. R. S. Lorimer, R.S.A., Edinburgh, has been appointed to advise the green committee of St. Andrews' Links as to the Tom Morris Memorial, for which 600*l.* has already been subscribed.

Mr. H. F. Kerr, A.R.I.B.A., 62 Hanover Street, Edinburgh, has been appointed architect for the David Murray Homes. The trustees are now looking for a suitable site of about two acres in extent, in the neighbourhood of Edinburgh.

GENERAL.

Mr. G. T. Hine, architect, Westminster, S.W., has been engaged by the Hampshire County Council as architect for the erection of an asylum at Park Prewett. In 1902, when it was decided to postpone the building of an asylum, Mr. Hine was paid 465*l.* 15*s.* for his services in connection with the work of planning the asylum, and it was agreed that that payment should merge in his ordinary 5 per cent. commission on the completion of the work.

The Establishment Committee of the London County Council recommend that 890*l.* be paid to Mr. W. E. Riley, the Council's official architect, in part payment of his services in connection with the new County Hall. The Council state that, apart from the large amount of work Mr. Riley has done in connection with the plans of the new County Hall, heavy and responsible duties devolved upon him as one of the assessors in both parts of the competition, and although his fellow assessors were each paid the sum of 1,050*l.*, Mr. Riley has not received any remuneration for this special work. The commission on the work is to be paid in the proportion of nine-tenths to Mr. Ralph Knott and one-tenth to Mr. W. E. Riley.

A Further Portion of the stained-glass collections formed early in the nineteenth century by George Weare Braikenridge, of Broomwell House, Brislington, near Bristol, will come up for sale at Messrs. Christie's on Friday next, and will comprise the extensive collection of stained-glass panels of the fifteenth and two succeeding centuries. There are seventy-six lots, Dutch stained glass forming two-thirds of the whole collection.

The Carnegie Dunfermline Trust are carrying out a scheme of operations, with the sanction of the Crown authorities, with the view of laying bare more of the ruins of the monastery connected with the Dunfermline Palace. Large quantities of forced soil are being removed from the base of the walls with the object of revealing the base courses. Along with that work the trustees are preparing for a scheme of street widening on both sides of Monastery Street, which will not only render the conduct of traffic safer in view of the narrow neck at the Pend, but will throw the massive walls of the Palace and monastery into more prominent relief.

Mr. Norman, the chairman of the establishment committee of the London County Council, stated in reply to a question on Tuesday that the amended plans of the elevation of the new County Hall were now before the professional assessors, and when they came back from them they would be submitted to the Council. He saw no objection to the amended plans being shown so that the public might view them, as was the case with the original plans.

While Preparing the municipal cricket pitches on the South Common, Lincoln, workmen have unearthed broken portions of a memorial tablet of the Roman period. It was found that, with the exception of two letters, the inscription was intact. The relic has been removed to the Lincoln City and County Museum, and the inscription has been translated as follows:—"Gaius Valerius Maccenas, the son of Gaius, soldier and standard bearer of the Ninth Legion called Hespes; he served thirty-five years and saw thirteen campaigns. He gave orders in his will for the erection of this monument. He is buried here."

The First of the Series of Lectures on the "History of Art in Europe," by Mr. Windsor Fry, was delivered at the School of Art, Crystal Palace, on Monday evening last with limelight illustrations. A chart illustrating the whole period from the fourteenth to the nineteenth century in the different countries was displayed, and a very interesting discourse was given on the Giotto frescoes and the artists of the Florentine school, who were often architects and sculptors as well as painters. The Sienese school of painting was also touched upon.

At the Meeting of the London County Council last week a member asked whether any precautions against fire were taken at the Royal Albert Hall; whether the building was inspected by the Council's officials; and, if not, whether it was not the only building which was not so inspected. The chairman of the theatres committee replied that the hall had not been inspected by the Council, and the Council had not been asked to make an inspection of the building. The facts with regard to the hall were reported to the Council on July 10, 1906. According to the terms of the Charter, the hall was exempt from the necessity of being licensed for music and also from the requirements of the London Building Acts. In view of its large size, it would, in his opinion, be well for the safety of the public if it were brought into the same category as other places of amusement.

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The Architect.

THE WEEK.

A MOTION on behalf of the Westminster Hospital, to restrain an interference with the lights of that institution by the new Wesleyan Memorial Hall, having come before Mr. Justice JOYCE in the Chancery Division on Friday last, his Lordship intimated to the counsel engaged in the case that, as charitable money was concerned on both sides, he proposed to appoint a competent and efficient expert to see the plans and report to him, thus saving the great expense to both charitable funds of *ex parte* affidavits. Counsel for the hospital said he would be glad if his Lordship would like to instruct a report to be made at once, but as the counsel for the Trustees of the Wesleyan Methodist Twentieth Century Fund wished to consult his clients on the matter, the motion was adjourned for a week, all proceedings with regard to affidavits being stayed meanwhile.

THE Earl of ROSEBERY, having been elected President of the London Topographical Society at its tenth annual meeting, last Friday, took for the subject of his presidential address the old Palace of Whitehall, the history of which he characterised as elusive, one reason for this being that the prints connected with it were rather those of what might have been than what was—illustrations of INIGO JONES'S designs for a palace that never existed. Another reason was that, though the Royal apartments were burned down in the fire of 1698, which was supposed to have put an end to the structure, the great mass of the Palace seems to have escaped. All that can now be described with any certainty as existing parts of the old Palace, besides the banqueting house, are a couple of cellars and as many windows, these latter being in the present passage leading from Whitehall to the Treasury. In one of the cellars the cocks were kept for the battles of the neighbouring cock-pit, which was on the site of the present Treasury. The other was a wine cellar underneath the spacious courtyard at the Charing Cross entrance to the Palace, where Carrington House used to stand. Another entrance to the Palace was the Holbein Gate, where Dover House now stands. This gate, designed by HOLBEIN for HENRY VIII., was carried away by the "Butcher" Duke of CUMBERLAND, to be placed at the end of the Long Walk at Windsor, since which nothing has been heard of it. The Palace precincts comprehended what is now called the Horse Guards, known then as the Tilt Yard, and also Scotland Yard. Stretching away to the left of the Holbein Gate, and on a line with it, were the Government Offices, and on the right a multifarious collection of Palace lodgings, extending nearly to Westminster, where there was another entrance, the King's Gate. The Palace was composed of a mass of unimposing buildings, a maze of dwellings and offices, with the magnificent banqueting house of INIGO JONES in the centre. Lord ROSEBERY concluded his address by emphasising the fleeting character of London, where nothing remained permanent, for our leases ran out just as our judiciously constructed houses were going to pieces. He exhorted the Society to garner up carefully what was worth preserving of a great city, built not for time or posterity, but for the business exigencies of a leasehold tenure.

THE future of the India Museum at South Kensington is a very pretty question, and one as to which there is hardly a possibility of agreement between the opposing parties, whose feelings are entirely dominated by their separate points of view. The official proposal to break up the unity of the present collection and to redistribute it among the various sections of the Victoria and Albert Museum, according to "material," commends itself to those who view the great art museum of the country as a means of study to specialised craftsmen, so that, for example, the designer for textiles may be able to readily compare the work of an Indian artist with that, say, of a Hungarian worker in the same material, recognising that design is not a thing apart, but is subservient to and regulated by the material to which it is applied. This view appeals therefore to those who consider the Victoria and Albert Museum as a place for the study of design, and to them the official proposal appears the right course to pursue. It is not surprising to those who know him that Sir CASPAR PURDON CLARKE, though no longer associated with our museum, upholds the official proposal. On the other side are ranged those who value the entity of the collection, either politically or archæologically, because it is Indian, and consider that its redistribution "would annihilate a most valuable means of learning to understand Indian art, and, what is more important, something of India itself." This is a perfectly comprehensible view, and one can readily understand that it is held by such men as Lord CROMER, Lord CURZON, and Lord ROBERTS; nor is it surprising that Mr. ERNEST GEORGE, the President of the Royal Institute of British Architects, Professor SIMPSON, and Mr. R. PHENE SPIERS are signatories of the memorials in favour of the preservation of the Indian collection, for architecture embraces all arts, and views Indian art as a whole. We think, however, that the memorialists go too far when they say "that the distribution of the Indian collection as proposed would not further a sound principle of education." The grouping together of the art products of various countries according to "material" as a means of studying design in any particular material is a perfectly "sound principle of education," though not perhaps so favourable to that precise phase of education to which the memorialists incline. The adoption of the views of the memorialists with regard to the Indian collection would logically seem to entail a similar treatment of the remaining exhibits in the Museum, and the art of France, of Germany, of Italy, and every other country should be similarly grouped. The Museum would then be rather for the dilettante and the casual visitor than for the serious student, and would thus miss what, after all, must be allowed to be its principal sphere of usefulness. The obvious solution, if it be possible, is the adoption of the ideal arrangement of an exhibition into which an international character enters, the arrangement in concentric and radial sections—concentric according to material and radial according to nationality, or vice versâ, as may be more convenient.

THE Americans have had so much more experience than ourselves up to the present with reinforced concrete construction, that due weight must be given to the opinions of one so well situated to form a deliberate and cool judgment as Mr. JAMES KNOX TAYLOR, Supervising Architect of the Treasury Department of the United States Government. He is reported by the *Washington Herald* to have said:—"I would favour the further use of reinforced concrete in the construction of Government buildings if it were possible for us to get a sufficient number of expert superintendents to take charge of the work. It requires careful and expert watching. I am afraid that we shall always encounter—or for a long time, at least—the same difficulty that we find now in its use, namely, that while we can easily get superintendents, we cannot get a large enough number of them who are highly trained in the use of concrete. There is too much danger in the indiscriminate use of concrete to permit us to try to make it a common material in the construction of Government buildings, unless, or until, this danger can be in some way eliminated." This is indeed the crux of the whole question in respect of reinforced concrete; absolutely capable supervision to ensure absolutely correct workmanship is a primary essential for reliability and for safety. Both the mixing of the concrete and the placing of it in position must be carried out with perfect fidelity to the prescribed and theoretical arrangement, or failure will result.

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THE ACROPOLIS OF ATHENS.*—II.

OUR author does not confine himself to the purely archæological questions relating to the architectural and sculptural remains of the Athenian Acropolis, but directs his readers' attention to some of the minutiæ that help to make its buildings pre-eminent in artistic merit. The first of these to which Professor D'OOGE alludes is the curvature of quasi-straight lines in the building of the Parthenon, and he rightly pays tribute to the painstaking and exceedingly careful investigations of the late Mr. PENROSE on this subject, the refutation of whose objectors is very ably and clearly stated. The Professor points out that the rule of curvature applies universally in the Parthenon, so that in the entire building there is not a single straight line of any great length; also that there is no vertical surface exactly plumb. The entasis of columns and the inclination of their axes are some of the results of fidelity to these principles. The effect of these refinements is well expressed by Professor D'OOGE when he says that they "produce in their totality an impression of elasticity and rhythm which every beholder feels as he looks with admiration upon this structure so full of life and grace." The difference in the point of view of the professional and the lay admirer of artistic work has seldom been more happily formulated. The lay beholder feels, the artist knows the effect of consummate artistic craft.

Professor D'OOGE has, however, missed two of the most important elements in the perfection of the Parthenon, and this although he instances so very small a point as the uniform depth of the flutings of the columns, which he tells us was maintained in order to produce as much shadow as possible at the top. The consequent effect of strength is undoubted. It is also to be found in the difference of character between Early English and Decorated mouldings, but practically it was also easier for the masons thus to maintain true alignment of the flutes as they were cut *in situ* from starting-points at top and bottom of the columns.

The elements that Professor D'OOGE has missed are, first, proportion, and, second, the contour of mouldings, both of which are more vitally important in producing the impression that every beholder feels than are the refinements to which the author refers. The systems of proportion that obtain amongst the best works of Greek architects have been excellently explained by Mr. PENROSE, and have probably more to do with the effect produced upon the beholder than any other element of the architectural design. Mr. PENROSE has also shown that, save—as we remarked in our former article—for the cymatium, every moulding in the Parthenon is a curve of conic section or a combination of such curves, and his extreme conscientiousness may be accepted as a warranty of the correctness of the facts that he discovered. This does not necessarily imply that ICTINUS and other Greek architects consciously observed the principles of proportion discovered by Mr. PENROSE, any more than that the principles of composition that RUSKIN pointed out as dominating the pictures of TURNER were consciously followed by the painter. A great artist may sub-consciously and instinctively embody in his work fidelity to great truths that are but faintly adumbrated in his active and conscious mentality.

The view has been advanced that the Greek architects drew the sections of their mouldings freehand, because it was not till after the completion of the Parthenon that mathematicians studied and described the parabola, the hyperbola, and the ellipse as sections of the cone. It is, however, comprehensible that curves of conic section were used by architects, because they are lines of constantly and regularly varying curvature, and hence give mouldings of exquisitely gradated chiaroscuro. They are besides perfectly easy to set out from the directrix and focus, and we venture to think that mathematicians would have been a long time discovering the importance of these determinants had they not been in practical use by architects. Our view that the Greek architects deliberately drew for the contours of their mouldings curves of conic section, without knowing that they were such, is strengthened by the fact that the parabola was earlier used than the hyperbola, and that in not a few instances of Doric capitals the vertical line through the plane of the abacus is the directrix of the curve of the echinus.

A most important factor in the work of Greek architects and sculptors that it is difficult for us nowadays to comprehend is their polychromatic treatment, and Professor D'OOGE appears to have adopted what we regard as the entirely correct view, that every particle of stonework, whether of Pentelic marble or less exquisite material, was coloured. There can be little doubt that the Greeks did not value marble as we moderns esteem it, for its surface texture, for if they had done so they would scarcely have covered it with stucco, as we know to have been their practice upon occasion. Crude and harsh as the primary colours used by the Greeks appear to our northern eyes, deadened to appreciation of polychromy by the practice of the eighteenth and nineteenth centuries, we must remember that in the powerful light of southern lands such brilliant colouring has a harmony that appeals even to us. In more northern latitudes bright colours, harmoniously used, are still pleasing to our untrained and atrophied senses. When FREIHERR VON HANSEN built the Parliament House at Vienna in pure Greek Doric style, he coloured a portion of one of his façades exactly on the lines of the Parthenon's polychromy, and the effect was decidedly satisfactory.

It is universally admitted that mouldings and projecting architectural members were coloured by the Greeks, as were also the backgrounds of sculpture in pediments and friezes. DÖRPFELD and some others hold that it was the custom of the ancient Greeks to leave plain surfaces of marble buildings untinted, but such a view is artistically unthinkable, and is, in our opinion, completely demolished by the recent experiments of some American investigators described by Professor D'OOGE, and particularly of Professor ALFRED EMERSON, who has arrived at the conclusion that the Parthenon and marble buildings generally, sculptures and all, were covered with a wash of calcareous matter—in other words, distempered—and that this artificial tinting is meant when VITRUVIUS says that the ochre quarries of Attica were exhausted by the old-time practice of painting the buildings with ochre. The patina of old Pentelic marble is far more likely to be due to such distempering with ochreous limewash than to the action of the atmosphere on any iron that may have been present in the marble. It is now beyond dispute that portions of the sculptures were coloured, and that accessory parts were of metal, in the form of weapons, wreaths, reins and bridles, sashes, sword-belts, &c., and it is therefore impossible to believe that in the best period of Greek art the whole of the sculpture was not coloured; the more so as we know for a certainty that this was the ordinary practice in earlier work.

The non-completion of the original designs of some of the great buildings of the Athenian Acropolis is well elucidated by Professor D'OOGE. Grand as it is, the Propylæa, "the brilliant jewel on the front of the rocky coronet of the Athenian Acropolis," is but a fragment of the original conception of MNESICLES, and the plan of the complete scheme, as very cleverly argued by Dr. DÖRPFELD, though necessarily largely a matter of conjecture and in some points open to objection, may at least be reasonably accepted as a legitimate speculation. Space does not permit us to fully discuss the line of argument followed by Dr. DÖRPFELD, and we must refer our readers to the very clear exposition by our author of the facts and the theories founded on those facts.

We are glad to find that Professor D'OOGE has placed before English readers the view now adopted by Dr. DÖRPFELD of the complete design of the Erechtheion. It is utter banality to describe this beautiful building in its incomplete realisation of its author's original design as an

* *The Acropolis of Athens.* By Martin L. d'Ooge, Professor of the Greek Language and Literature in the University of Michigan. (London: Macmillan & Co. 1908. 17*s.* net.)

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example by Greek architects of unsymmetrical planning. Students at the Architectural Association have years ago heard the argument:—"No architect who was not a fool would design a portico extending beyond the end of his building. The Greek architects were not fools. Therefore the Erechtheion must have been intended to project westward beyond the north portico and probably as far as the eastern end." This is the view now adopted by DÖRPFELD, who, in his plan, illustrated by Professor D'OOGE, makes the north portico the central feature of a symmetrical plan. To an architect it is preposterous to suppose that any other intention ever entered the mind of the great Greek artists. Everything confirms the probability of such an intention, and even the slight eccentricity of the caryatide portico, explainable as we have already pointed out, is no argument against this view.

We must not close without expressing our high appreciation of the account given by Professor D'OOGE of the sculptured remains of various dates, of the temples and shrines on the southern slope of the Acropolis, and of its history in the Hellenistic and Roman periods. We may characterise the book as a most able and interesting epitome of all that is known or conjectured about the Acropolis of Athens.

ARCHITECTURE: ITS TRUE PRINCIPLES.—IV.

By R. OWEN ALLSOP.

THE NATURE OF ORIGINALITY IN ARCHITECTURAL DESIGN.

THE knowledge of detail acquired by the student of architecture should not be regarded as samples to be "worked in" to a composition. The acquired knowledge of form and arrangement must go through a milling process in the mind, and there must be besides corn gathering a sifting of the chaff. There must be a bottomless pit. So long as any one piece of design is a stencil copy of some precedent, the hand and brain of the designer will be more or less completely paralysed. If this is a true statement—and we see no reason to suspect any flaw in the premises—it once for all explodes the "Order" theory. The matter can be tested for oneself. Let a design be laid down, and as a commencement a most exact copy of a Grecian order, base, column, capital and entablature be set as a key note. If the architect is an artist—*i.e.* has a sense of æsthetics—the whole of the parts added to such a design will be cramped and bound by the key note thus struck His brain will be in leading strings. Contrary to the great necessity for original action, the sense of fettering will be complete. True design is an inspiration, an initiative born of we know not what. The mind must be absolutely free and untrammelled, or the muse will be invoked in vain. Recently in the competition for the new London County Council premises a sketch plan was put before the architects as a suggestion. No greater mistake could have been made by the promoters of the competition. It is encouraging to find that this was quickly appreciated by the intending competitors. The objection to the arrangement was well put in the round-robin signed by several competitors, "This arrangement tends to destroy the real architect's enthusiasm and initiative (and) damages his self-respect." Self-reliance would possibly have been a better term, but the intention and sense is clearly correct. If we are seeking the best of another brain's assistance this latter must be left free and uncontrolled. To attempt to dominate another mind results—if the attempt is successful—in a weakening of the powers of the subordinate brain in measure to somewhere between the extremes of rebellious concession and slavish service. It is the death blow to all imagination. Practically the effect is to get less value in work from the servant.

If then, it may be argued, the mind of the designer must be free and untrammelled, and least of all a copier of old forms, we should avoid—should be better without—the study of bygone architecture. This we know is a wrong assumption. Sir JOSHUA REYNOLDS observes:—"The greatest natural genius cannot subsist on its own stock. He who resolves never to ransack any mind but his own will be soon reduced from mere barrenness to the poorest of all imitation; he will be obliged to imitate himself, and to repeat what he has before repeated."

The system of sketching affords practice in pencil control, and enforces close observation of the thing sketched and interesting mementos and records; but it may be stated as a general rule that no architect should require to refer to note-books save but for "motive." An author does not refer to his predecessor to copy his sentences, except as a direct quoted reference. The memory must be the storehouse, and reason the threshing and winnowing machinery that separates the good and useful from the dross. Unknowingly the designer may reproduce line for line the conception of another, but so long as he was unaware of the fact he cannot be stigmatised as a copyist. In the case of limited study and experience the production of the designer would certainly be at best a very strong echo of some of his special studies; hence it comes about that the more study of the work of others the more original one's own work becomes. If we have read only one author's book on any given subject, and then endeavoured to essay on this subject, we may rest assured that strive as we may the spirit of whole sentences of that author will permeate our production.



FIG. 12.—KARNAK.

On the other hand, if we have read largely all we can lay hands on bearing on the subject, the several ideas of the writers may be passed through the fire of thought, and with the exercise of reason and comparison—a large component part of the faculty of reasoning—we are enabled to give original views based possibly to some extent on a selective process, whereby we cast out what reason refuses to accept and put down what reason acclaims as true and sound. These opinions will be partly a recombination of old ideas and novel ideas suggested by old, and "originality" arising from inductive reasoning. The essential part of the process is that there should be evidence of brainwork.

If design is the impress of the right use of the functions of a healthy brain the mind must be the master of the whole work. There must be no superstition—no "standing under" any other brain. The action of the mind upon the matter of an architectural composition may be compared to that of the bee in producing honey. The material—the various flowers—differ, but one and all contribute to the honey which is one substance, just as there is homogeneity of character in the product of the brain—that is, what comes out of it after the act of right reasoning. There can be no two ways in dealing with the question of Orders of architecture. The Order must go as such, unless indeed reason and the eye together working repro-

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duce exactly the Doric, Ionic or Corinthian forms, proportions and details. Directly the brain ceases to work, as it does in a sense immediately we commence to transfer dimensions from old examples to new work, the artist dies and the machine-like copyist reigns in his stead. No logic can put the matter in any other light. It has been advanced that if we would reproduce an "Order" it should be correctly drawn. This may be so, but the question arises—of what value is the thing when reproduced?

Originality in architectural design, then, may be defined as the product of reason and knowledge. It assumes principle, and is the ultimate outcome of refinement and delicacy of the eye, the hand, and, indeed, also the heart. We have seen that originality should be sought in novel combination of old forms We do not sigh for some

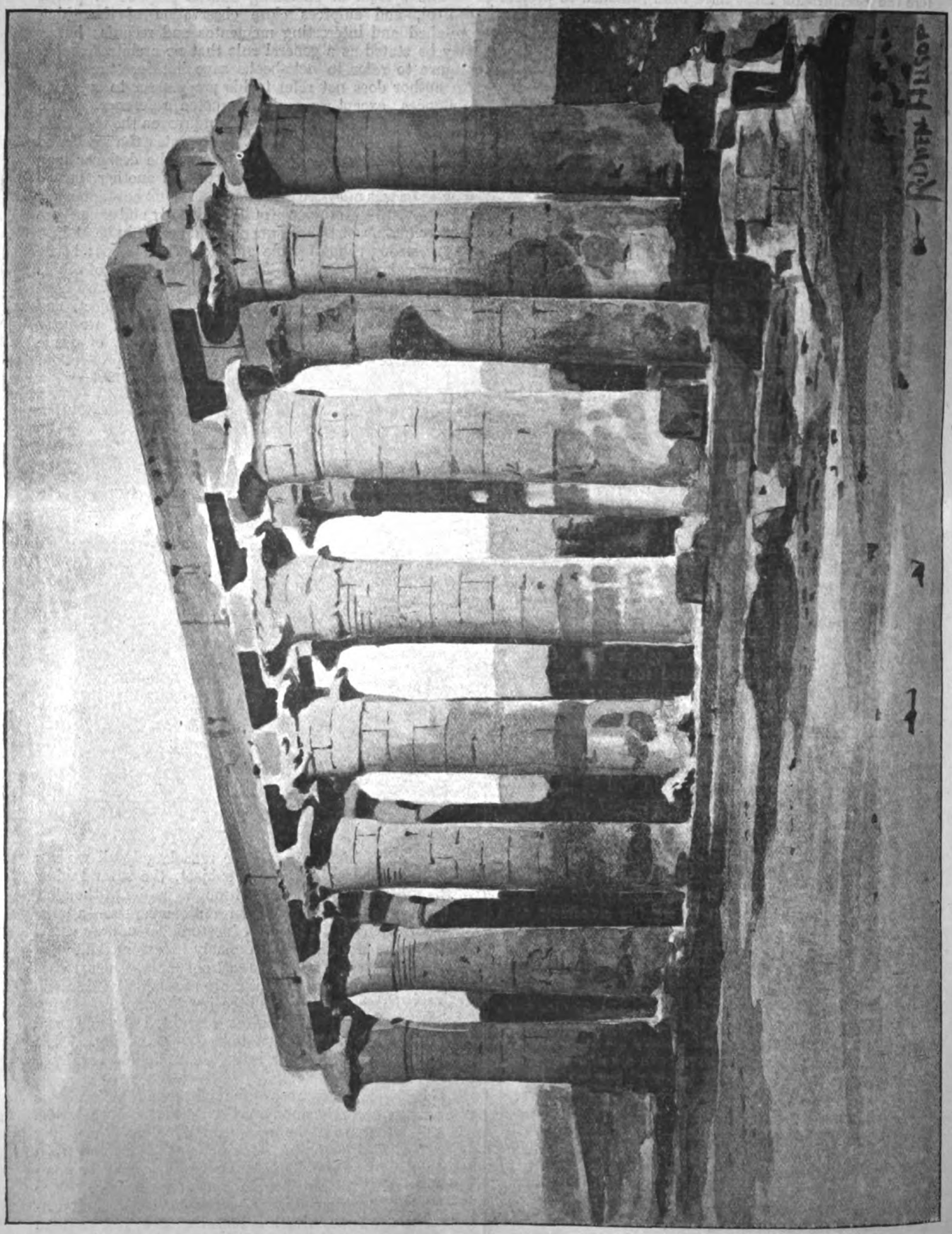


FIG. 13.—LUXOR

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substitute for the sphere, the square, the equilateral triangle or the circle. We can infinitely vary the surface its proportions, the line its length, and the angle in its degree.

The kind of Order that should more concern the architect is that which has been termed "Heaven's first law." Ungainly building masses are, fundamentally, the expression of disorder. A row of equal-spaced columns seems to please primarily by the sense of order conveyed. All arise from the same base line, have axes on one plane, and are truly "plumb." Majesty of effect seems to be in direct ratio to geometrical simplicity of main mass; hence a group of columns, such as Luxor, cannot but powerfully impress us although the amount of actual design may be small. Conversely, a scene such as that at Karnak depresses by its impression of disorder, relieved only by the perpendicularity of the standing obelisk and the relentless geometry of that which has fallen.

(To be continued.)

THE CONCRETE INSTITUTE.

THE third general meeting of the Concrete Institute was held on Thursday, the 18th inst., at the Royal United Service Institution, Whitehall. Mr. Edwin O. Sachs, F.R.S., Ed., the chairman, in opening the proceedings said it had been the custom at previous meetings to make an announcement as to the increase in membership of the Institute. At the first meeting there were 300, at the second there were 401, and in the intervening period the numbers had increased to 551. Mr. Lucien Serraillier then read a paper dealing with "The Commercial Aspect of Reinforced Concrete." The lecturer began by stating that the relation which subsisted between (*a*) the client or principal, (*b*) his technical adviser, and (*c*) the contractor in ordinary civil engineering and architectural construction was more complex in reinforced concrete construction, while the recent advent in England of firms which were endeavouring to popularise this particular industry has further intensified the complexity of this relation. The present paper was an attempt to define the duties and responsibilities towards each other of the various parties engaged in this class of construction, to explain the conditions which govern its exploitation, and to determine between (*a*) the principal or engineer and architect, (*b*) the specialist firm which confines itself to this branch of construction, and (*c*) the contractor, an equitable relation which should as far as possible conciliate all interests and eliminate those injustices which now unfortunately arose, undoubtedly through ignorance of those peculiar conditions rather than through intention.

The principal, or his technical agent the engineer or architect, hereafter called the client, had two methods at his disposal under which reinforced concrete work could be undertaken:—(1) He might design the structure himself, and either confide the work to a contractor under his supervision or else carry it out himself with his own gang of men; (2) he might entrust the design to a specialist firm, and either carry it out himself with his own men, or with his own contractors, or else get the specialist firms to do it themselves or through contractors selected by them.

The first method was the usual practice adopted in general civil engineering and architectural construction, whereas the second method might be said to be peculiar to reinforced concrete, although sometimes adopted for steelwork. The technical and practical difficulties of the reinforced concrete industry were of such a special nature that the client generally preferred to employ a specialist firm, to whom he thus delegated his duties and responsibilities, contenting himself with a secondary control.

Division of the work.—Reinforced concrete work might be subdivided into (1) the design; (2) the execution; (3) the reinforcing material employed (as also other materials of construction which do not concern us in this paper). These were respectively contributed by the designer, the contractor, and the merchant. By designer the lecturer understood the engineer, the architect, or the specialist firm, as the case might be, who was the author of the design. The contractor was the one who executed the work, and was not necessarily distinct from the designer, whilst the merchant might be, and was in some cases, both designer and contractor. The work was carried out from start to finish through the separate agency of these three divisions, or by combinations of them, and it was precisely those combinations which introduced the complications to which he referred at the commencement of the paper. In ordinary construction, matters were simple enough, because the engineer or architect who was the designer of the work assumed control of its execution, and was responsible for such, although any mistake on his part affected his reputation, but never his pocket. In that case the designer not only controlled the contractor, but indirectly, through the latter, also controlled the merchants who supplied the material; he had the right of rejection, and in virtue of the fact that he held the purse-strings his power was supreme. In reinforced concrete, matters were not so simple, for where the designer was a specialist firm, it was the engineer or architect who then became the principal or client, and the specialist firm assumed his duties and responsibilities, and certain additional responsibilities into the bargain.

The intrusion of the specialist firm.—The point which concerned them in the paper was the case where the assistance of a specialist firm was called in either by the client direct or through his technical adviser. There were two categories of specialist firms (A) those which derived their profits from the exploitation of a patent system of construction, and (B) those which derived their profits from the exploitation of a patent form of reinforcing material. The firm which exploited a patent system of construction combined divisions 1 and 2 previously referred to—i.e., the supply of the design and its execution. The execution was generally carried out by contractors specially licensed by the specialist firm, whose work was approved by the latter. On the other hand, the firm which exploited a patent form of reinforcing material combined divisions 1 and 3—i.e., the supply of the design and of the necessary reinforcing material. In this case the execution was generally tendered upon by non-licensed contractors, with sometimes, however, a certain restriction in their selection. Where a specialist firm executed the work itself, it came within the category of a licensed contractor for that special contract. The logical method would doubtless be for specialist firms to combine all three divisions, and supply design, execution, and materials, thus doing the whole work throughout themselves. But it was obviously impossible, under present conditions, for any single firm to keep up the enormous organisation which would be necessary to carry out contracts simultaneously in all parts of the country. Each method of exploitation had its use and advantages, and the selection of method by the client would depend on circumstances and on local conditions. There was room in this country for all methods and systems, and no doubt in time these would settle down into specific grooves, so that certain classes of work would be carried out on certain lines, and some co-relation would be established between the various firms and systems which would apportion the work to the interests of all concerned.

Responsibilities.—It would be conceded as a general principle that responsibility should be confined to duties undertaken. It was illogical, for instance, to fasten responsibility of execution upon a specialist firm which was not afforded the opportunity of control and supervision of work. It was unfair to expect this firm to make good any mistakes in quantity of material which might arise in estimates; and yet this was continually occurring. The client, when ignorant of the method of construction he was about to adopt, naturally looked to the specialist firm for a guarantee. A refusal to accept this guarantee would frequently lose the work, because the client imagined that the firm had no confidence in its system. The real reason for refusal was that no provision was made for supervision, and, as so much depended upon the actual work upon the site, no specialist firm which valued its reputation would accept such responsibilities, unless it was in a position to supervise. Clearly responsibility in this case should be accepted by the contractor, but he would frequently refuse, under the impression that everything depended upon the system adopted; naturally, if he could avoid such liability he would do so. The ordinary responsibilities of a specialist firm should be limited to the design and to the quality of the reinforcing material, when the latter also was supplied. When a full guarantee involving construction was exacted, the firm should stipulate for proper supervision and control over the contractor by one of its staff appointed as resident engineer, with suitable remuneration for such service. The question of responsibility, therefore, should be clearly defined at the outset of every contract, and those specialist firms which did not carry out contracts themselves should stand together in resisting the imposition of guarantee for work which they could not control, or otherwise any resulting disaster would affect the reputation of all. In the case of

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firms which exploited (A) systems of construction, the responsibilities were of course more clearly indicated. The firm guaranteed its design and the licensed contractor guaranteed its execution. The reinforcing material being purchased by the contractor, the latter was responsible for it, but had the right of rejection. In this case the specialist firm occupied the place of the technical adviser, and risked its reputation like the latter, but not its pocket, except as regarded the guarantee of design pure and simple.

Data.—The client, the lecturer thought, should remember that the more complete information he supplied to the specialist firm he employed the more expeditiously and intelligently would his plans be prepared. Particulars concerning the loads to be carried, nature of soil and foundations, materials available near site, were essential. Architects should say whether the specified loads included the dead load or not; the tendency to omit this information often placed reinforced concrete in unfair comparison with ordinary steel joist construction. The nature of the test load should be specified at the outset. Sufficient attention was not paid to the question of fire protection. The nature of the aggregate, whether sharp or smooth, a specification of the cement and its setting time, the breaking and elastic limits of the steel, whether concrete should be mixed wet or fairly dry, &c., should be stated. The height of the floor above ground when only one floor had to be supplied would materially affect the price, and even the scantlings of available timber for centring will, if known beforehand, enable the beams to be so designed as to utilise it without waste, and thereby effect a saving. So that no details were so insignificant as to be despised. A point on which confusion often arose was the factor of safety. A comparison of competitive designs on a large contract would frequently reveal an extraordinary diversity in the factors of safety when these were reduced to the same denominator. The client should at the outset clearly indicate whether designs were to be tendered upon by contractors selected by him or by contractors associated with and approved by the specialist firms. This saved time and useless correspondence, and would enable the latter to give detailed information to contractors with whom they were not associated when these were specified by the client, which was not necessary in the case of contractors with whom they worked together. Clients should, in justice to competitors, place them all on the same footing, and any deviation from this rule should be resisted by competing specialist firms, who should co-operate in refusing to submit designs under conditions which did not give all the same chance.

Preparation of designs.—When inviting competitive designs the client should not ask for too many details at the outset, but should be content with diagrammatic plans which indicated the system proposed sufficiently clearly to enable him to make a selection. He should remember that plans were generally prepared free of charge by specialist firms, and consideration should be shown by not throwing too much useless work upon them. The present tendency was to require too much detail before the selection of a specialist firm was made, and this was particularly irritating when schemes were only in their initial stage. It was a regrettable fact, to which attention must unfortunately be called, that designs obtained from one specialist firm were sometimes sent by the client to a competitive firm to see if the latter could improve upon them. A design was the property of the designing firm and should be respected as a privileged communication until the client had acquired it on the terms on which it is submitted. The communication to a rival was a breach of faith which the lecturer suggested should be met by a joint undertaking by specialist firms to refuse work offered under such conditions.

Estimates.—Generally the client was in a tremendous hurry for his plans. Hurry meant mistakes, and for these the specialist firm had to suffer. The modern system of bustle and strenuousness, so much admired in another hemisphere, was peculiarly unsuitable for reinforced concrete, for in this, more than in any other branch of construction, more haste meant less speed. Engineers and architects who took months to mature a plan expected very often full detailed plans by return of post. Specialist firms should resist such demands, and refuse work for which a proper time allowance was not made, rather than risk a disaster which may affect all concerned in the industry.

Differentiation of work.—There was a present tendency to lump all classes of work together, and to invite tenders on the whole contract, even in cases where the reinforced concrete portion is relatively insignificant as compared with the remainder of the contract. It could not be too strongly insisted upon that reinforced concrete was a separate subject altogether, and that the portion of a contract which concerned it should be scheduled apart from the other portions of the same contract, and separate tenders invited upon it. In the case where the reinforced concrete portion was the most considerable part of an important contract, the other portions might form sub-contracts. But it was essential to differentiate the reinforced concrete from the rest, so that the estimates from specialist firms might be compared together on their merits without being affected by other portions of the contract. A satisfactory tender would frequently be spoilt by the addition of excessive sums for other portions of the work with which the contractor was not familiar and for which he provided too large a sum to cover himself against possible loss. This occurred specially in cases where prices were sent in hurriedly and the specialist firm or the other contractor had no time to obtain sub-estimates from contractors versed in that class of work.

Payments.—It was desirable that specialist firms (B) which supplied reinforcing material should receive payment for this and for their designs, if these were charged for, direct from the client, and not from the contractor as at present. This would avoid the frequent unjust detention of moneys for materials supplied to the contractor by the withholding of the necessary certificate of payment when the contractor had failed to satisfy the engineer or architect.

Cheapest not always the best.—This was perhaps a trite saying, but in no case was it more applicable than in the case of reinforced concrete. The tendency in this country was to go for the lowest tender without reference to the status of the contracting firm or the quality of the design. The cheap tender which cut out the offers of good firms might frequently come from an unsatisfactory contractor or from one who was ignorant of the difficulties he had to encounter, or who desired to get the work at any cost as an advertisement. The carrying out of the work under these conditions became a source of expense and worry to the client, and he was likely to regret his selection.

Local Government Board loans.—The London Building Act now in course of revision would, it was hoped, be so amended as to give an impetus to construction in the Metropolis, which had hitherto been restricted by regulations which were drafted when reinforced concrete was an unknown method of construction: but unfortunately, difficulties were still experienced with the Local Government Board in respect to satisfactory loan periods for reinforced concrete structures, which it would not sanction on the same terms of repayment as other forms of construction such as brick, timber, &c.

Mr. F. E. Wentworth Shields, M.I.C.E., in opening the discussion said that reinforced concrete had brought into being its own specialists, who were of two kinds, viz.: the "designing" and the "merchant" specialist. They had done a great deal of good work in this country. The paper from its general tone might, he thought, be called the bitter cry of the specialist. A firm of architects who wished to design a reinforced concrete building and who had not a very intimate knowledge of the subject, put themselves in the hands of such a man. They referred contractors to him, and he told them how much the work would cost to execute. When the work was finished the contractor, says the story, discovered that the price he had been given was altogether too low, and he accordingly applied to the architects to make up the difference. The concrete specialist had done most magnificent work, but he was bound to disappear, at any rate as a mere designer. He was owed a debt of gratitude for the enormous lot that he had done to push forward this material. But he would go as surely as history repeats itself. When steel girders first came in, people were extremely suspicious as to whether they could carry such loads as were claimed for them. There arose a number of engineers who made a speciality of the practice and theory of their subject, and they were consulted by architects and contractors. But in course of a few years every young architect got familiar with girders, and the specialist died out. So in the same way the time will come when the architect and engineer will prepare his own design for reinforced concrete work. The fact that most systems are in the hands of patentees might seem to point against the accuracy of this anticipation; but that is really only a minor obstruction—some of the patents are already expiring, while others are being contested in the courts. The necessity for giving full information about failures was a most important point. Indeed the Concrete Institute should investigate all such cases, and should lay down rules which will prevent them, and in the light of which they could say that providing their rules were followed they could guarantee a life of thirty years.

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Mr. A. ALBAN H. SCOTT said one would think from the author that the professional services of architects and consulting engineers would shortly be entirely dispensed with, as the concrete specialists will carry out all the duties formerly performed by them, excepting apparently the settling up of accounts and differences between the various people engaged upon any work. During the course of the paper the word "client" was used indiscriminately. A "client" is really the person who pays for professional services, and in all cases this must be the building owner. It is stated that the logical method would doubtless be for specialist firms to combine the three divisions of supplying the design and materials and executing the work; but this is surely illogical. It is against all accepted principles, and can never to any great degree come into force. A large number of the difficulties put forward in the paper are very easily overcome by adopting the simple process in use for all other kinds of work—namely, that the architect prepares the whole of the plans necessary for obtaining tenders and that the quantities are taken off by him or his quantity surveyor, and that he should calculate the whole of the reinforced concrete work, the same as for every other part of the work, and provide in the quantities for the necessary amount of steel and other materials required. Tenders should then be invited from any responsible builder in the usual way. In the bill of quantities an item should be inserted for the payment by the builder of the patentees' fees, and these should be treated exactly the same as the quantity surveyor's fees are treated when inserted in the bill of quantities. The patentee would then be in exactly the same relation to the client and architect as the quantity surveyor. After the tenders have been received and examined the architect or the surveyor should get into touch with the patentee whose system it is intended to adopt, and should at this stage, and not before, ask the specialist for detail drawings showing his exact suggestions for the adaptation of his system. The quantities can then, so far as the steelwork is concerned, be revised if found necessary. Under these conditions no question of deficient quantities can be raised, no unnecessary trouble is given to the patentees, and—perhaps the most important item of all—there is no competition between different systems, because immediately there is such competition it is the tendency of all patentees to reduce the amount of their steel and concrete to the very lowest point possible. Provided the calculations are made all on an identical basis the amount of steel required by the various systems is for all practical purposes the same, and this also applies to the labour required. This method had always been adopted by his firm, and, Mr. Scott said, had always, in both small and in very large works, proved eminently satisfactory. With regard to the question of responsibility, although under common law the responsibility is already clearly defined, yet in all forms of contract it is advantageous to have a special clause inserted for reinforced concrete work that the builder is entirely responsible for the materials and workmanship, and that the patentee or the designer of the reinforced concrete work is responsible also direct to the client for any faulty design. It is mentioned that it is not an unknown thing for a "client" to merely indicate four lines to scale on a plan and ask for a warehouse. Presumably it is meant that the so-called client wishes for plans and estimates for a warehouse. No architect would lower his dignity to do such a thing as this, and therefore the word "client" in this case is no doubt used to indicate the building owner. This only emphasises the point that a so-called specialist in reinforced concrete work should not act in the capacity of architect or engineer, as he is certainly not competent to put the windows, doors and other accessories in their proper place.

Mr. E. FIANDER ETCHELLS, Phys.S., remarked that the contractor who thinks to-day of strength alone not counting the cost would most probably find himself in the bankruptcy court. Everyone knows how often an order has been missed because some person less scrupulous or more daring has cut down his thickness and cut out some of his reinforcement, and so won the coveted order. Unrestricted competition and each man his own Concrete Institute does not make for sound construction or fair prices. At present the man who will take the most risks gets the most business. The Concrete Institute should consider whether the R.I.B.A. joint committee's report should not be adopted with such amendments as might prove to be necessary. The position of the engineer in the case of failure was of great importance. In France, he understood, they put the designer in prison. There was very ancient legal precedent for far more drastic measures in the case of bad building.

Mr. G. C. WORKMAN thought it was quite fair that the specialist designer should be held responsible. Often a specialist's work was handicapped by the meagreness of the data supplied. For instance it was sometimes necessary to guess at the floor loads, and they were rarely given the bearing capacity of the ground; in consequence there are wide differences in the estimates. Then such vital questions as the working stresses in the materials and the factor of safety are controlled to a great extent by personal opinion. Many architects fail to realise that they should allow the specialist reasonable time for preparing his work. They should understand that hurry means mistakes in the preparation of estimates, and other work.

Mr. J. MUNRO considered it was too early to formulate statistical data as to the value of reinforced concrete work in this country—another decade will have to elapse. The responsibility should, according to his view, be absolutely borne by the specialist, for an architect has not enough time to accept it. If specialists make too much fuss on this matter the architect will send them to perdition. Eventually no doubt the architect will have all the details at his fingers' end and will assume all the responsibility. In every specification, i.e. in every estimate given by a concrete firm, there ought to be a definite sum earmarked as discount for the builder, who has a lot of things to see to and who earned 5 per cent. If the total is not a serious one there is no reason why it should not be amalgamated in the general bill.

Mr. MORITZ KAHN stated an Englishman used a reinforced concrete type in 1831 when Moniet was a small boy. Reinforced concrete was indeed rocked in the cradle between the North Sea and the Irish Sea. Undoubtedly too much competition was prejudicial to the interests of the owner, for it was he that eventually had to pay for the loss incurred by firms in endeavouring to secure business. As to responsibility Mr. Kahn argued that if an engineer prepares a design he should be held responsible for it. If a contractor supplies the labour and materials he should be responsible for such portions. All the reinforcing steel could easily be tested before use. Any accident must result from faulty design or faulty labour and material. Drawings can always be checked, and if these are found correct the fault must lie with the execution. In his opinion Mr. Serraillier had asked too much in requesting the client to become liable for the payment of reinforcing steel supplied to the contractor. This, however, was a trade problem rather than a professional one. It was undoubtedly wise sometimes to investigate the standing of a contractor. If it proved unsatisfactory the refusal to supply him with reinforcement would probably have the twofold advantage of saving a possible financial loss and a future accident. One of the disadvantages which competent firms had to labour under was the way in which their designs were passed around.

Professor HENRY ADAMS thought that the greater part of the paper could not be gainsaid. On the subject of responsibility the law seemed to be that a person was not responsible for errors of judgment but that he is responsible for neglect. The differences in the factor of safety correspond to the differences on the Stock Exchange—taken as a whole the stocks average under 5 per cent. It is a factor against all possible contingencies, and therefore to some extent against the unknown. In practice it is impossible to rely implicitly on the workmanship. In the case of failure the fault is traceable to workmanship rather than to design.

Mr. EDWIN O. SACHS in summing up the discussion expressed his belief that certain abuses which are to be found at present would gradually disappear. He did not share the views expressed as to the impending extinction of the specialist. In his opinion it would be more in the nature of evolution. The architect will design more carefully; the specialists will get good specifications, and the makers of such things as bars will make them to standard specification. The architect will know exactly what he wants. In fact the specialist may look forward to enjoying an easier time. Everyone should be very grateful to the specialist for his pioneer work, though it ought really to have been done by the architect and engineer. In the case of failure publicity would be an advantage, for the unknown is always worse than the known. In Germany and Austria, he believed, unfair competition was treated as a criminal offence. In his opinion builders should receive a specific sum, say 5 per cent., for their trouble in connection with such work as reinforced concrete. But builders often tried to make considerably more out of the specialist.

Mr. SERRAILLIER then replied to the various points and the meeting closed.

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NOTES AND COMMENTS.

We have been asked to explain what is meant by the "zero-potential" system of ventilation to which we referred last week. The term, we believe, is somewhat new, having been coined—or rather transferred—from the language of electrical science by Dr. Shaw, to describe the system of ventilation in which both inlets and outlets are under control by the use of fans or other means of applying power to force in fresh air and extract foul air. If the air is being sucked out by the same amount of power that it is being pushed in, the system is neither plenum nor vacuum, but a combination of the two, and this Dr. Shaw christened "zero-potential." Although the name is new, the system is not, as it has been in use on the Continent for more than a quarter of a century. In this country, despite its excellence as a system, it has been very little used, chiefly because the British public has not yet learnt to pay sufficiently for really good ventilation.

The interesting church at Worth, in Sussex, is the subject of a monograph by W. P. B. Stebbing, F.G.S., recently issued by the Essex House Press, and giving a very full account of its architectural history, all the more valuable for the views included showing the appearance of the church before its restoration. There is no doubt that both from its plan and the character of its masonry, Worth Church is an example of later Anglo-Saxon architecture, and we agree with the author that it would be incorrect to assign to it an earlier date than A.D. 1050, the period when, although William of Normandy had not yet fought the Battle of Hastings, the influence of Norman architecture was making itself felt in the buildings of this country. It should not be forgotten that the Norman period in English architecture commenced before the year A.D. 1066, hence there is no reason to suppose that an apsidal east end and Anglo-Saxon masonry may not be contemporaneous.

The excellence of the illustrations in *Country Life* is so well known that the second half-yearly volume of 1908 needs no recommendation. To architects its chief interest and value lie in the continuation of the remarkable series of illustrations and descriptions of the country homes and gardens of Great Britain that has now been for some time in progress, and of which are included in the present volume Bamburgh Castle, Northumberland; Batemans, Sussex; Bridge House, Weybridge; Cefn Mably, Glamorganshire; Cirencester House, Gloucestershire; Clumber, Nottinghamshire; Dorfold Hall, Cheshire; Easton Neston, Northamptonshire; Fawsley Hall, Northamptonshire; Gilling Castle, Yorkshire; Haiswell Park, Somerset; Harrowden Hall, Northamptonshire; Hestercombe, Somerset; Kirklees Park, Yorkshire; Parnham House, Dorsetshire; Plas Mawr, Carnarvonshire; Rainham Hall, Norfolk; Studley Priory, Oxfordshire; Tredegar Park, Monmouthshire; Westbury Court, Gloucestershire; and Wolterton Hall, Norfolk.

Tariff Reform, when it comes, if it does come, may introduce British architects to a like mild excitement to that which is agitating our Canadian brethren at present. It seems that architectural plans and specifications are dutiable articles in Canada, and that there is going on a considerable amount of smuggling in such contraband from the United States, which is the matter of serious complaint on the part of Canadian architects against the indifference and neglect of the Government officials to enforce the payment of duty. The gravamen of the present discontent seems to be that there is no reciprocity; that Canadian plans never, by any fortunate chance, find their way into the United States, where the duty is high and those who have its enforcement in charge understand that the law is made to be enforced.

Protection by tariff is usually understood to be the weapon employed by States to defend their industries against stronger and abler competitors in foreign countries. We can hardly imagine that Canadian architects are so far inferior to their fellows in the United States as to render it necessary for a paternal Government to protect them by a high tariff—indeed, the fact that the United States places a high duty on Canadian plans is a tribute to the ability of Canadian architects.

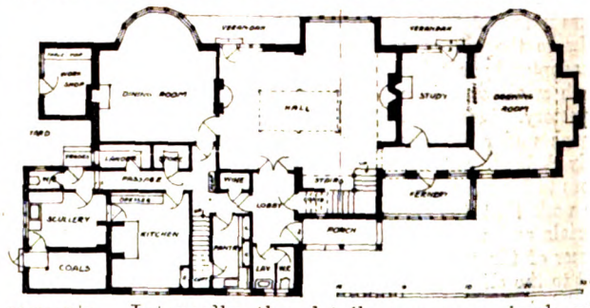
ILLUSTRATIONS.

DESIGN FOR GLAMORGAN COUNTY HALL, CARDIFF.—ELEVATIONS—DETAIL OF MAIN FRONT—PLANS.

This scheme shows a building well set back from the boundaries of the site, as it was felt that the buildings erected in this park should be seen from all sides. The Portland stone elevations are therefore carried round and treated in a simple manner, the enrichments being reserved for the façade to the avenue. The plan is arranged round a single area, which lights the corridors, the rooms being lit from the outside. The Council chamber, with its committee and members' rooms, is placed on the first floor, and is approached by means of the grand staircase and a lift near the entrance; this arrangement ensures the necessary privacy of this department. The office departments are placed on the ground floor, where they are readily accessible to the public and each other. The provision of the basement was a condition of the competition, and is utilised for the caretaker's apartments and for storage purposes. The features of the façades are suggested by the plan, and are designed to be in character with the municipal buildings in the same avenue, but are kept simple, as this building is of secondary importance. The architects are Messrs. Nicol & Nicol.

HOUSE AT SUNDRIDGE PARK.

The site for this house has its main interest in the rear, where the morning sun is, so the principal rooms all face the garden, excepting the drawing-room, which has windows to the front as well, to catch the last rays of the afternoon sun. One of the principal conditions imposed was that there should be a hall large enough to take a billiard-table, and so arranged that servants could go upstairs and answer the front door without crossing the hall. On the first floor are seven bedrooms and dressing room, two of the bedrooms being kept in a separate wing over kitchen and offices for the use of



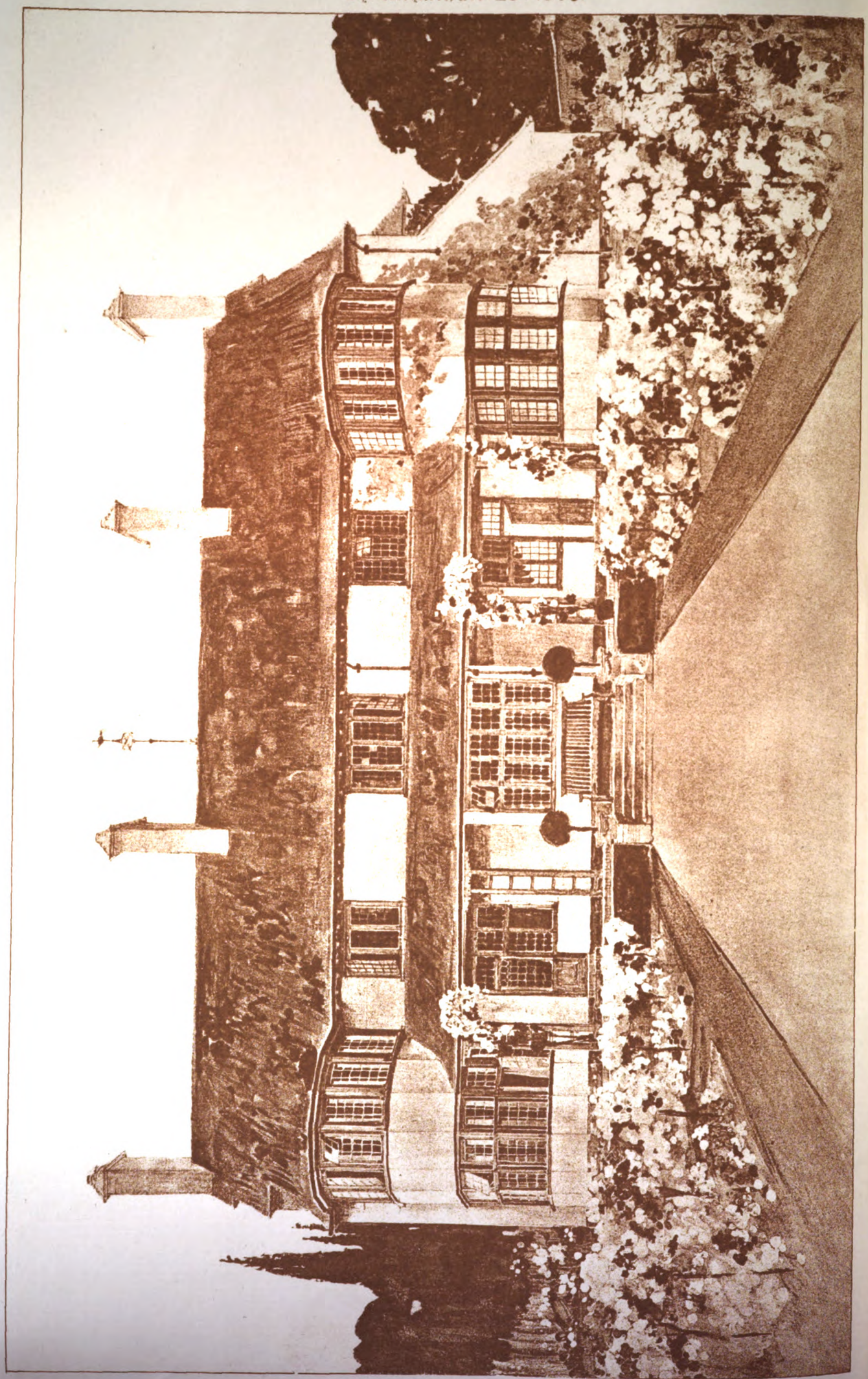
servants. Internally the details are very simple with little enrichment except a Bankart ceiling to the hall. Externally the walls are rough-cast, with a hand-made tiled roof. The builders were Messrs. Pearce Brothers, of Bromley. The wrought-iron casements and glazing were supplied by Messrs. Henry Hope & Sons, Ltd. The woodwork internally and externally was finished with carbolineum, the architect being Mr. C. W. B. Quennell, F.R.I.B.A.

NEW CLUB HOUSE, MARKEATON.

This building is being erected in a commanding position upon the new links acquired by the Derbyshire Golf Club at Markeaton, near Derby, which will be opened in the spring this year. On reference to the plan it will be seen that in addition to the ample rooms to which the members have access, there are also the private quarters of the professional and an office for the secretary. All the main rooms have wood-block floors, with the exception of the lavatories, and will be heated by low-pressure hot-water system, which is in the hands of Mr. A. J. Brooks, of Derby. The principal elevations are covered with rough-cast above a brindled brick plinth, and the roofs covered with hand-made sand-faced tiles. The contractor is Mr. J. H. Fryer, of Derby, and the architects are Messrs. Thorpe & Fryer, of Derby.

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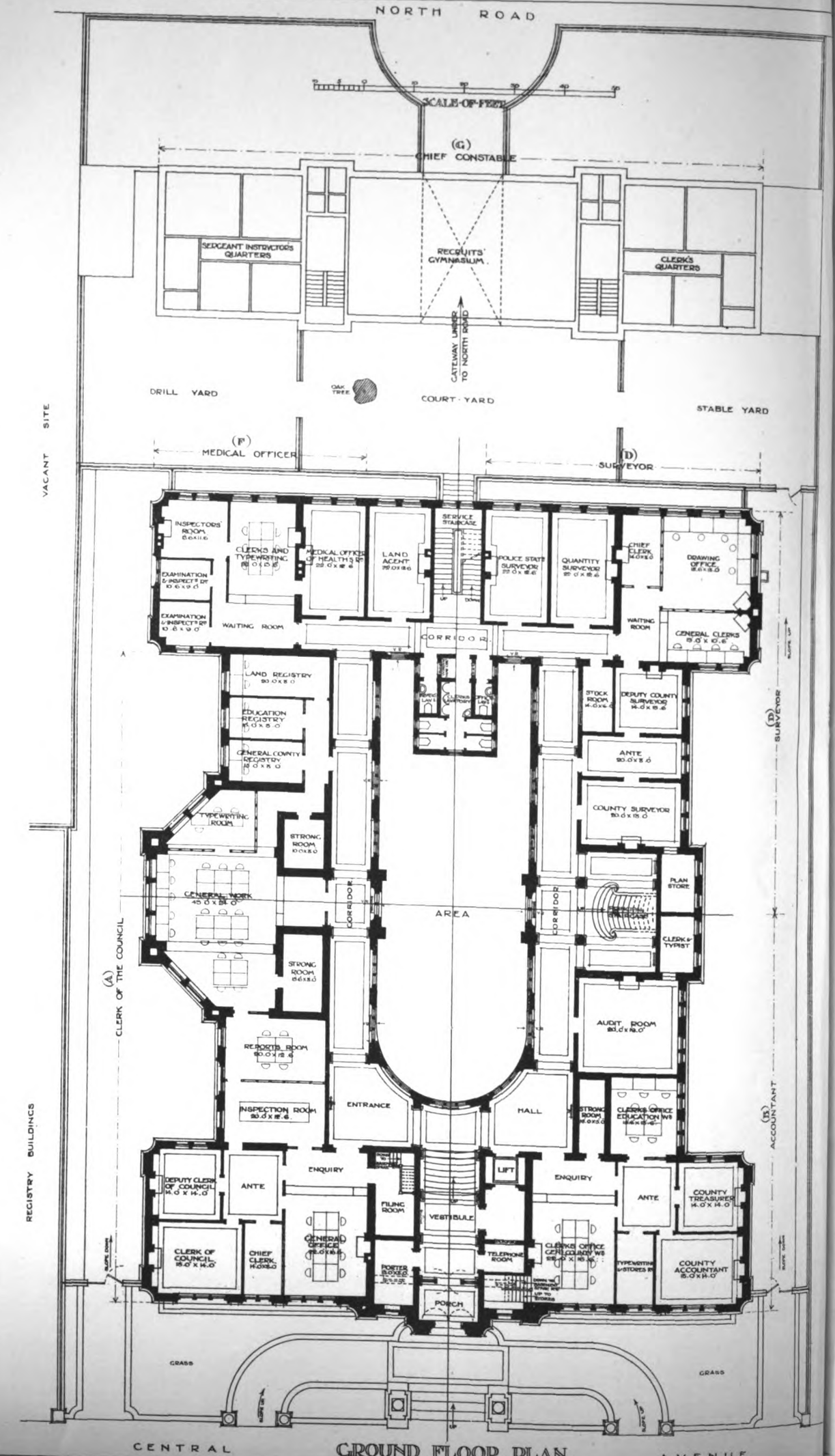


HOUSE AT SUNDRIDGE PARK.

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GROUND FLOOR PLAN.

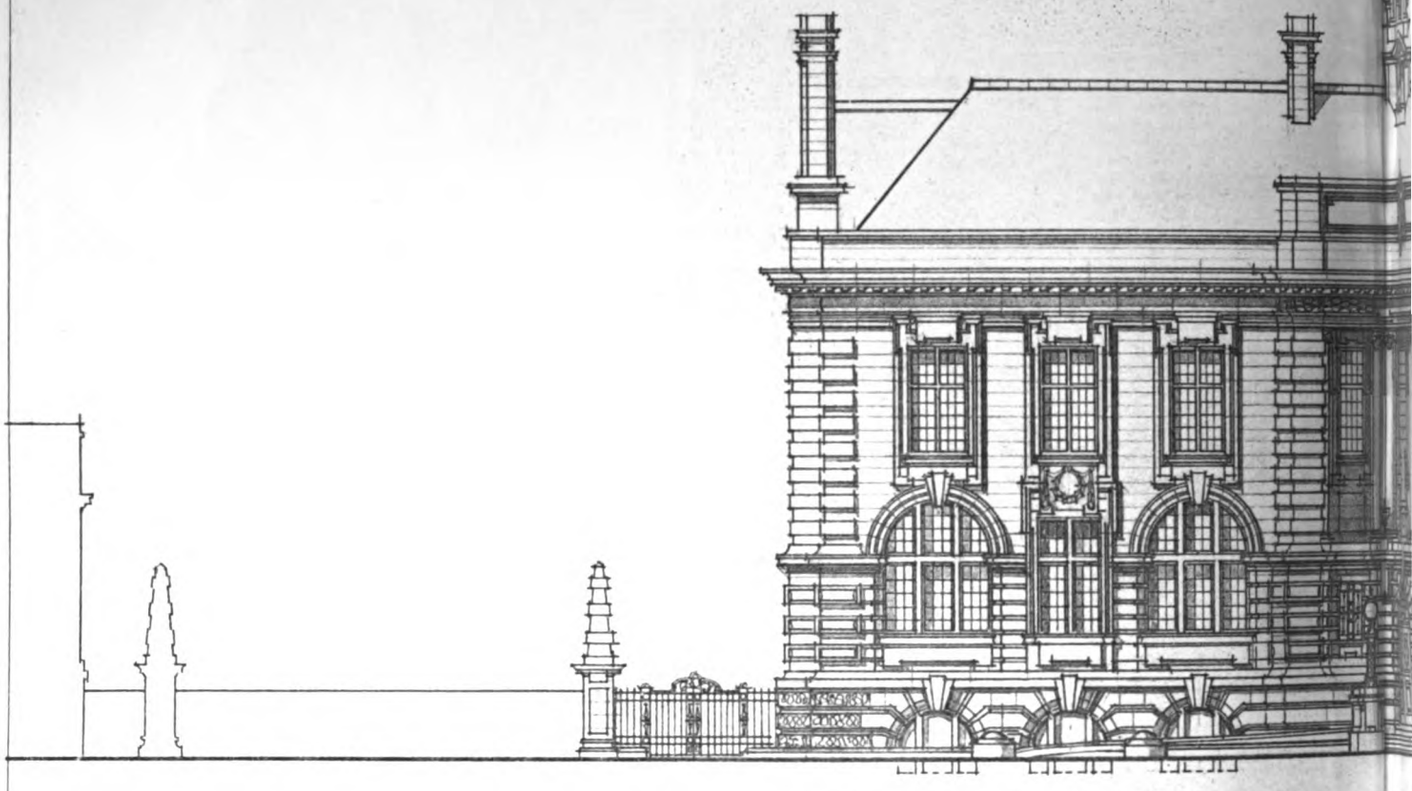
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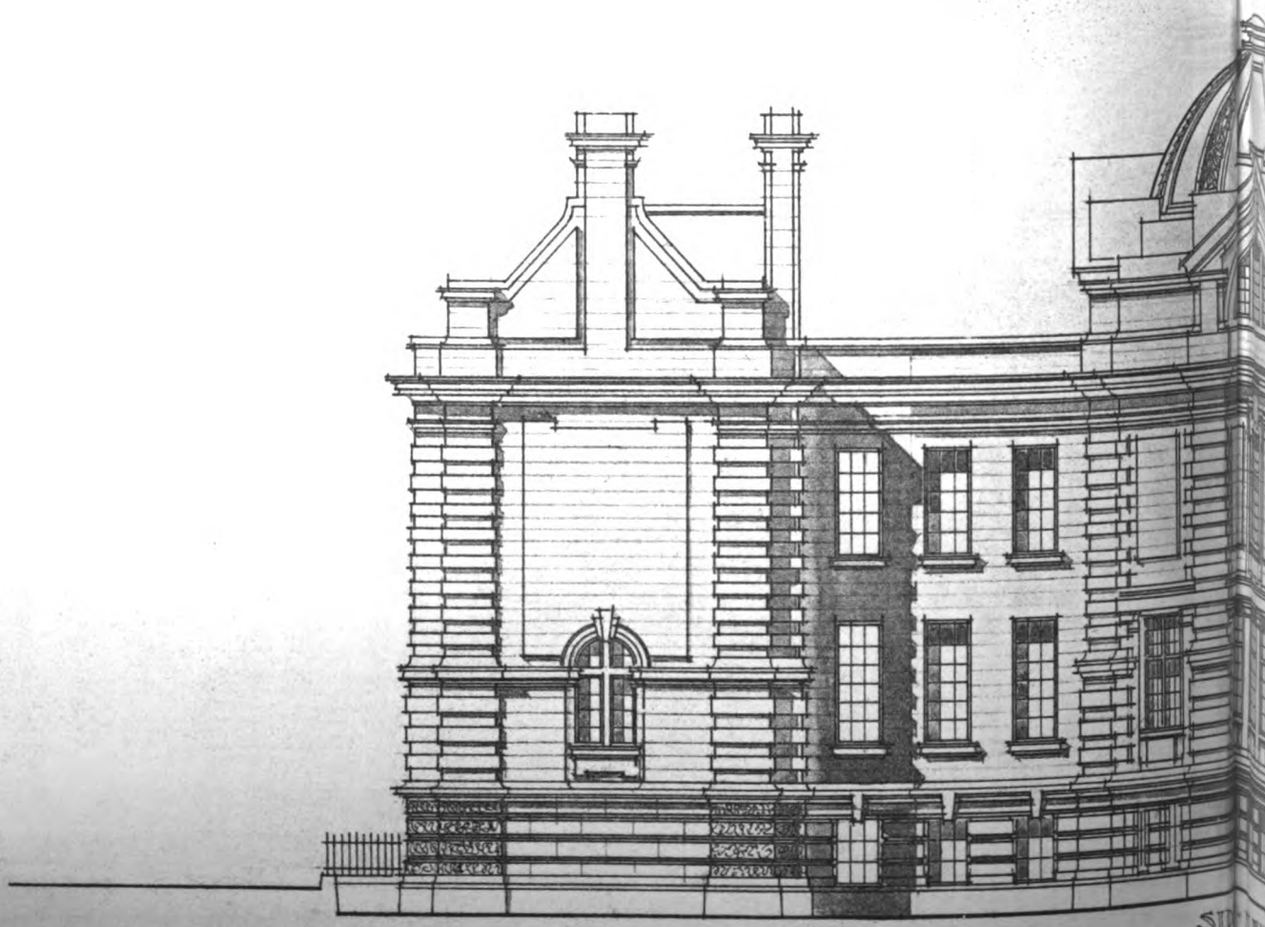
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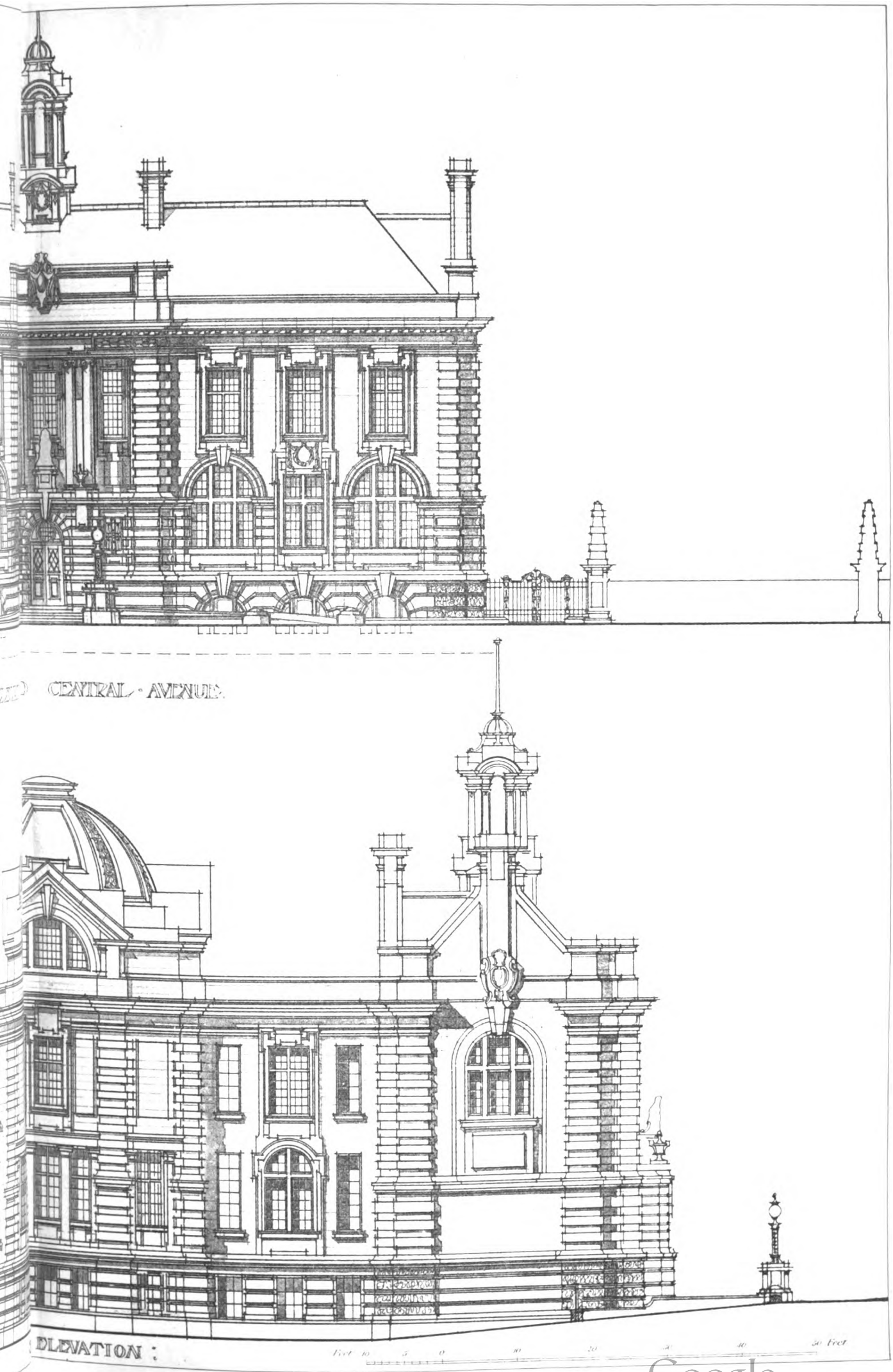
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HALL, CARDIFF: ELEVATIONS

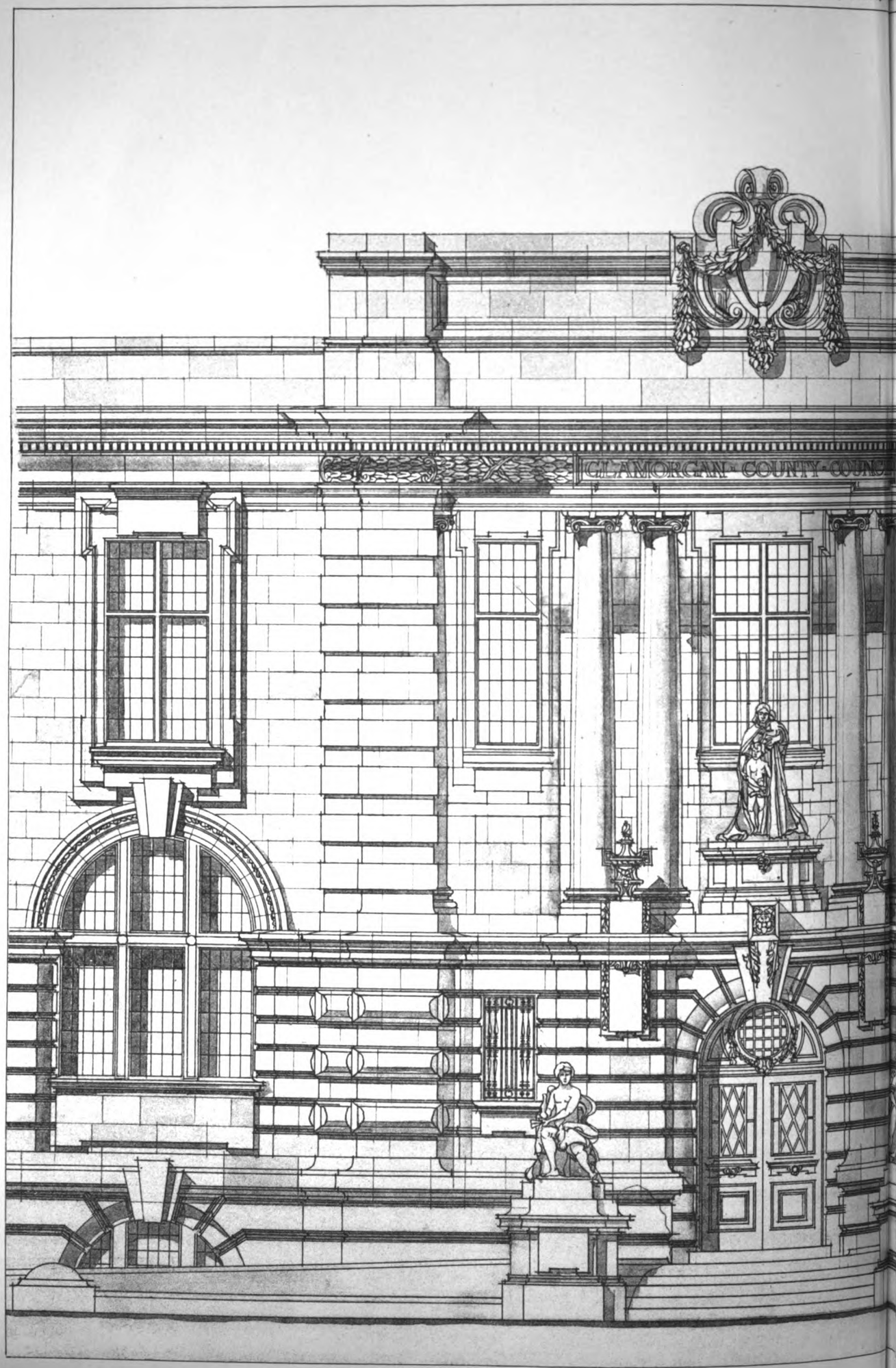
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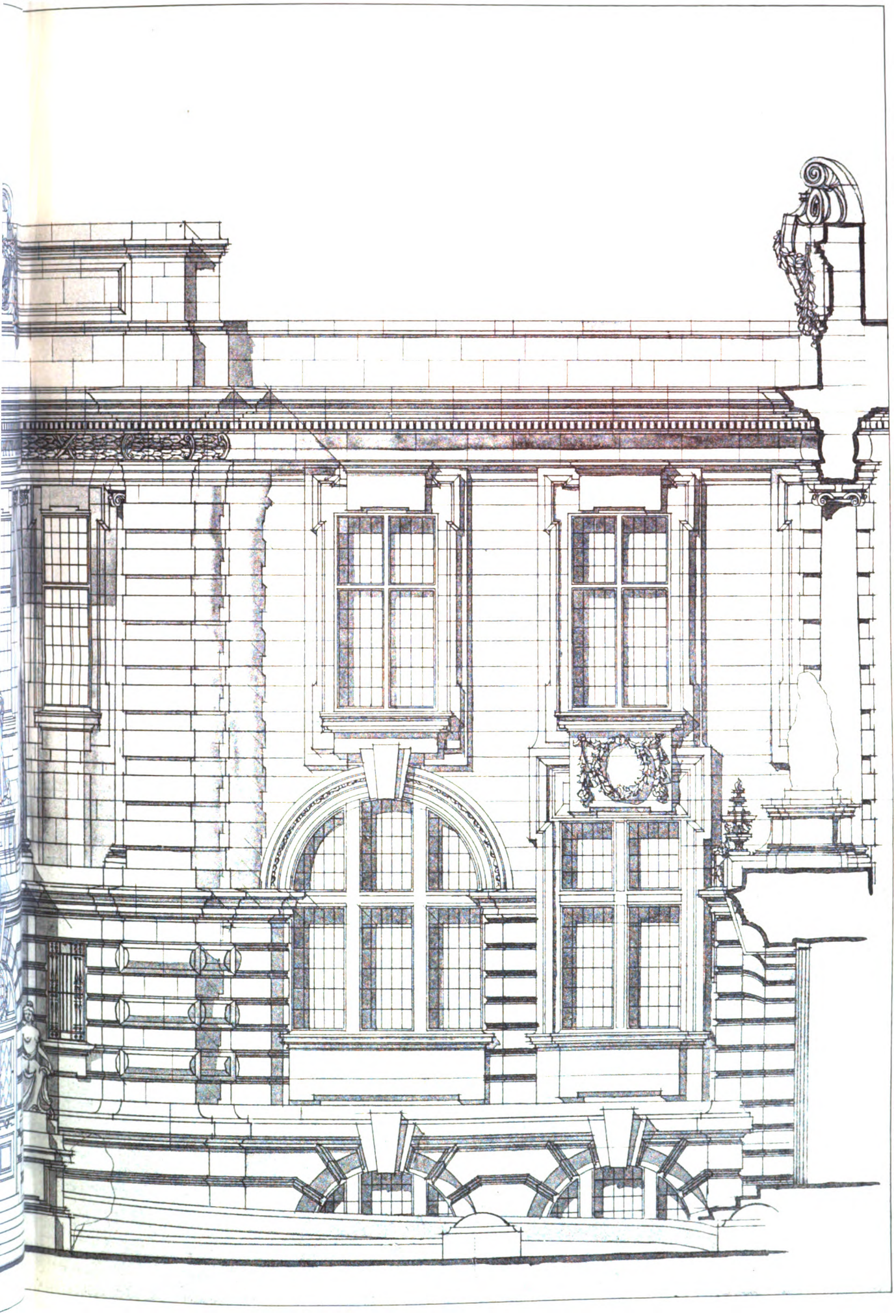


DESIGN FOR GLAMORGAN COUNTY [illegible] HALL ADOPT: DETAIL [illegible]

By Messrs. [illegible] Wood.

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..., CARDIFF: DETAIL OF MAIN FRONT.

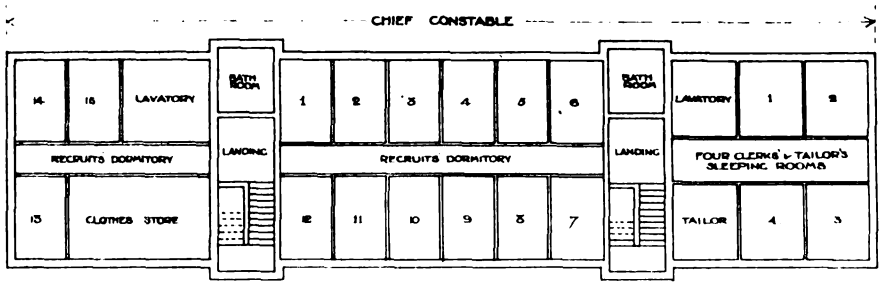
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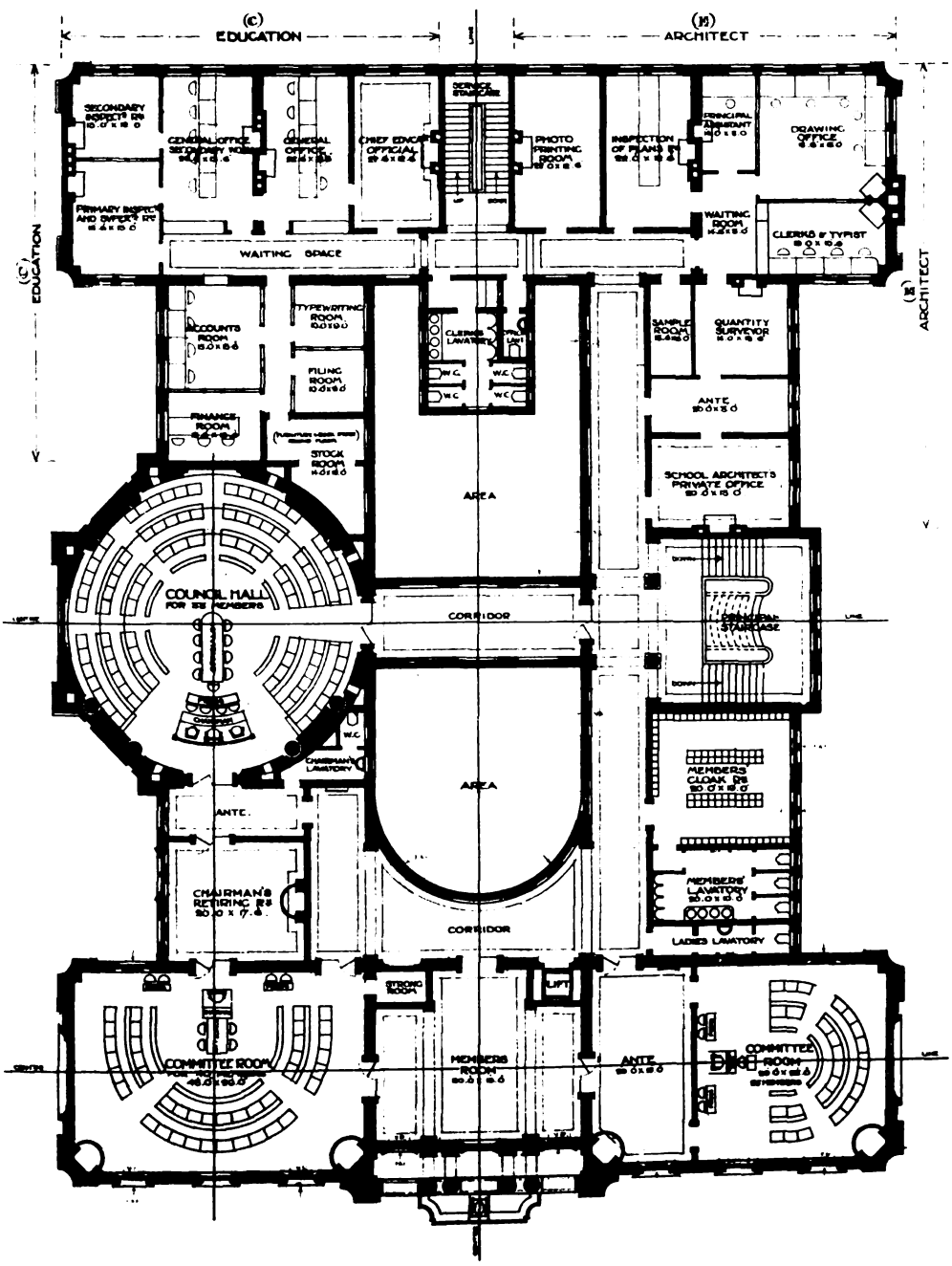
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SCALE OF FEET.



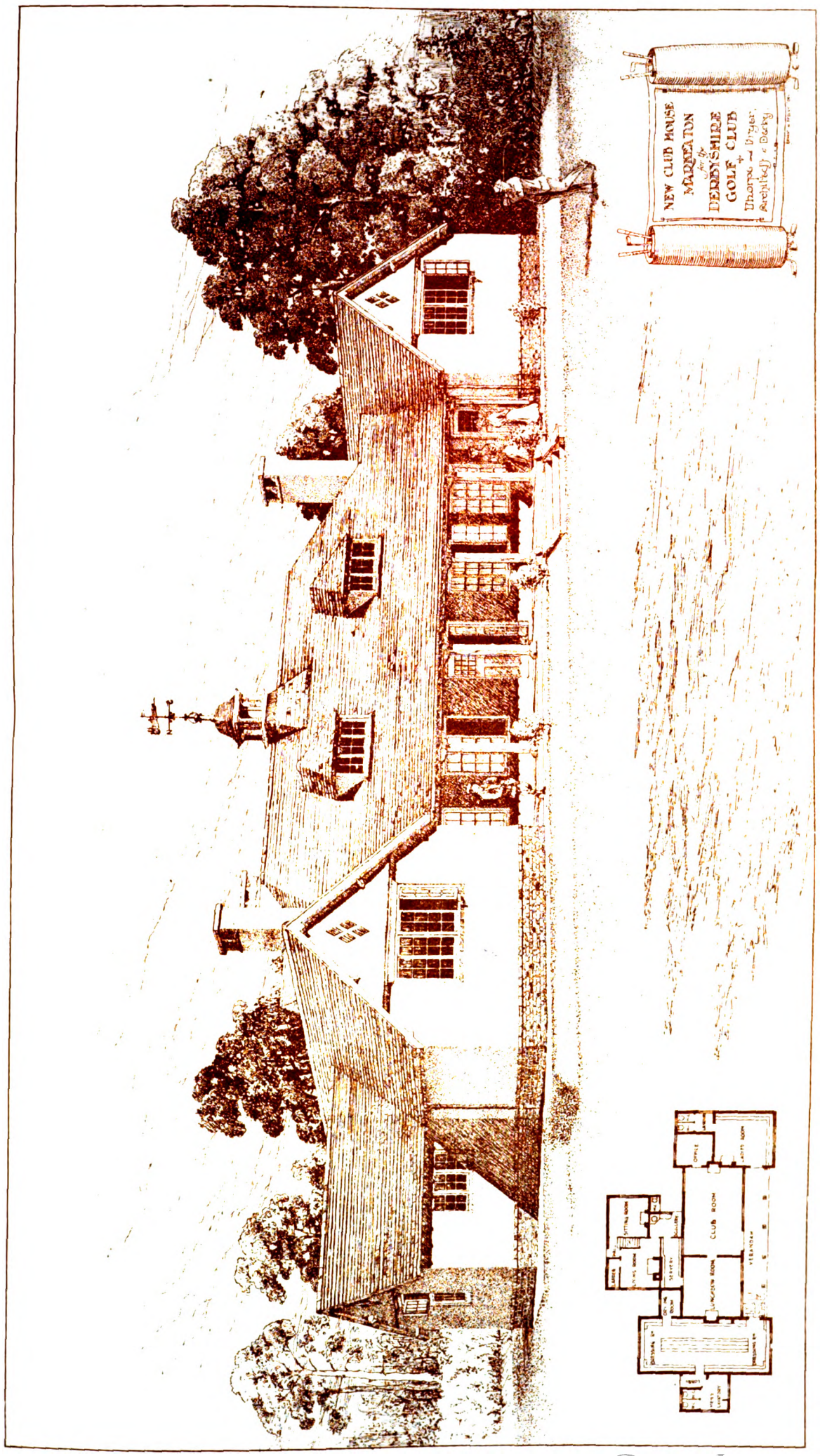


FIRST FLOOR PLAN.

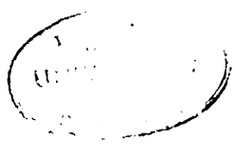
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SIR CHRISTOPHER WREN'S OFFICE.

OUR illustration of a now vanished corner of St. Paul's Churchyard shows the house which tradition says was at one time the office of Sir CHRISTOPHER WREN, and which is also interesting both as an example of our English version of Renaissance and from the peculiar rhythm of its composition. During part, at any rate, of the time that St. Paul's was in progress, WREN had an office in Scotland



[*Photo by Bolas, London.*

Yard, for his pupil's copy of "Vitruvius," published in 1684, contains the autograph signature, "NIC. HAWKESMOOR. At Sr. CHR. WREN's, in Scotland Yard." HAWKESMOOR went into Sir CHRISTOPHER WREN'S office in 1684, and probably purchased his "Vitruvius" soon after its publication. The photograph from which our block was made is an enlargement from a snapshot by Mr. S. B. BOLAS.

The Whittingham Asylum Competition has been decided in favour of Messrs. Sykes & Evans, 7 Chapel Walks, Manchester, to whom the first premium of 100*l.* has been awarded. The second premium of 50*l.* and the third of 25*l.* have been awarded to Mr. Percy D. Lodge, 34 John Dalton Street, Manchester, and Messrs. Appleyard & Quiggin, 67 Lord Street, Liverpool, respectively. There were eighteen sets of designs. The competition was for an annexe for about 700 pauper lunatics to be erected on the asylum estate at Whittingham, near Preston.

ROYAL ACADEMY LECTURES—SCULPTURE.

THE first of the four lectures delivered by Mr. W. R. Colton, A.R.A., Professor of Sculpture in the Royal Academy, was described as "Preliminary—to the Sculptors of To-morrow." In his opening remarks he deplored the fact that there was now a craze for the acquisition of wealth, while science, art and literature were held of little account. This must inevitably tend to the lowering of the mental standing of the nation. Our schools of art possess one of the most satisfactory systems of teaching in Europe. By it the retention of individuality in every student is fostered. Students of sculpture, however, were handicapped by the difficulty of instructing them in the large practical side of their work. Sincerely to be pitied was the dexterous young student who starts his career after being petted by his masters and assisted by encouragement. He has most likely gained numerous prizes, and (not unnaturally) has come to regard himself as something of a great man. He must now sweep all this on one side and stand once again lonely and deserted at the beginning of things.

The present day is a time full of promise for sculpture—perhaps, all things considered, the greatest time for sculpture that has ever existed. Nevertheless there was considerable danger in the tendency to go back to the archaic and to the barbaric. There is an impatience with those refinements of art that have ever increased since art began. The philosophic in art has been pushed on one side by the passionate and the sensual. It was deeply to be regretted that there are not half a dozen generous and sufficiently rich patrons of ideal sculpture in England. It was a reflection upon the nation to have to say that there was not at present a single artist living upon the production of ideal sculpture alone. There were certainly beautiful things to be seen in this country, but they were mostly to be found in museums where they become wearisome and are not sufficiently near for us to get to love them. What proclaims itself loudly or shouts is poor sculpture, poor both in taste and execution. The test of the real in art is an increase in appreciation; the greater the familiarity the more precious should an object become.

One of the great dangers besetting the path of the young sculptor was that he might be ensnared and enchanted by coloured figures. He may have more the feelings of a painter than of a sculptor, and thus lose the highest in both. As the head of Medusa turned flesh into stone by its gaze, so the true sculptor should turn clay into flesh by his touch. The use of colour seems rather to indicate that this high result has not been achieved. It was to be doubted whether the finest sculpture was ever coloured at the wish of the artist; it might be so treated at the command of an emperor or at the suggestion of an architect. No sculptor could ever be really willing to see his noblest work so used. With second-rate sculpture it would be different. It was common knowledge that coloured figures were employed by the Assyrians, Egyptians and Greeks, but this particular class of work was intended to impress the common people. The deity represented was the owner of the temple rather than an architectural part of it; the figure was so large as to be out of all proportion with the building. On the other hand, the absence of colour in a statue confers on it that quality by which it may be looked upon without arousing any of the sensual feelings that may be inspired by the nude on canvas. The temptation to indulge in colour has before now heralded decay. Its use distracts attention from the higher points.

Mr. Colton in his second lecture continued his remarks under the heading "Preliminary—to the Sculptors of To-morrow." He deplored the tendency nowadays to regard sculpture from an incorrect standpoint. Sculpture brutally executed is called power and passes for the highest in the art; all that is rough hewn is supreme. It is true a giant carved out of a mountain of living rock is, or ought to be, impressive by its sheer ruggedness; but to reduce this to life-size is to put to scorn the art and striving of the past centuries and is unthinkable. A very modern development is mutilation. It has been discovered that to lop off an arm or two arms, a leg or two legs, greatly enhances the value of the artistic production. Students must bear in mind that sculpture should never try to express the frivolous or domestic, nor descend to the absurd and grotesque; it should be an expression and realisation of an idea which should, as far as may be, be divorced from the matter of fact. In decorative work its most proper place is perhaps the fountain with its many beautiful and delicate associations.

The most important works in this country had been too curbed by committees, or sometimes instead of a committee

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it is an architect that has to be faced. It was not realised by these people how important it is that the prime intention of the artist should not be frustrated and the whole thing be made of negative value. It is a case of each man to his craft, and the creation of a memorial should be left absolutely in the hands of its creator. But this, there was good reason to hope, would with passing years become less and less a difficulty. For the sculptor and architect are joining hands, as they should, in their endeavour to produce fine work. The architect who does not wish the sculptor to have anything to say as to the arrangement of the work will go to the architectural sculptor, a term that always sounds something of a misnomer.

There were many points in the practical side of his work that the young sculptor would only learn by experience. If possible, the sculptor should not undertake the foundations of his work, as they were such an unknown quantity. And it is better to put the responsibility on somebody else's shoulders, such as those of the contractor for the pedestal.

The Greek seems always to have had a desire for thoroughness. The figure or group that was to be placed prominently a long way from the eye was executed with the same conscientiousness as if it were to be seen close to. The modern European idea of scale of texture of surface is opposed to this. It is now thought sufficient if the surface is left rough hewn so that an effect of finish is given to it at a distance. More than this, the modern doctrine is that this roughness gives more power when seen from afar. It would be interesting to know of any case where the Greeks were satisfied with this. Their end seems to have been that their work should not only have the appearance of completeness, but as far as they could make it should be really so in fact. Our museums and galleries contain works which were originally placed a considerable distance from the eye, but their finish is absolutely perfect. The Parthenon frieze was never done justice to before it was placed in the British Museum. It was safe to assert that a completely rendered work need lose little from its position, provided that the sculptor has learnt from the old masters to execute broadly enough. No doubt the love for the rough-hewn in sculpture is partly to be accounted for by the diminishing payment which is made in inverse ratio to the height of the statue. Another reason is the urgent demands from architects and committees for rapid completion and delivery. There is one thing to be said in excuse, and it is that modern architectural work, especially in our great cities, will not live one fraction of the time that will be enjoyed by work in a purer climate.

These considerations should suggest many thoughts of interest regarding sculpture in conjunction with architecture and the beautifying of cities with sculpture in relief and in the round.

THE ARCHITECTURAL ASSOCIATION.

A MEETING of the Association was held on Friday evening last at Tufton Street, Westminster, Mr. Henry Tanner, jun., vice-president, in the chair.

The HON. SECRETARY announced the fourth spring visit, fixed for February 27, to the National Society's Training College, West Hampstead, members to meet at the building at 2 P.M. A visit will afterwards be paid to the L.C.C. Board school at New End, Hampstead.

The following gentlemen were elected members:—Messrs. L. M. Yetts, G. H. N. Inman and E. V. West.

Mr. A. L. N. Russell was presented with a book prize, value 3*l.* 3*s.*, gained in connection with the A.A. photographic competition.

Mr. A. NEEDHAM WILSON read the following paper, entitled

The Press and Architecture.

I confess that I approach the subject of this paper with a very considerable amount of diffidence and under conditions of more than usual difficulty. For one thing, I feel that it would have been infinitely more advantageous to have had the views of a Pressman, and one intimately acquainted with that portion of the Press which is accustomed to gauge the tastes of the vast reading public; not to pander to the tastes that are vitiated, but strong enough to lead, to guide and to instruct. For another thing, I feel that latterly we have witnessed a vast change in the attitude of the Press to our profession and its productions, and the present moment is one of such paramount importance, a moment so pregnant with great possibilities, that since it was ordered that the subject should be dealt with by an architect it should be handled by one who had greater influence and whose words would carry greater weight in our profession.'

I am so convinced that the moment is fraught with big events for architecture, in this awakening of the powerful English Press. I am so anxious that the impulse should be well directed. I am so desirous that the opportunity should be favourably seized upon, and without false modesty am so conscious of *my* incapacity to deal favourably with it, that I can only express the hope that the question may receive more capable attention at other hands than mine.

Before I proceed I think it is advisable to clear the ground somewhat, and I wish it to be understood that I do not include the professional Press in my remarks. We architects, in my opinion, cannot overrate the debt of gratitude owed to the professional Press, which has done so much to promote the best interests of our art, to foster its appreciation, and to advance its progress in the best channels. It would be an ungracious act on my part if I did not pause to acknowledge the help and assistance which we as an Association have received from the professional Press and all those connected with it, from the editors to those gentlemen who report what are only too frequently, I fear, dull, lame and halting speeches in this room. No, we have little to complain of in our professional Press, which indeed does not come within the scope of my paper.

I am fully aware of another serious difficulty which I see looming ahead. In advocating the acknowledgment of architecture I shall be accused of advocating the acknowledgment of architects. I plead guilty, for that is precisely what I shall do, holding that the one is a necessary corollary of the other. If I am to be accused of advocating the advertising of architecture and architects, I shall not plead guilty, holding, as I do, that such exhibitions in the daily Press are not conducive to the best interests of our profession, and are open to justifiably caustic comment. I have no doubt several instances will occur to the mind, and I leave it to others to say whether such published interviews are calculated to promote either the dignity or the best interest of our art.

My difficulty to-night is accentuated by the impression that the daily Press has a tendency to rush from indifference to the other extreme, and thereby offer a temptation to the young and struggling man to make a desperate attempt to escape from the trammels of obscurity, and to launch himself on a career of fame. The process is simple. Hatch up a wild cat scheme, preferably connected with a public building, dish it up in as splashy a drawing as you can, and send it to the—well, a daily paper. Do you think a dome would look well on Westminster Abbey? Send it to the Press. Why not rebuild the Bank of England as a skyscraper? Send it to the daily Press. Cover in Trafalgar Square with steel and glass—send it to the daily Press. Cannot you find a site for an unnecessary public building? Then put it on an artificial island in the river and send it to the Press. Presumably these perpetrations are forwarded to the journals by their authors, for it is difficult to believe that editors themselves search out these things with the idea of interesting their readers.

This suddenly awakened zeal in architecture has taken another strange phase of recent years, partly accentuated by the garden city and cheap cottage craze, and such incidents as the settlements in St. Paul's Cathedral. So much public attention was drawn to these matters that the reading public realised for the first time that there existed a class of individuals known as architects, and the doubtful privilege of the "interview" was extended to members of the profession. If I remember rightly, one of the first of these appearing in a pushful morning paper was not unwarrantably made the occasion of some extremely severe comments by brother architects. Then when three men who were legitimately entitled to be consulted upon the condition of St. Paul's came so prominently before the public eye, there seemed to be quite an unseemly rush to express an opinion, not only on this subject, but on many others. The number of unknown men with opinions of no value whatever whose names appeared in print at the time was rather astonishing. The public read with awe of the opinion of Mr. Brown, the "well-known architect," of Mr. Jones, "the celebrated architect," of Mr. Robinson, the "famous" architect—read and was none the wiser. Shade of Vincent Crummles, how do these things get into the papers?

It is unnecessary to take you through the subsequent stages, but it seems to me that this Press period culminated recently in a sort of symposium in an evening paper following on a series of articles by a certain professor, and sup-

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posed to aim at the discovery of the finest building in London. The result must have been somewhat bewildering to the reading public if they read the opinions at all. And if they came to any conclusion, it must have been one of contempt. Still the attempt was on the whole commendable, as it probably led many to realise for the first time that fine buildings did actually exist in London. This is something achieved by the Press, though whether as a result architecture has been advanced is open to question, and for architects there seems only a step between this kind of thing and the advertisement columns.

This tardy recognition of the architect by the Press is but a bare act of justice long delayed, and in its inception naturally ill-expressed. Hitherto he has been consistently ignored. The painter who executes in pigments the creation of his brain, and the sculptor who puts in concrete form his fancies, are recognised as the authors of their creations, and are open to adulation or criticism according to the fad of the moment. Indeed, a Press warfare may rage around their work if the Press, that stern guardian of public morals, decrees so. An amazing amount of prurient rubbish is put in the minds of the reading public by these sticklers for purity, who do not hesitate to publish the nauseating details from the Divorce Court or the criminal courts. A notorious instance will be fresh in your minds, where the merits or demerits of the building were ignored, and the architect only came into prominence in connection with the decorative features which were the subject of the censure.

The painter and the sculptor who adorn the building, and whose work is enshrined in the architect's conception, come in for their full meed of recognition, while the obscure individual who provided a fitting home for such decorations, allotting with care and skill the right place and proportion to each, is ignored and buried under a deluge of statistics. The editors consider that the public are far more interested in the exact number of bricks used, or the precise quantity of cement employed, or the number of men engaged, and how many were killed or injured, and how many gallons of beer they drank. They hardly go far enough. Why do they not add the age of the contractor, a brief family history of the quantity surveyor, the weight of the clerk of works, and such interesting details? Why does it not occur to these editors to give the number of drawings made, the aggregate of hours spent upon them, and the quantity of pencils used? Why not detail the time occupied in party-wall disputes, struggles with innumerable authorities, and other engrossing matters? But hitherto no one has been interested either in the method by which a building is produced or in the man who produces it. But now that the public have discovered that a building does not rise spontaneously, and that there is a directing and controlling force known as the architect, there is a tendency to rush to the opposite extreme and advertise the architect at the expense of the architecture. This tendency has been aggravated by the result of the competition for the County Council Hall, where the picture of a young man, rising suddenly into prominence and fame, appealed strongly to the Press, and through it to the public. But what appealed more strongly still was the remuneration. You all saw it—in heavy leaded type—"A Fortune at Thirty-two!" Such minor points as that the receipts would spread over many years and be subject to heavy deductions for expenses were absolutely ignored. The impression conveyed was that the successful author had done his work, had received so many thousand pounds, and there his interest ceased. Not one of the papers, so far as I know, took pains to present the facts of the case, and how many presented a serious and authoritative criticism of the designs? Still, there is the salient fact that the architect has been discovered and has received a certain amount of recognition. How different from the time when the Imperial Institute was opened amid circumstances of unusual public interest and extreme pomp and ceremony. The papers were full of it, and devoted column after column to the event, but I cannot remember one which even hinted at the existence of an architect. Certainly, views of the building were published, but it is significant that the name of the author should be considered of insufficient interest to demand publication. There is no need to multiply instances. They will occur only too readily. But the prominent fact remains that only recently has it dawned upon Press writers that some man is responsible for a building which attracts public attention.

This is no plea for advertisement; it is hardly a plea for recognition. It is something more. It is a plea for the recognition of an art essential to the community, on the efficiency of which depends that community's well-being. It is an art which should appeal deeply to the artistic sense of the community (if it has any) just as surely as it should meet the demands of comfort and hygiene. The men who produce it should be subject to public recognition as benefactors. The painter and the sculptor receive that recognition to a limited degree as contributors to the artistic requirements of the nation. The engineer receives his meed of recognition as meeting the utilitarian demand. And these three rightly and yet inadequately. But the man who in his own person meets all three requirements after a prolonged period of obscurity, working beneath the surface, so to speak, producing art for art's sake, is just beginning to creep into the light of the Press, and is here and there receiving public recognition in the shape of well-deserved honours. In honouring them the profession as a whole has been honoured, and in honouring the profession our art has been honoured. This lack of recognition for benefits conferred upon the community—and again I must emphasise that point—has been due to a variety of causes. Partly the indifference and ignorance of the public, partly the lassitude of the profession, and partly the attitude of the Press.

It has been the custom of the Press to give undue prominence to law-suits in which architects have been involved, often to their undoing, and I have felt that the Press has taken almost a malevolent delight in holding up the unfortunate man to the jeers of the unsympathetic. For long years, whenever the architect has appeared in the pages of our journals, he has served as a butt for the shafts of somewhat clumsy ridicule. Occasionally I confess the ridicule has been deserved. More often it has not, and the daily Press, taking its cue from the pages of *Punch*, has continued a campaign of satire, which I submit has now become pointless and ill-deserved. I do not think as a profession we are more thin-skinned than other professions, or that we are free from foibles, and we do not claim immunity from the cheap sarcasm which passes for wit.

What we want, and what we do not get, is intelligent criticism from persons qualified to criticise. Here, I again submit, we have a genuine grievance against our otherwise excellent Press. If the editor of a newspaper requires a special criticism upon an exhibition of paintings, presumably he does not entrust it to the hands of a reporter whose speciality, we will say, may be writing a *précis* of Divorce Court proceedings. Not at all. The task is given to a man who is a reputed critic at any rate, though his criticisms may be, and too often are, valueless, and invite only the derision of the artist. Of course the public is no wiser, and meekly accepts the dictum of the great man. Again, does an editor depute the criticism of a new play to a reporter whose speciality is the sensational writing-up of murder cases? On the contrary, the task is entrusted to a recognised and frequently well-known dramatic critic. Now both these critics—the art and dramatic—are supposed to be well versed in their particular lines; the one, to know all about the old masters, colour, chiaroscuro, grouping, drawing, perspective, and the rest of it; the other, a sort of play-writer encyclopædia, ready to convict the unwary author of plagiarism at short notice, a judge of elocution, of stage-craft, and goodness knows what else. If the intelligent editor desires a special article upon an army matter, does he follow the example of our Governmental system and put it in the hands of a civilian? He surely goes to the man with the special knowledge—the army man himself. If a naval subject has to be written up, is a novelist the proper authority to deal with it? And yet, on the rare occasions when an architectural article is required, how often is an architect employed to write it? Not long ago I was staggered to see in a sober evening journal, and not one of the sensational journals either, this very unfamiliar heading:—"Architecture in the West End. By an Architect." And a very good and well-written article it was, to my mind. I make the editor my compliments. Too often, I fear, if a building has to be "written up," it is the custom to apply to the architect for a written description, and probably the fearsome "specification" English disclosed puts the average editor in wholesome terror of an architect's literary accomplishments. And yet I venture to think a perusal of our professional journals and proceedings will show that the architect can more than hold his own in the literary field.

For long years the profession has endured slight, calumny, misrepresentation and distortion in the Press, and endured it "lying down." Not that there has been no opportunity for retort. Within my recollection scarcely a newspaper article, description, criticism, or witticism, scarcely a magazine article, scarcely a story or novel, but has contained some glaring solecism or inaccuracy which has excited the derision of the architect. But then the reader does not know in his blessed ignorance, and the architect

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has left him to wallow in it. Is there any other conceivable subject under the sun as to which a writer would take no trouble to verify his facts? Is there any other direction in which the reader or the critic would not pounce on inaccuracy and take care to correct it? Why, the correspondence columns of our newspapers thrive on this sort of thing. How is it that we never see corrections of architectural inaccuracies? Do we as a profession consider such things beneath contempt, or do editors reject such communications as "not being of sufficient public interest"? It would be interesting to know indeed. I do not want to bore you with examples which must be only too fresh in your minds, and one or two only must serve to illustrate my point. In a novel by an extremely well-known and popular living writer is a description of an invalid's bath-chair being wheeled down the steps of the house by means of planks laid from the lintel of the door to the ground. Having gone out of his way to indulge in detail, he perpetuates a gross technical absurdity by a confusion of terms which a little trouble would have obviated. Why, the translators of the authorised version of the Bible had a better technical knowledge, as those who remember their twelfth chapter of Genesis may know. But this is not the point. The distressing fact is that as far as I am aware not one critic seized upon the solecism. Was the author who wrote of the "stone gargoyles which grinned down upon the passers-by from each stone mullion" held up to public derision as a person with a little dangerous knowledge? Not at all. Was the lady who wove a novel round one of our English cathedrals, a novel full of gushing and fulsome anachronisms, pulled up for references to cloisters which simply do not exist? Never to my knowledge. Are any of the newspapers with their turgid descriptions of buildings ever pilloried for their wilful ignorance? Again, I ask, whose fault is it?

We architects bleat glibly of "educating the public," and yet we do not take the means readiest to hand for doing so. It is no use holding up these erring ones to the derision of architects in the professional Press. They should be taught through the columns of the general papers to take the same care with architectural technicalities that they would take with any others. Almost a worse type of offender is the one who has a nodding acquaintance with technical terms and showers them upon the long-suffering reader as proof positive of his superior knowledge—a blatant assertion of his real ignorance. I venture to think, however, that this state of things is passing away and the colossal ignorance hitherto shown will no longer be tolerated by a better educated public. I suggest that the Press is lagging behind and but slowly following the public demand, instead of exercising its true function in leading and developing.

It is not realised how intimately the daily life of the community is associated with the buildings in which it dwells, worships, conducts its business, works, amuses itself, houses its museums, its works of art, its learned societies, its law courts, its vast system of government. The very necessities of life are bound up in the edifices which meet the eye everywhere.

(To be concluded.)

IDEAS IN THINGS.

On Wednesday evening last Mr. C. F. A. Voysey delivered at Carpenters' Hall, London Wall, the first of his lectures on "Ideas in Things," in connection with design as applied to completed work. The age we live in, he said, is intensely material; it has witnessed a mighty development in things material. The steam engine and electricity have transformed the world; our minds have been engrossed by material ideas to such an extent that we have scarcely devoted that attention to the spiritual side of our natures which that side deserves. It is for us to kindle the thought and feeling that shall form the motive power by which material forces are to be turned to good account. It is lamentable when men's minds are so absorbed by material conditions that they lose all sensibility to the higher forms of usefulness and happiness. Materialism alone is a demon of unrighteousness; one of its commonest effects is to belittle the faculty of reason, and allow the will to follow the dictates of the emotions. We are content to be pleased with anything, without asking ourselves why. Things said to be charming are often accepted without question. Artists have been heard to openly affirm that art has nothing to do with reason They say they are led in a mysterious way in their work, and never reason about it, although they talk reasonably enough about material qualities. The presence of so much ugliness in life to-day is largely due to the materialistic habit of mind. We love ease far more than beauty, utility far more than inspiration, and consequently "ideas in things" are not readily recognised.

All art is the expression or manifestation of thought and feeling, therefore a technical knowledge of any craft by itself is but a language with which to express thought and feeling. And such qualities of mind as accuracy, order, neatness, precision, frankness, love of truth, and above all reverence, are some of the qualities we call spiritual, because they minister to our characters far more than to bodily comfort. We may make doors and windows, chairs and tables with mechanical exactness, and be paid in coin in exchange, but neither we nor those who pay for them will gain any spiritual benefit from our labour unless we have put our hearts and minds into the work, anxiously seeking to impart some good thought and healthy feeling. Whether or not the workman be seeking to gain praise for himself, or express praise of lovely qualities, will make all the difference to his influence through his productions. It will be vain and frivolous, or dignified, simple and restrained. A thousand subtle feelings may be suggested by it according to the earnestness and purity of the man. It is base materialism to shut our eyes to the spiritual character given by man to matter. Materialism has given rise to a thirst for artificial excitement. For in proportion to man's loss of interest in spiritual ideas, and in the manifestation of moral qualities, he loses enjoyment in his work, and cries out for amusement by itself. A workman to whom his work is a feast of reason and a flow of soul does not want to waste much time in watching football matches; he is not hungry for the excitement of gambling; his joy is more constant and less spasmodic. The old carpenters derived deeper pleasure from their work than we derive from ours, because they read less and thought more; putting more thought into their work, more thought was got out of it. Their ideas were fostered and stimulated by the thoughts and feelings in the things around them. The capital or doorknocker were eloquent in their appeal to their fancy. But now the idea that a chair or table can be made to express thought and feeling seems to the carpenter quite ridiculous. Once let it be recognised that the spiritual verities are of primary importance, and that we can help on our own as well as our neighbours' growth in virtue by trying to put thought and feeling into our work, we shall then find an added joy in labour far more precious than any material reward. Many of the schools teach that in certain past ages very beautiful work was done, and that such beauty is not possible to this dark age. We are all miserable sinners, so they say in effect; we must go on hands and knees and measure up, and draw and learn like parrots to imitate with technical excellence what the ancient and good have showed us. This is false teaching. There is as much capacity for goodness to-day as there ever was in any age. Men can turn out work as perfect in all material qualities as the world has yet seen.

The human quality in familiar objects has in many cases been driven out by the machine, and the lack of spirituality makes many content with mechanical things, and lose their taste for the subtlety and charm of human work. Nevertheless the machine has come to liberate man's mind for more intellectual work than was provided for him by the sawpit. Conscientiousness and a love of truth and hatred of all forms of deception will help us to make the hidden parts of our work as good as those that are seen. What carpenter would not enjoy making articles of furniture of one quality throughout instead of oak in front and deal behind? And patrons, if they too felt the same, would be glad to pay for the absence of sham. If we would frankly acknowledge the structural necessity of nailing down floor-boards, we should not strain our ingenuity in devising methods of secret nailing. The age is far too keen on mechanical perfection. The modern builder will have the arrises of his stones drafted and made mechanically square and true, so that the mason can set them with plumb-rule and little or no thought, preferring that mechanical exactness to the work of the painstaking human eye. And alas! many a mason prefers to use a tool rather than have to think. All have observed the soft yet massive effect in old buildings, when the angles were put up by human eye. Compare them with the hard, unsympathetic, mechanical effect of the modern drafted angles. It would be inadvisable, of course, to go back to all methods of hand labour and to neglect the aid of the machine. All we need is to recognise its material value and its spiritual imperfection, and put into all our hand work that thought and feeling which is the breath of life. All the beautiful human work that has been bequeathed by the ages was the outcome of sincere and honest thought and feeling. Let us

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then see to it that our work is palpitating with sincere and noble thought, and feeling. The frame of mind of the joiner in mitreing his architraves is destined to have its effect, whether he be followed by the painter or not. Faithfulness in little things builds up the strong character and makes work enjoyable to the worker, and lays the foundation of that sense of beauty which all need. If work is to be fit and beautiful, it must express some good thought or healthy emotion. Whatever we make, be it only a chair, can record our honest endeavour to serve a useful purpose and stimulate kind feeling.

Students think to ease their labours with the polish of Greece and crumbs of knowledge from Italy. When asked to design anything, they immediately inquire how someone else did it; having no reverence for contemporaries they look to the dead and buried and find the museums crowded with lovely examples. Every inducement is held out to use the wits of others rather than their own. If we would go humbly to nature more, we should have a juster reverence for man's work. We should not be content to copy his successes and his failures, without exercising our own faculties. It is much more healthy for a student to be told the conditions and requirements necessary to provide any given object of use than to set him to copy the best example of the same in existence. The process of thought in the classification of requirements and conditions is immensely valuable. It stimulates the faculties and warms the heart and encourages the feeling that there is always room for improvement. But the general method of procedure is to fix on existing human productions as more or less perfect and final, and at any rate superior to our own, and then copy without having a full knowledge of all the circumstances and conditions that give rise to the object of our admiration. The student's faculties are in this way cramped and petrified.

It is quite easy to see when articles of daily use are made by loving hands and thoughtful heads, and when they are made by human drudges working for wage alone. To impart this human spirit to anything, we must not imitate blindly; no feeling can be imparted until it has been truly felt by the workmen.

One of the chief reasons why we should evolve our creations out of a due consideration of conditions and requirements instead of imitating tradition or well-beloved examples, is that our conditions and requirements are always changing; new methods and new materials are constantly being evolved, and men's habits and tastes are for ever developing.

Think what a keen love of cleanliness could do if applied to our architecture in dirty towns. How much so-called ornamental enrichment collects dirt and depresses us by harbouring all that is unclean and repulsive, producing feelings the very reverse of pleasure. The very proper pleasure we feel in dexterity is often sacrificed for the sake of elaborate ornamentation that is hopelessly meaningless and sometimes used to hide bad workmanship and bad material. This kind of enrichment gives no pleasure and cannot stimulate any nice feeling or healthy thought.

Often a feeling of generosity is expressed by making the parts of a building or object larger than may be actually required on structural grounds. For instance, the old roofs were composed of massive timbers, it being in old time often cheaper to use a whole tree than to cut it up. There is a certain satisfaction to the eye to be gained by proportions which are in excess of mathematical requirements. We call the architect's work an art, but the engineer's work a profession, and the difference may be traced to just that addition of the spiritual quality of generosity, just that thought and feeling which humanises the work.

In conclusion Mr. Voysey said a little more love of peace and quietness and a greater readiness to take a seat behind nature instead of crushing her under foot will help to make our buildings more pleasing and restful. Greater spirituality, in fact, shall blot out all material vulgarities. The wonderful resources for gaining knowledge and culture have not made our work more beautiful. The most intimate knowledge of the history of Greece and Rome, what has it done for our buildings? It has failed hideously and stimulated pride in scholarship. It has made us vain but not thoughtful, arrogant but not emotional. Better to have sought out the immortal thoughts and feelings that guided the spirits of ancient times. Materialism has been the seed so sown and we have only tares to reap. Or rather say we are at the end of a hideous night, and are now awaking to the necessity of sowing living seed. All around are signs of renewed spiritual activity and a reaction from materialism.

DEVON AND EXETER ARCHITECTURAL SOCIETY.

THE annual meeting of the Devon and Exeter Architectural Society (embracing the counties of Devon and Cornwall) was held at Plymouth, the President, Mr. James Crocker, F.R.I.B.A., of Exeter, being in the chair. The twenty-second annual report stated that the roll of members now stands at eighty-five. The Council still regret there has been no response from the younger members, whereby students of the society may join the school of design of the London Architectural Association. Therefore the guinea book prize offered by the society to the competitor whose design is placed first has not been awarded. It is also noted with regret that the attendances of members at the general meetings continue to be small; and that when papers are read, the benefit they are intended to supply is not gained. For the two guinea prize (in books) offered by the society for measured drawings for 1908, only one set was submitted; but, being deemed worthy, it was awarded to Mr. W. W. Hitchins, of Plymouth. The balance-sheet was of a satisfactory character and with the report was unanimously adopted.

The retiring president, Mr. James Crocker, then read his address. After some introductory remarks, in the course of which he expressed his belief that architects would soon see a return of the wave of prosperity, Mr. Crocker said in an address of this kind, however brief, some reference should perhaps be made to the present position of the profession, and of architecture generally; the former thought divides itself under one or two headings. It is true that the services of an architect are now almost invariably called in, or rather the work, whatever it may be, is carried out upon some sort of definite plan prepared by somebody; and this takes us at once to the subject of "The Architects' Registration Bill" or "Architectural Registration," which I have now advocated for many years.

Something more than merely "marking time" has taken place during the last decade, but the wheels of the coach run very slowly, and meanwhile there has been an addition to that ever expanding army of those who take on architecture with an audacious flippancy, and with no necessary qualifications beyond the ability to plan four square walls and cover them with a roof. I am not going to recount all the evils of the present system because you all know them, and have mostly made up your minds about them, but the extraordinary thing is the gullibility of the public. It vainly hopes for what it has no right to expect, and is disappointed because it does not get it; but if the architects of this country were to put into practice what an enormous majority of them are perfectly agreed upon, they might bring this measure off without delay. Notwithstanding the almost feverish anxiety which has been displayed within the past few years for the teaching of drawing in all its branches in our schools and colleges, and even the establishment of chairs of architecture, it amounts almost to a national reproach that in the particular way to which I am referring, architecture is found in the condition in which it now is, and allowed to "limp along" on its own.

I feel strongly that this official indifference is one of the gravest things we have to think of. Those of us who have to look back over more years than we can possibly look forward to will have little to gain by the passing of this Bill, but we shall, by using every legitimate effort, be doing what every corporate body is bound to do, viz., that which is for the best interests of those whom we mutually serve.

There is another subject which is constantly being pressed upon us, and that is the overcrowded state of the profession. It is a condition not singular to the profession of the architect, but it is none the less serious, and the remedy if there be one ought to be discovered. This state of things exists from two or three causes; one is that of which I have been complaining, and which the Registration Bill through closing the open door would partially cure. Another is the great facilities granted for learning drawing and architecture in the various schools and colleges, creating draughtsmen by machinery; and a third evil is to be attributed to the natural but oftentimes disastrous ambition on the part of parents to make their boys what they were never destined for. A large number of boys enter the ranks of architecture who would be much better in a trade or business, for they only get intermittent employment, and when it is too late to find out that their choice has been a mistake. This serious state of things was referred to at some length by the President of the Architectural Association in his address in October last, in which he stated that some members had sent in their resignation through inability to meet their subscriptions.

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I should like also to make a suggestion or two, more especially to the younger members, on the subject of sketching and tradition. As to the former, I have for years constantly expressed a fear that there is a great risk of its being neglected in favour of the camera; and let mé say the one can never take the place of the other without serious loss to the student. My thought on the second subject is a plea for the carrying on of the traditions of a county or a district both in the matter of materials and treatment. This is a sound principle to work upon, and although Devon and Cornwall are not so rich as some others in examples, we need proceed in no uncertainty. We cannot take a walk or a short journey without noting the incongruities arising from a transgression of this principle.

And now to make a few observations upon the position of architecture as we find it. In doing so one is met with the initial difficulty that it requires the perspective of years to fairly judge of the past, and that we have to hand on our works to those who come after us without final answer, and with the note of interrogation still standing. This is only expressing a platitude, but nevertheless he who runs may read, and it is impossible to look upon the brilliant work of the past fifteen or twenty years without feeling that we are living in a great age, and probably making a history according to its kind, almost if not quite equal to that handed down through the middle ages, and by the influence of Inigo Jones and Wren. But what a revolution has taken place within the last sixty or seventy years! The Gothic had spent itself, as it has now done again, and the later Renaissance, in the midst of great wealth, had reached a period of decadence which found its worst expression in the hideous country mansion. Ecclesiastical restoration was invariably ecclesiastical desecration, and early Nonconformist architecture, in its struggles for existence in any form, has been aptly described as "the barnic order," with the inside like a sawpit, and galleries all round.

We live in times of greater inspiration; times in which the public taste is alert to the things that are best, and if not always technically safe is mostly easily guided; times of great public and private ambition in which there is some joy in living, and in which we have some opportunities here and there of not merely working for a living, but leaving a memorial; and if in the fulfilment of this object we constantly look back and live in the company of those who have gone before us, maintaining the traditions they have handed down, and gathering up all that is best in their works, and welding them with our own ideals, we shall by so doing best realise that which is the highest object of the artist—not the mere making of money, although I hold no Quixotic notions about that; nor the winning of popularity if it is to reach us through the avenues of vulgarism; but the enhancement of the art we have espoused.

The following members constitute the officers and council for the ensuing year, viz.:—Mr. W. H. May, M.S.A. (Plymouth), president; Mr. Charles Cole, M.S.A. (Exeter), vice-president; Messrs. M. Alfon Bazeley (Plymouth), James Crocker, F.R.I.B.A., John M. Pinn, T. A. Andrews, J. A. Lucas, A.R.I.B.A., O. Ralling (Exeter), C. Cheverton, M.S.A. (Devonport), J. C. Southcombe (Barnstaple), Mr. S. Dobell, hon. treasurer (Exeter), and Allan J. Pinn, A.R.I.B.A., hon. secretary (Exeter).

ANOMALIES IN BY-LAWS AND REGULATIONS WHICH AFFECT SANITATION.*

(*Continued from page* 118.)

IT is not my intention to enter into the much debated question of *iron versus* earthenware for domestic fouled water drains, beyond that my own experience is entirely in favour of iron.

There are considerable variations in the practice of providing foundations for drains, as also in the thickness and peculiarity of form, but the omission of these from the by-laws of many districts where earthenware or even stoneware pipes are used is wrong, as with pipes of this material no ground is free from the probability of movement that will either disturb the joint or break the pipe.

In regard to depth of drain or inclination of fall, little attention is paid, except that there is no limit to the depth they are buried, providing there is fall to the outlet and the fall steep enough, the latter not always a desirable condition, especially in a drain too large for its work.

In most provincial towns the work of laying domestic drains is done by the excavator, or, as his bill of quantities describes him, excavator and drainer, a practice which should be universally condemned for the reason that there ought to be no divided responsibility in this part of the work between the plumber or technically-trained man and what is often an unskilled labourer.

It is quite obvious that as great, if not greater, necessity exists that drains which are out of sight and may create irreparable damage before the cause is apparent should require a knowledge and expert training equal to that of drains above ground, when defects are more easily apparent and have the additional advantages of free circulation of air and sunlight to counteract the effects of their leakage.

In the matter of testing drains the same inconsistency of practice obtains, although the method is not so often defined by the by-laws, but rather depends upon the selection of the official for whose information the test is made.

Most authorities are content with a smoke test either before or after the drain is covered; some insist on the test being applied in both conditions. It is, however, quite obvious that this method of testing is very unreliable after the earth is replaced in the trench, and a drain that may have answered to this test when exposed and which is disturbed in the process of filling in and consolidating the earth may easily be defective without the possibility of discovery by the smoke test when applied afterwards.

It would appear much more reasonable to submit the drains to a test of the elements they are intended to convey and made with air and water under a pressure slightly greater than they would normally be required to withstand. In some districts junctions and bends are permitted, and but a few (unfortunately) insist upon inspection chambers at all junctions and bends with air-tight covers. In these latter and favoured districts there is, however, little attention paid to the designing of a general scheme for the domestic drains which will limit to the minimum of necessity these inspection openings.

It is again unnecessary to point out that no variation of local conditions can require such a numerous variety in either material or practice in so simple a matter as domestic drains; the object sought cannot be equally well secured by all these methods, or, if so, some of them are unnecessarily costly.

The elementary principles taught, and which govern this particular work, require that a drain shall be laid to regular falls on straight lines and accessible from point to point, for the purpose of periodical cleansing or removing of any obstruction which may occur; and it is further admitted that no ground is absolutely free under all conditions from the movement or shrinkage which is liable to injuriously affect the rigid joint or material of a drain not strong enough to resist such conditions, causing consequent leakage not easy of detection, with potentialities of danger and discomfort. The drain and its joints should therefore be strong enough to resist all adjacent movement or be laid on a foundation which will secure a like result.

Of gullies and traps there are an infinite selection of shapes and sizes, not a few of which are distinguished by the name of the town or district, whilst others stand as a permanent record of some fad or fancy of the official or sanitary expert who conceived their peculiar necessity of form; but few are designed to secure the most efficient results in their use, and in these are by no means included the examples of misdirected ingenuity for which the sanitary official or expert was responsible.

There is also an absence of regulations which limit the number of these intended safeguards, thus ignoring the principle that one trap may effect its purpose, but that a multiplication of traps may provide a number of dangers greater than the one they are intended to minimise, not least of which are the impediment they provide to the flow and force of the irrigant upon which depends the progression of the solids or flocculent matter to the point of discharge into the sewer and the decomposing sediment they retain owing to defects in their form and capacity.

In these appliances occur the same wide divergencies of approval or rejection by different authorities.

Some will be found to insist upon the provision of a huge 6-inch gully, with a capacity of some four gallons or more, to receive the discharge from a bay-window pipe of 1½-inch diameter that may discharge at most a gallon of water during the period of an occasionally severe rain storm, the doubtful advantage being that it does not often completely stop for want of cleaning out and does not soon lose its water (or more likely mud) seal by evaporation. In all gullies at present used there are several defects, one of the

* A paper by Mr. William Challoner, president of the Institution of Plumbers, read before the Midland Association of Local Government Officials on February 8.

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most usual being the form of the outgo spigot, which precludes the possibility of a tight joint, except by accident or the use of an unnecessary bend in the drain.

The common practice of fixing the gully "square off" the building and inserting a bend to regain the direction of the drain cannot be too strongly condemned.

The provision of guards to prevent the gully from receiving any undesirable substance are usually of a most unstable character, as is also the convenience for a necessary periodical cleaning.

The general trend of regulations which affect underground domestic drains, through a disregard of common-sense principles (such as suggested when dealing with earthenware drains), tend to create elements of danger, and in the guily or trap is provided a belated expedient to safeguard these often unnecessary conditions, but instead of doing so these in their turn provide a greater certainty of danger than the one they are intended to counteract.

Almost every district in its own peculiar way imposes some regulation which illustrates this tendency to provide a series of lines of defence against possible dangers which can only arise through defective construction in the drainage system itself, and which permits the retention of originally innocuous matter until it becomes disagreeable, if not dangerous, by the process of putrefaction.

One illustration of this is provided by the 18-inch long open channel from all sink pipes to the gully, which is insisted upon by most of the authorities within the metropolitan area and by some in the provinces.

Whilst it would appear that the original purpose of this expedient was to cool any hot water before it should enter the drain, for which purpose it was both unnecessary and useless, its main purpose at present is alleged to be a means of disconnection to prevent the possibility of bad air entering into the house up the sink pipe.

It may be of interest to consider how far the defects for which this safeguard is the intended antidote are preventable and in what degree the disconnecting channel contributes to its own necessity.

The absence or provision of this channel cannot affect the usually filthy 1½-inch lead sink pipe and its trap under the sink, which will neither gain nor lose effluvia by this precaution, but it will so disperse the slight force of the discharge from the waste pipe as to render it useless to disturb the contents of the enormous gully, on to the grating of which it eventually delivers it.

After being further dispersed over the grating it trickles down the sides of the rough brick eye, which bungs up the earthenware grating or clumsy dishstone to the level of the yard or area.

There is usually a waterway of about 1 inch beneath the dip of the gully, just kept clear by the trickling of the water in manner as described. The rest of the inside of the gully is a miniature anerobic tank, seldom cleaned out except when some case of zymotic disease has occurred and the drain-testers come along or the drains are up for repairs.

We may safely anticipate that the 4-inch drain from the sink gully to the outgo is more or less fouled with putrefactive matter at every joint and over two-thirds its internal area, and that the air in the same space is never displaced until the gases generated are in sufficient volume to force themselves out at the only open end, which is at the lowest point and quite opposed to their natural direction. It is apparent that this multiplication of defective conditions could be easily prevented, and that they are aggravated to some extent by the provision of this channel.

The whole arrangement is a double or treble precaution to deal with an easily preventable contingency. This is a typical illustration of how in this work provision is made for contingencies that seldom occur and which at other times provides a source of danger greater than the nuisance it is designed to prevent, and that, given common-sense principles in the construction and design of the work, the result would be the simplicity of action and economy on area upon which the safe reception and conveyance of putrefactive matter depends. *(To be concluded.)*

Mr. W. Birnie Rhind, sculptor, recently wrote to the streets and buildings committee of Edinburgh Town Council asking permission to erect the proposed Black Watch Memorial in the centre of the Princes Street end of Castle Street, but the committee delayed the matter in order to have before them a sketch. It had been previously decided to erect the memorial on ground belonging to the Bank of Scotland at the Mound, but it is understood that so many restrictions were imposed that it was decided to abandon that site.

Correspondence

Steelwork.

SIR,—I appear to have aroused the lion of the reinforced concrete camp, and what is more he is attacking me with tooth and talon for daring to utter a note of warning in regard to the use, or rather abuse, of this form of construction. I may say this is not the first time I have endeavoured to point out the danger of employing this combination of material under certain conditions; some time ago I sent a similar article to a journal that discourses freely on ferro-concrete work, but apparently this kind of communication was not wanted.

Here let me assure Mr. Twelvetrees that I am dealing with this matter purely and solely from the standpoint of a consulting engineer; my remarks about commercialism I will postpone until the end, so that your readers may omit that portion if they feel so inclined.

Mr. Twelvetrees would, however, do well to remember that it is generally the counsel that has a poor brief who tries to discredit the standing of a witness. Now to the point in question, which is whether reinforced concrete is a safe form of construction for beams, where they are exposed to moisture or other corrosive agents.

Unfortunately for simplicity's sake, Mr. Twelvetrees has expressed his calculations in the ratio of elongation to length; this naturally involves a long string of decimal figures. He, however, admits that the limit I stated, to which concrete would stretch under tension, may be taken at 1/10,000th of its length; that is to say, for a 2-foot length (I ask pardon for my temporarily returning to this length, assumed for the sake of making the figures less intricate) the elongation would amount to 24/10,000ths of an inch, or approximately 1/400th of an inch; this is quite near enough, considering the wide variations in the quality of concrete, and it has the advantage of stating the amount in round figures. When the concrete has stretched under tension 1/400th of an inch, it cannot stretch any farther, but must crack. Whether it still retains its additional length is doubtful, the probability is that it returns almost to its original length of 2 feet; otherwise how can the fact be accounted for, that a tested reinforced concrete beam will return practically to its original position after deflection? I wish to make this point clear, as Mr. Twelvetrees deducts the elongation of the concrete from that of the steel in order to determine the widths of the cracks; personally I think this is wrong, but it does not affect my argument to any vast extent.

Now as regards the elongation of a steel bar, subjected to a tensile stress of 7 tons per square inch, my figures and those of Mr. Twelvetrees do not vary very much. The elongation is inversely proportional to the modulus of elasticity of the steel; for my calculations I assumed the ordinary value of 12,000 tons per square inch (vide Messrs. Dorman, Long & Co.'s handbook); this gives an elongation of 1/1,700th of its length. Mr. Twelvetrees puts it at 1/1,900th of its length, based on the assumption of a modulus of elasticity of 30,000,000 lb., or 13,393 tons per square inch. Accepting his figures for a 2-foot length of a steel bar, the elongation would amount to 1/80th of an inch.

Again accepting his statement that the concrete retains its elongation after cracking, the difference in elongation between the steel and the concrete is 1/80th − 1/400th = 1/100th of an inch, as against my former statement of 1/70th of an inch. In any case, the total width of the cracks in a 2-foot length of a reinforced concrete beam, when the steel is stressed at 7 tons per square inch, would aggregate between 1/70th and 1/100th of an inch. If the steel is stressed up to 10 tons per square inch, the widths of the cracks would aggregate between 1/49th and 1/70th of an inch.

Now as regards the assumption of a 2-foot length Mr. Twelvetrees sarcastically remarks, "Mr. Childs probably knows, but omits to say, that the maximum tensile stress due to bending moment obtains only at the middle of the beam and progressively diminishes towards the ends, where the value is zero." I certainly omitted to say so, because the veriest tyro in constructional design knows that this is not true in many cases; as for example a beam carrying two concentrated loads of equal amounts, placed equally distant from the ends, such as a main girder carrying bearer girders. Here the maximum stress may extend over many feet; for

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a supposed case, it may be taken at 15 feet, then the total width of the cracks would amount to, at the least computation, 1/13th of an inch. Perhaps Mr. Twelvetrees' mind is obsessed by the beam that carries an equally distributed load; for such a beam of 20 feet span, the minimum stress in a central 2-foot length would be 6.93 tons, if the stress at the centre were 7 tons; so that the mean stress is 6.965 tons. Surely this is near enough to 7 tons for the sake of demonstration.

When once a hair crack has started in the concrete, which as previously shown would occur when the steel is stressed at about 1 1/5 tons per square inch, additional stress would naturally tend to widen that same crack, this being the line of least resistance; the only thing that opposes this is the grip of the concrete on the steel bar; if this is sufficient to prevent the first crack from widening, then only will other cracks open in preference. I can assure Mr. Twelvetrees that "no unhappy contretemps" has led me to these conclusions, but I must say that my experience in tests is that cracks do become visible, and that too without the aid of a microscope.

Turning from the abstract to a concrete example, such as the Post Office buildings in Newgate Street, the practice in such cases is to form the bases of the stanchions of a comparatively shallow slab of reinforced concrete, the reinforcements being within a few inches of the ground, these slabs being subjected to a considerable bending moment. Presuming that the steel is calculated on a basis of 7 tons stress, and that only the minute hair cracks, as admitted by Mr. Twelvetrees, exist, is it not possible that these may so expose the steel bars as to endanger their corrosion from the moisture arising from the ground?

The result may happen that in the course of time the stanchions may take their bearing on the ground over an area more nearly approaching that of their shafts than of their bases. At any rate is it wise to trust the entire safety of an important building to the hope that such a state of affairs will not happen?

Why should concrete in itself when reinforced become more ductile than when in its plain state? Can Mr. Twelvetrees mention any other material whose properties are altered by its physical, and not chemical, combination with another material?

The early theories of Considère, Hatt and others, who claimed that concrete would stretch without cracking ten times more when reinforced than as plain concrete, are now generally admitted to be as much in error as their theory in regard to the tensional stresses to be allowed in the concrete for reinforced beams.

In an article by Professor Hatt, after he had commented on and accepted M. Considère's elastic theory, he goes on to state:—

"The point to notice is that we can count on very large deformations in the material of the *tension* flange. The stress in the steel reinforcing material may be near its elastic limit and yet the concrete in *tension* may still be carrying load without cracking. This element of strength may then be included in the analysis." (Re strength of beams.)

Professor Hatt would probably repudiate both these claims at the present time; certainly all building regulations state that concrete shall be considered as incapable of resisting any tension.

Passing on to Mr. Twelvetrees' statement that "The presence of an alkaline compound will prevent the process of rusting," he here states as a fact what is only a theory; a very plausible one it is true; some theory had to be devised to account for what I admit is a fact, viz., that steel as long as it is not stressed and is thoroughly embedded in the concrete remains rust proof. He has, however, stated the theory in such a way that it becomes misleading. The alkalis of course neutralise acids, whose presence, by the way, is not absolutely necessary for the formation of oxide of iron or rust.

In the formation of an alkali, which takes place during the making of concrete, as soon as the water is added its alkaline properties are neutralised by the radicals, with which it immediately combines; so that before the concrete is brought in contact with the steel, it is almost a certainty that these alkaline compounds are fixed and stable, and no further free action can take place amongst the alkaloids; this is a certainty, after the concrete has set. These alkaline compounds, one of which is water glass, exist too in very minute amounts capable of neutralising a very small amount of acid; probably all are more brittle than the concrete. What is more, the better the cement, the less amount of alkaline compounds it contains, and these have been accused of being responsible for the minute hair cracks that appear in perfectly plain concrete.

Mr. Twelvetrees' statement would lead a casual reader to believe that free alkalis exist in concrete after it has set, ready at any time to attack any acid that may be assisting in the "process of rusting." After the concrete has set the alkaline compounds can only prevent rusting, not by any chemical action, but by providing a minute protective coating to the steel, which is in all probability less ductile than the main body of the concrete.

Even steelwork in exposed positions receives different treatment from that used in buildings; it is of the utmost importance that all its members should be open to inspection whenever desired; it is not safe to trust to theories that all is well, and the same should certainly apply to reinforced concrete work.

A word in self-defence. I will confess my sins. I am somewhat interested in a reinforced concrete firm, one of the very few that can claim to be English. I am even a shareholder in two others; but if I were dependent on these alone I should take a great personal interest in the proposed Poor Law Reform.

For the last ten years I have been consulting engineer to reinforced concrete firms; had I not been so I should have been entirely dependent for my knowledge on the makers of books, and my practical experience would have been nil. My experience is (I hope Mr. Twelvetrees' is otherwise) that clients or architects, I know of no exception, go direct to the commercial firms, not only for the material, but for the design itself. If they would confine themselves to one firm, they would get a fine design and the firm a fine price, but to put work which includes the design out to competition puts a premium on scamped work. I may say that of late I have used what influence I have had with the firms for whom I have acted as consulting engineer, to restrain them from using reinforced concrete in such classes of work mentioned above, because I conscientiously believe it is to their interest, and to that of reinforced concrete work generally, to abstain from anything that involves an element of risk.

Finally I might ask Mr. Twelvetrees why it is that, if what he states is such a foregone conclusion, the Concrete Institute is circularising its members, asking them to give their experience in regard to the corrosion of steel in reinforced concrete work?

Your space, Mr. Editor, is of more value than a long apology.

C. V. Childs

Suffolk House, E.C.

Fire Risks in Public Buildings.

Sir,—With reference to your article in *The Architect* of February 12, the arrangements in Westminster Abbey are antiquated and deficient. The water supply for the hydrants in the triforium comes from a tank in the south-west tower, which has to be kept filled by a manual pump worked by, say, a dozen men, and, with the relief, eighteen would be required.

Suppose a fire was to take place in the night, there is probably not more than an hour's supply in the tank, and how the men are to be quickly assembled at a short notice is problematical.

I pointed this out to the assistant architect last autumn when I was making my inspection of the lightning-conductors, and asked to be allowed to embody the subject in my report, but was told "that the fire department of the London County Council are responsible"; but they certainly cannot throw a jet from the street level.—Yours faithfully,

Killingworth Hedges, M.I.C.E.,
Hon. Sec. Lightning Research Committee.

10 Cranley Place, S.W.: February 21, 1909.

Architectural Drawings intended for exhibition at the Royal Academy must be delivered unpacked at Burlington Gardens entrance on Friday, March 26; oil-paintings on March 27 and 29; sculpture on March 30. No artist is allowed to send or exhibit more than three different works.

The Wexford County Council have decided that the county should be divided into two portions, and to appoint two surveyors, at a salary of 400*l.* a year each, this sum to cover allowance for travelling and clerical assistance. The County Council offered Mr. Henry Webster, M.Inst.C.E., the county surveyor, the county surveyorship of half the county at a salary of 400*l.* per annum. This he at once refused, and handed in his resignation.

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The Architect.

THE WEEK.

THE latest point relating to competitions taken up by Mr. K. GAMMELL is of considerable importance. It is of little use for the Council of the Royal Institute to boycott a competition whose conditions are unfair or undesirable, unless the members of the Institute loyally support their representatives. The class of promoters whose particulars and conditions need correction, though sometimes erring by ignorance rather than by intent, are most often just the people who will not swerve from their own course except under the persuasion of the mailed fist or the big stick. The mild remonstrance of the Institute will by them be treated with contumely and ordered to lie on the table, but the intimation of a taboo universally respected by the members will often bring the recalcitrants to a more reasonable frame of mind. The Council, however, can scarcely expect ready compliance with their decision when they are so exceedingly slow in making announcement that a certain competition is under their ban. It is no uncommon thing for members of the Institute to receive the first intimation of the Council's disapproval of the conditions of a competition when half the time allowed for the preparation of drawings has elapsed. When architects have not only planked down their one or two guineas for particulars, but have spent much time, thought, and expense on a well-advanced design, they want to have a run for their money, and to ask them to throw away all chance of recoupment is to put too great a strain on their loyalty. It is a comparatively small matter personally to the big-wigs at Conduit Street whether a particular competition is barred or not; but to the small fry, who are hoping by the ladder of competitions to mount to the seats of the mighty, it is of vital importance, and these are the men who make up the bulk of participants in all competitions and who can least afford to throw anything away, even the return of the sum they have paid for particulars.

WE are glad to note that in the House of Commons on Monday last Mr. W. REDMOND, rather dramatically, perhaps, furnished the First Lord of the Admiralty with the name of an Irish quarry owner who would undertake to supply the Admiralty with stone for the works at Rosyth of as good a quality and as cheaply as Norwegian granite is obtained. Norwegian granite, by reason of its usually excellent quality, its pleasant appearance, and its cheapness, has hit our home quarry owners very hard, but we have long felt that if the Irish stone industry, not only in granite but in marble and other building stones, were properly developed, there would be little need to go abroad either on the score of excellence of material or of cost.

THE report has been issued of the Departmental Committee on Humidity and Ventilation in Cotton-weaving Sheds appointed by Mr. HERBERT GLADSTONE in November 1907. For fine cotton-weaving it is essential, as in the fine lace-making industry of Belgium, that the atmosphere be kept moist; and one reason why Lancashire is the home of the English cotton industry is that its climate is naturally humid; but the Committee's opinion that it has been clearly proved that work in moist atmospheres at high temperatures is really and seriously uncomfortable for the workers, and probably, in the long run, injurious to their health. It scarcely needed a Departmental Committee to find this out. One would hardly select the atmosphere of a Russian bath as a pleasant and healthy condition for prolonged work. The Committee seem to be astonished that in dry sheds natural ventilation is considered sufficient, and that where such ventilation is in use the atmosphere, especially in winter, does not show worse results than they found. Even in the few instances when plenum and exhaust fans are installed, they are seldom used in winter. As most of our hospital wards have natural ventilation only—and this is preferred by the majority of their medical officers—it is clear that it does not necessarily follow that the atmosphere of a weaving-shed must be unhealthy because it has no mechanical ventilation. The Committee, however, is of opinion that regulations are required enforcing that arrangements shall be made that no person employed shall be exposed to a direct draught, and that the incoming air shall be sufficiently warmed to make the workers comfortable and prevent them from catching cold.

THE universal acceptance of the lowest tender is a practice far from capable of being always defensible. The possibility is ever present of a low price being offered by a cut-and-run contractor of doubtful stability or even an impending bankrupt, who, in desperation, is prepared to take his chance of a smash if he cannot by means of scamping or extras screw a profit out of the most unlikely contract. The result in such a case is misery to the architect and dissatisfaction or even loss to the employer, for if the latter signs a contract apparently giving him something for less than it is worth he usually gets less value than he pays for. Nothing for nothing and very little for sixpence holds good in building as in other mercantile affairs. The employer who wants a "bargain" in bricks and mortar generally gets a bad one. Various suggestions have been made to overcome the inherent weakness of competitive tendering. The selection of a limited list of contractors has long been in vogue, and, given the possibility of wise selection, has usually led to satisfactory results. There have been cases where a limited number of contractors have arranged who of them should be lowest, with a douceur to the others, but the occasions have been rare. A suggestion has been lately made that the lowest tender but one should be that for acceptance, so that no contractor would be tempted to cut his price too fine; but this method is obviously open to the chance of collusion, and needs only two scamps to form a confederacy. A far better suggestion in modification of this is that the tender to be accepted should be that nearest the average of the lowest half-dozen, or of the lowest half or even of the whole. We should not support the suggestion that the average of the whole list should be taken, as it nearly always happens that there are some tenderers who do not want the job, and purposely put their price high enough to escape getting it. But the average of a reasonable number of the lower prices will sometimes be nearer to a fair price than the absolute lowest. Not always, for, if so, it would follow necessarily that the lowest price is invariably too low to allow a contractor to give good workmanship and materials to the employer with a fair profit to himself. On the contrary, it not infrequently occurs that the lowest tenderer is able, quite honestly, to make a larger profit than some of his competitors would have done had their higher prices been accepted. Those who have had the opportunity of analysing competitive prices know that the lowest tender is very often such by reason not of a generally lower scale, but of some particular section of the work as to which the lowest tenderer is in a peculiarly fortunate position.

RECENT discoveries at Sparta have considerably increased our knowledge of Greek history and life. From a number of inscriptions of the second century—to be precise, dating between A.D. 170 and 190—it seems clear that at this period of the Roman domination, with its tendency to luxury and enervation, there was a recrudescence of the old Spartan spirit, an effort to revive the simplicity and austerity of which LYCURGUS was the traditional founder. It appears that during this time "the divine LYCURGUS" was at least eleven times elected Patronomos of Sparta—an office corresponding to that of Archon at Athens. Nor was this office a mere sinecure, for the deified LYCURGUS, being unable to take an active part in the government of the city, a deputy was appointed to maintain the observance of the old-time customs and traditions of the Lycurgean era, including the peculiar ritual associated with the cult of ARTEMIS ORTHIA. This is the only instance at present known of a deified legendary hero with an acting deputy occupying the position of magistrate on the mainland of Greece, although it was not at all an uncommon arrangement in Asia Minor.

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FRESCO PAINTING.*

FRESCO painting is in this country rather under a cloud at present, principally, if not entirely, no doubt, from the failures of mid-Victorian essays in this department of art work. The most important of these failures and the most influential in their deterrent effect upon its further employment are without doubt the examples in the Houses of Parliament. This failure has been ascribed to the dampness of our climate and the argument advanced that under such climatic condition fresco is necessarily incapable of durability and entirely unsuited for our country. The more truthful explanation is that the mid-Victorian artists did not sufficiently understand the limitations, physical and chemical, of true or buon-fresco and the necessity for a properly prepared wall surface and limited palette of colours. It is well, therefore, that we should have, in the volume now before us, the essential conditions for permanency in fresco painting clearly and succinctly laid down by an expert.

It is idle to gainsay the permanency of fresco painting in view of the examples recently discovered at Tiryns, at Thera and at Cnossus, none of which can possibly be of later date than 1500 B.C., whilst some may be as early as the nineteenth century B.C. Mr. Ward gives in his book an illustration of a fragment of ancient fresco from Tiryns.

We should note that there are several methods of applying colour decoration to plastered wall surfaces that have been loosely described as fresco painting; true or buon-fresco, spirit fresco, encaustic, fresco-secco, water glass, tempera and a combination of buon-fresco and tempera. With the possible exception of spirit fresco, whose introduction has been of too recent date to allow of full comparison, none of these can hold a place in durability with buon-fresco properly carried out.

Buon-fresco may also be rightly regarded as the most architectonic of all methods of colour decoration or painting, both because the colour becomes physically as much part of the building as stone, brick and plaster, and because the limitations of technique impose a restraint upon the painter, both in colours and in handling, that ensure his work being decorative rather than pictorial, so that it appears, as it should be, part of the wall and not a window through which an extraneous view is to be seen.

Though fresco has in the past been mainly concerned with subject-painting, so that we associate it with the idea of a more or less conventionalised picture, there is no reason why the methods of buon-fresco should not be utilised for pure ornament within the scope of an ordinary journeyman decorator down to the simplest arrangement of line or pattern with far greater permanency than that of oil-paint on Keene's cement, or any other medium at present commonly in use. The public is not prepared at all times to pay for the services of a great artist to decorate the walls of a building; it cannot afford always to employ a Leighton, a Poynter or a Richmond, but it is, so far as our experience goes, ready to accept colour decoration, even if it be only stencilling. It would be possible to use stencilling in buon-fresco, but the process is not the most suitable and is by no means necessary on the score of economy. It is one of the advantages of fresco that it is applicable to any surface whatever that can be plastered, and the methods of buon-fresco followed by the greatest artist in the most elevated work can equally be adopted by a journeyman decorator in the rendering of the simplest and most conventionalised ornament. It is not requisite that the architect should provide panels in which the fresco painting shall be, as it were, framed. The entire wall may be covered with fresco, partly pictorial to any extent that funds will permit, and partly decorative ornament, unity of effect ensuing that makes—given, of course, artistic skill and judgment—an architectural character to the whole scheme of decoration. The adoption of the methods of buon-fresco by architects would familiarise the public with its advantages and lead to the further and more general employment of pictorial artists for the purposes of wall decoration.

Where buon-fresco is to be applied, the first duty of the architect is to provide a dry wall, and Mr. Ward recommends that this should be of good brick, or if of stone, that it should be lined with brick, or, better still, a hollow brick wall. To this we would add that the architect should not attempt to ensure dryness by the use of Portland cement. Our modern Portland cement has in it so much of sulphur compounds and is so greatly given to effloresce that its use would be fatal to the durability of fresco. The joints being properly raked out for a sufficient key, the first coat of plaster may be applied, and this Mr. Ward advises should consist of "old lime" and coarse, gritty, well-washed river sand, mixed with ox-hair or white asbestos cut into small bits, the proportions being one of lime to two of sand and the coating about three-quarters of an inch in thickness. By "old lime" we opine that the author means lime that has been long slaked under water in the manner adopted for centuries by the Italian stuccatori and by the use of which they produce not only in their own country, but elsewhere on the Continent, and particularly in Austria, stucco that, used externally, is as lasting as the majority of building stones and more so than many. It is the universal custom of the Italians to keep the lime for at least twelve months under water so that it becomes completely hydrated, but not at all carbonated. Air slaked or carbonated dry "old lime" would be useless. The first or pricking-up coat of plaster, roughened to form a key, should be left for the best part of a year to harden, and is then ready for the final coat or intonaco, to which the painting is applied. The technique of this coat is quite simple, but strict adherence to details is essential, and these are clearly explained by the author.

In the actual painting the most important consideration is quickness, so that the colour may be all laid on before the plaster dries. The painter must therefore completely make up his mind before the plasterer starts on the intonaco what he is going to do, and must do it. There is no time for experiment and very little for touching up or amendment. Hence a finished coloured drawing of the design and a full-size cartoon are imperative. It is the provision of this full-size cartoon that renders the methods of buon-fresco applicable, as we have pointed out, to decoration by means of conventionalised ornament. From the cartoon the drawing is transferred to the wet plaster by pouncing or tracing, and a journeyman decorator of quite ordinary capacity could do this and apply the colour. The palette of colour is limited in range, but sufficient for a fairly rich and luminous colour scheme, and Mr. Ward gives a complete list of the pigments whose permanency may safely be relied upon, as well as an account of those of a more dubious character.

With a strict observance of the very simple methods of buon-fresco, its absolute permanence is certain as long as the plaster lasts; but if this is attacked by damp or sulphurous gases, its destruction entails that of the fresco painting chemically incorporated with it.

Spirit fresco as invented by Mr. Gambier Parry does not possess that peculiar quality of monumental dignity nor the undoubted luminosity characteristic of buon-fresco, but, as far as experience goes, appears equally permanent. The basis of the process is the employment of a solution of wax and gum elemi in copal varnish and volatile oil of spike, and it has the advantage of permitting over-painting and retouching at any interval of time after the original work. It is thus more in accord with the usual practice of painting in oil, and hence, no doubt, appeals more powerfully to the pictorial artist, but, to our mind, is, by reason of the latitude it affords, far less likely than buon-fresco to produce wall decoration that is part of the architecture of the building. Paintings in spirit fresco may be and are executed on canvas in a studio and then stuck on to the walls of a building as in the case of some of the pictures in the Royal Exchange, so that except as a curiosity it is hardly worth while to paint in the medium on plaster in situ, and the resulting decoration is no more part of the building than an ordinary oil-painting on canvas. Mr. Ward gives a full account

* *Fresco Painting: Its Art and Technique, with Special Reference to the Buono and Spirit Fresco Methods.* By James Ward. (London: Chapman & Hall. 1909 10*s.* 6*d.* net.)

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of the technique of spirit fresco illustrated by precise details of Lord LEIGHTON'S work at the Victoria and Albert Museum.

Encaustic painting receives but a bare mention in Mr. WARD'S book, but is far older even amongst moderns than spirit fresco, having been described in a paper by Miss E. J. GREENLAND, read before the Society of Arts in 1786, and we know that it was used by the Greeks, though their precise method is lost. In Miss GREENLAND'S process the medium was a mixture of gum arabic, gum mastic and wax dissolved in water, and the work was therefore always liable to be injuriously affected by damp air or moisture on the surface, in which respect it was inferior to spirit fresco, which is impervious from the front and affected only by damage to the plaster.

The latter half of Mr. WARD'S book consists of technical notes on the composition, colour and present state of some Italian frescoes, copiously illustrated by admirable illustrations, both in monotint and colour, so that we have an interesting account of some of the best old work as well as valuable instruction in technique sufficient to enable anyone to practise painting in either buon-fresco or spirit fresco.

STEELWORK.—VI.

By C. V. CHILDS, A.M.I.C.E.

Girders.

THE greater the number of stanchions the less the weight of the steelwork, may be laid down as an axiom in steel design. The weight of the stanchions is little affected by increasing their number; they have, in any case, to carry the total dead and live floor loads, which are practically constant quantities, independent of the number of stanchions which support them. The total load of a floor is a certain quantity of tons, whatever the number of the stanchions may be; the only difference that affects these is due to, the greater the number, the smaller the sections will be, and consequently their carrying capacity; or in other words the allowable stress will be slightly less than for fewer stanchions of larger area; the difference would affect the cost but slightly. With the girders however it is a very different matter; the farther the stanchions are placed apart, the greater the spans, and to an even greater extent is the steel increased that is required to span them.

Taking the case of girders carrying a uniformly distributed floor load, their strength and consequently weight is dependent on the product of their span and the total load, which again depends on the span; that is to say, the requisite moment of resistance of the girders is proportional to the square of the spans. Their weight, however, will not follow this rule, owing to the fact that the longer the span the greater depth of girder will be required to give it the necessary stiffness. The nearest approach that can be made for a general rule, governing the weight of the girders, is that this is proportional directly as the square of the spans and indirectly, to a certain extent, as the depth of the girders. As an example, to carry a load of 15 tons on a 10 foot span, a 10 inch by 5 inch rolled-steel joist weighing 30 lb. per foot run would be required; by doubling the span the load would be 30 tons (the width of the floor bay remaining the same) on 20 feet, requiring an 18 inch by 7 inch joist at 75 lb. per foot run, thereby increasing the weight of the girder two and a half times. To produce equal strength (the question of stiffness being neglected) for an equal depth of girder, viz., 10 inches, would increase the weight fourfold. In all probability neither of these two girders would be employed in actual practice, the former on account of the loss of headroom, owing to its depth, and the latter for want of stiffness for the opposite reason. Two joists 14 inches by 6 inches, weighing together 92 lb. per foot run would probably be selected, so that in doubling the span the weight of the girder has been trebled; at the same time the loads to be carried by the stanchions, whether two or three in number, remain the same.

Another most important point to be considered in regard to making the girders of long spans is that not only the weight, but in almost all cases the cost, of the steelwork is increased. Where for short spans plain joists would serve as the girders, for long spans compound girders would become a necessity; the weight is thus not only increased, but the cost per ton of the latter would exceed that of the former by at least twenty per cent. Take a similar case to that stated above, but for 14 and 28 feet spans carrying 21 and 42 tons respectively. For the two 14 feet spans, a 14 inch by 6 inch R.S.J. 46 lb. per foot would cost about 4*l.* 6*s.*; whereas for the 28-foot span a compound girder, composed of one 16-inch by 6-inch R.S.J. and cover plates, weighing 143 lb. per foot run, would be required costing 16*l.* 2*s.*; which shows that the cost has been increased nearly fourfold; from this it is apparent that the luxury of having but few stanchions can only be attained by paying heavily in excess of what the steelwork would cost in the case of stanchions placed closer together.

Architects should give this point especial consideration. The first thing that is necessary to be done in the steelwork design (and in the majority of cases this is settled before the engineer appears on the scene) is locating the positions of the stanchions, which are dependent on the general planning of the building, and therefore taken into consideration in the architect's design. The chief difficulty usually lies with the ground floor plan, where shops, banqueting halls and the like occur, in which an open space free from all obstructions is the chief desideratum.

These large areas necessitate large girders over them and advantage may be taken of this, and the increased number of internal walls and partitions, to augment the number of stanchions in the upper storeys. A comparatively small amount of extra material in the flanges of the large girders will, by enabling an additional stanchion to be carried, save a considerable amount of steel by reducing the spans of the girders for the upper floors. This is again on the principle that one large girder is more economical than many smaller ones of the same span. By this means, too, the depth of the girders in the upper floors may be considerably reduced, a very important consideration when it comes to the matter of the internal decoration and the plastering.

Frequently there is a wide difference of opinion between the architect and the steelwork designer in regard to what the depth of the girders should be. Naturally the architect is desirous of keeping the joists and girders as shallow as possible, in order to avoid having to case these in, where they would project below the ceilings, as well as for the sake of the appearance of the ceilings; also in order to reduce the depth of the floor to a minimum. Increasing the thickness of the floors may mean losing a course or more of brickwork in the heights of the rooms. Against this must be placed the points the designer has to consider; apart from the economy gained by using joists of greater depth, the most important consideration is the question of stiffness. A spring-board is strong enough for its own purpose, but this is hardly the principle on which to design floor girders. The depth of the main girders should be at least, unless in exceptional circumstances, one-twentieth of the span; 1 foot in depth for 20 feet in span is a convenient proportion to remember. It would be better if the rule could be adhered to for the cross joists as well; but in their case, when the concrete is filled in between them, this helps to give them rigidity.

One instance that frequently occurs may be mentioned, where the temptation is great to use too shallow girders; and that is, where they carry a flat roof over a long span with a skylight in the roof. As regards strength the girders may be comparatively small, but where glass is concerned, rigidity is essential. It is no uncommon thing for trouble to occur by reason of the glass cracking—it may be purpose-made panes for curved skylights—owing to a little false economy or want of sufficient depth in the steel girders.

Talking of purpose-made goods, this term is specially applicable to girders; they are requisitioned to bridge the gulf under every kind of condition. There is the roof truss in all its various forms; the lattice girder; the plate girder; the compound, composed of joists and flange-plates; even the bridge truss, built up of its component members, is occasionally required in architectural steel construction.

The bridge truss may be disposed of in a few words, because it is seldom that this type is economical in building work. One is tempted sometimes to use it where it might be buried in a partition wall at the first floor level, in order to avoid the equivalent plate girder, or compound, breaking down too far into the ceiling of an important room in the ground floor. But, as a rule, it will be found more economical to relieve the first floor girder by carrying up the stanchions and placing an additional girder at a higher level.

The reason of this is the high cost per ton of the bridge truss; also the assembling of the members and the large amount of rivetting to be done on the site. Even in a case, as stated above, it is a difficult matter to design, owing to the openings for the doors interfering with the proper arrangement of the diagonal or vertical bracing.

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Undoubtedly the best design for roof trusses is to make each members, whether ties or struts, of two steel angles, and to avoid the use of flat bars; this not only makes a more rigid truss, and less liable to damage during transit and erection, but the jointing of the members, by means of gusset plates is made simple and symmetrical. The use of flat bars always gives a meagre and flimsy appearance to the trusses; where they are used it would be an advantage to join the bottom tie at its centre by means of a union nut, for the sake of adjusting any inaccuracies of workmanship. It frequently happens that when the trusses are first erected, the flat bar tie appears to be flapping about and not settling down to its work, until the weight of the roof comes on the truss. Very slight inaccuracies in the length, which are not adjustable, may cause considerable unevenness in the line of the ridge.

The use of the union nut might with advantage be introduced more freely into English work. In America the sleeve nut, or turnbuckle as it is termed there, holds a recognised position in steel design; it is drop forged to standard sizes and the works are equipped for upsetting and tapping the ends of bars or rods to be connected and adjusted by the sleeve nut. Unfortunately, but few constructional works in England are so equipped, consequently this useful member has to be avoided by the designer. Where appearances count, the most graceful looking trusses are those whose tension members are round rods with forged eyes, but this unfortunately adds considerably to their cost. One point requires attention, and that is to see that the purlins take their bearings as nearly as possible over the joints of the bracing members to the main rafters; unless the rafters are increased in size to withstand the bending, caused by the purlins being placed intermediately between the joints, an unsightly appearance may be given to the roof, owing to the rafters sagging.

Purlins are frequently troublesome to design. Architects are almost always in favour of spacing the trusses far apart; this means long purlins, the loads are usually light and the difficulty is to secure enough stiffness in the purlin section. In an ordinary roof the worst that can happen is an uneven surface, due to the sagging of the purlins; but when there is glazed work in the roof, it becomes a serious matter, owing to the danger of the glass continually breaking. One means of overcoming the difficulty is to truss the purlins, but this gives the interior an unsightly appearance; the better way is not to space the trusses unduly apart.

Lattice girders are but seldom used in the steelwork for buildings; they are more adapted for carrying light loads over long spans. In building work the loads are as a general rule too heavy for this form of girder. Heavy loads mean heavy cross-bracing members, and consequently large gusset plates at the joints, so that there shall be a sufficiency of rivets to transmit the strains. This destroys the effect of what it is desired to gain by using lattice, in place of plate, girders, viz., lightness in appearance. In fact, in almost all cases it is for the sake of appearances, and where the girder is exposed to view, that the lattice girder is used, in order to avoid the solid and heavy effect produced by the plate girder.

The chief purposes for which lattice girders are employed in buildings, are for carrying roof trusses over long spans, also it is frequently used to carry foot bridges between separate parts of a building; in some cases, too, it may be used for the purpose of obtaining borrowed light, the external side of the girder being protected by vertical glazing.

THE SOCIETY OF ARCHITECTS.*

IT may be taken as an axiom that the Romanesque style developed almost entirely, if not entirely, in the districts which, some 700 years before the period now under consideration, had been under the dominion of Rome. There had been at an earlier period, and there were again in the eleventh century, two principal trade routes throughout Europe, one of these lying along the Rhine Valley, while the other traversed the Riviera and the South of France. From each of these main arteries trade and culture spread like a fan over the land, until the intermingling of influences in Mid France and Northern France was so complete that they became well-nigh indistinguishable. Speaking generally, the detail of this time throughout the whole Romanesque period now remaining along the Rhenish route is of a Roman type. Of mouldings there are scarcely any. A capital, from Soissons, gives a fair idea of what might be expected to be found throughout the whole district in which the Roman influence was in predominance, having a certain amount of Byzantine feeling in the shape of the acanthus leaves. The work is essentially Classic, with acanthus foliage and suggestions of volutes in the cap, and the use of all the ordinarily understood Classic enrichments, debased but recognisable. In this district the carving is Roman; it is true carving, in which, as a rule, the foliage projects well from the background.

Along the southern trade route, although it was a district where Roman remains must at that time have existed in innumerable quantities, the character is much more Byzantine. The surface of the stone which is carved is clearly discernible, the enrichments being obtained by sinking the background beneath it and by the use of the drill, as in much of the Byzantine work; while the cushion capital, itself a Byzantine feature in its enriched form, is found rather than the Corinthianesque.

This Byzantine stream of influence, as it neared the coast and travelled northwards, was subjected to another, an apparently Scandinavian influence, due, it may be supposed, to the fact that the coast-line of Western Europe was invaded by the same northern pirates as overran England and founded the Anglo-Saxon race. The result is seen in perfection in Poitiers. One of the capitals from the richly carved west front of the church of Notre Dame in that town consists of a cubical block of stone which has been roughly shaped into the cushion form so as to fit upon the semi-circular shaft, and has then been carved by cutting in the background so as to represent grotesque birds of an undoubtedly Scandinavian character, while the abacus above is enriched with a crude Byzantine interpretation of the anthemion.

Further north, particularly in Normandy, the Scandinavian influence is even more apparent, the details being almost identical with those commonly found in England during the same Norman period, their origin being in many cases easy to trace back to the forms of twisted wirework or to embroidery.

Detail of this description is, however, never found in connection with what we know as Gothic architecture; but the Gothic foliage, as it occurs in France, appears to have developed almost directly from the pseudo-Corinthian capital found in the Western districts under Rhenish influence. In the example already referred to at Soissons the acanthus is overshadowed by a broad leaf, and from this combination it is easy to recognise the source of the rich broad-leaved capital in very common use. In an example in the choir arcade of Lisieux Cathedral the leaves are arranged in tiers one above another as in a Corinthian capital, curling over at their tips much in the same manner as do acanthus leaves in Classic work, but without serration and more resembling the terminations of the fronds of the hart's-tongue fern.

At this date there is a general consensus of opinion that the carvers, whether in England or on the Continent, were beginning to obtain their inspiration from Nature. It is not so generally recognised that it was undoubtedly the spring foliage from which this inspiration was taken. Examination of a large number of examples must drive any careful observer to this conclusion. The first leaves were broad, certainly, but they were not fully developed leaves, as the curled-over tip indicates; and as the thirteenth century proceeded, the leaf became more narrow and the tip developed to a half-open series of leaf-buds known as the "Crochet" (or hook) capital. There is almost invariably an indication of Corinthianesque origin in the formal arrangement round the shallow bell cap, which is also of Corinthianesque type; but the fact that the foliage is natural and that of spring is incontestable, just as much as it is in England.

Gradually, too, as time went on, the foliage opens, as it does in Nature, when spring merges by imperceptible degrees into summer. A certain formality of arrangement is still retained, though in some of the grandest examples the foliage now occurs in the form of a scroll serving as a horizontal string. The use of foliage is, however, not exuberant as it is in England, except in crockets.

Strangely enough, as the thirteenth century merges into the fourteenth, the foliage became more and more like that of summer, until a perfectly summer foliage was developed; for instance, in a capital in the apse of St. Alpin, Chalons-sur-Marne, which shows vine leaves growing as a wreath round the capital and young grapes among the leaves. The capital has entirely lost the bell form and has reverted to that of the cushion, while, as in the earlier times, the carving no longer stands out, but effect is obtained by inci-

* Abstract of a paper entitled "The Development of Romanesque and Gothic Architecture on the Continent," by G. A. T. Middleton, A.R.I.B.A., read before the Society of Architects.

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sion of the background. As a general rule the foliage of this period is flat in effect in France; in England, while it also here represents summer at the same date, it is crisp and fully undercut.

It may be remarked that of this time there is no great amount of Gothic detail to be found in France, nor in fact much Gothic building either, for the country was overrun during the early part of the fourteenth century with English troops, who ravaged and pillaged wherever they went, preventing all attempt at building operations, and immediately on their departure the "black death" came, leaving utter ruin in its train. When it was desired to enrich the porches of Bourges towards the end of the fourteenth century, the Portuguese were called in to do the work, with the effect of extraordinary cusping and the introduction of a large amount of small enrichment, both of foliage and figures.

During the whole of the thirteenth and fourteenth centuries figure carving and sculpture were developed in France as nowhere else, with extraordinary breadth and dignity and extreme simplicity. They are mostly to be found in the great cathedral doorways, as majestic figures of Our Lord and the Apostles, as groups of angels, and illustrating scenes from Bible history and the lives of the saints. They are also to be found in many unexpected places, notably upon buttresses and pinnacles. Human grotesques are also common, and animal grotesques are more so, occurring sometimes as gargoyles, but quite as often as mere ornamental groups, say, of scampering rabbits, mice, or other animals, all crisply and clearly cut, indicative of close observation and an intimate knowledge of field life.

During all this period the mouldings changed scarcely at all, in this way differing widely from those in England. Romanesque work, where based upon the Roman, was perfectly plain, the arches, in receding planes, being usually rectangular in sectional outline, enriched with some carving possibly, but rarely moulded at all; while in Western France, and subsequently throughout the whole district under consideration, the angle roll and the slight surface hollow, which are associated in England with Norman work, became common, if not universal. The strange thing is that this extreme simplicity was retained throughout the whole of the thirteenth century, being only modified on the lines of our Early English mouldings in rare instances, when the English influence can generally be traced, as in the cloisters of Mont St. Michel.

Recognising this, that what we call Gothic mouldings were in the thirteenth century not fashionable on the Continent, it is not astonishing to find that the development in the fourteenth century was only such as would naturally follow out of the Romanesque angle roll. It may be thrown out as a suggestion that it is largely due to the simplicity of the mouldings that we have such exceedingly dignified pointed work in France in comparison with the delicately beautiful English arcades.

In the fifteenth century, when English mouldings were flattening and deteriorating, those of France developed in an entirely fresh and Gothic spirit of great freedom; with long and narrow bowtells projecting in many directions apparently without rule; with deep hollows sometimes narrow and sometimes wide, and with a general avoidance of all symmetry. The effect is wiry, but it is frequently extremely beautiful, the narrow mouldings being allowed to interpenetrate as circumstances might require, and each having its own independent base, which dies into a greater base belonging to a group. There is a theory abroad that when the art of building revived in the fifteenth century the detail of tracery, at any rate, was evolved out of that of the English flowing Decorated style, owing to the influence exercised by Englishmen who had remained after the wars. This may be true of the tracery, but the mouldings and the carvings are essentially distinct. They seem rather to indicate that the French character revived when war and plague had passed, with the energy of a species of false youth, impetuous to recklessness, but captivating all the same.

The foliage suddenly lost the flatness of the period before the English invasion and took on the clean undercut character and crispness of that of England in the fourteenth century, giving to it, however, the effect of autumn leaves instead of those of summer-time. Nothing could exceed the brilliance both of execution and design of such work as the thistle scroll round the north door of the west front of Tours Cathedral. The leaves are unquestionably autumnal in character, fruit and nuts growing among the leaves, while the stem is knotted and gnarled. There is much of this late work at Abbeville, at St. Maclou, at Rouen, and in the south doorway of Beauvais Cathedral, where an example occurs of the bare boughs without foliage being utilised as cusps, the leaves having fallen entirely away, and the indication being that the winter of Gothic architecture has arrived.

CHICHESTER CATHEDRAL.

SOME interesting particulars concerning the work of restoration needed to be carried out at Chichester Cathedral were given at a meeting of the executive committee of the Restoration Fund.

The financial report showed that of the 1,651*l.* 2*s.* 11*d.* promised in connection with the restoration of the campanile, only about 60*l.* remained to be collected by instalments. Of this sum 1,415*l.* had been made to Messrs. Vick on account of their total claim of 1,880*l.* 17*s.*, so that with other expenses the amount now at the bank was 40*l.* 17*s.* 7*d.*, which with the unpaid instalments left the balance in hand to the present of 94*l.* 10*s.* 5*d.*

The condition of the cathedral was reported upon by Mr. Gordon Hills, the surveyor, who suggested that priority of action be taken in the following matters:—(1) The completion of the general repair and pointing of the walls, including dealing with the various cracks and settlements; (2) the west front and south-west tower; (3) the general repair of the vaulting; and (4) the repair to the leadwork of the cathedral roof. With regard to the first item Mr. Hills pointed out that the general repair and pointing to the walls had been steadily carried out since 1902, and that the whole of such repairs and pointing had been completed with the exception of the west front and the space between the south-west tower of the south transept.

Reporting upon the vaulting of the cathedral Mr. Hills said his father had as long ago as 1892 called attention to certain old cracks in the nave vaulting, originating at least 300 years since. As they had recently shown symptoms of instability he had caused a scaffolding to be erected, and was at the moment engaged in examining the condition of the vaulting. In view of the doubtful condition of the vaulting he advised the postponement of the work on the leaden roof, as the jarring or disturbance might tend to upset the equilibrium of the portions of the vaulting now under examination. Mr. Hills, however, was emphatic in his opinion that no danger whatever was to be apprehended to the public by the condition of the vaulting.

The urgency of the work to the roof was not so great as was apprehended, although no doubt it would be necessary to prepare for it in the near future. Constant care and attention had rendered the roof water and weather proof beyond expectation, and with continued care the roof might fairly be expected to remain in watertight condition for another ten years at the least. The roof had been materially strengthened by the rebuilding of the north-west tower and the recent repairs at the west gable and adjoining roof truss, and he felt certain there was no urgency for dealing with the lead work at present. But when once taken in hand the releading must be completed, whatever might happen, whereas, on the other hand, the repair of the vaulting could be done a bay at a time, and he thought it would be a great advantage to the appearance of the interior to be rid of some of the cracks, and loose and patchy plastering on the vaulting, besides being a work which the subscribers could see and appreciate.

After some discussion it was agreed, on the proposition of the Bishop, "That the repair of (*a*) the west front and south-west tower should first be taken in hand; then (*b*) the remainder of the pointing; and afterwards (*c*) the bay of the vaulting, which is at present receiving attention, should be properly dealt with. It is understood that a further appeal for subscriptions will be made shortly to the diocese.

The Henry Saxon Snell Prize was founded to encourage improvements in the construction or adaptation of sanitary appliances, and is to be awarded by the Council of the Royal Sanitary Institute at intervals of three years, the funds being provided by the legacy left by the late Henry Saxon Snell, F.R.I.B.A. The prize will consist of 50*l.* and a medal of the Institute, and is offered in the year 1909 for an essay on "The Principles of Heating and Ventilating Public Buildings, with descriptive details and illustrations of the best systems." The essay is to consist of not more than 5,000 words. Two competitors of different professions or crafts may join in sending in an essay and plans. Essays must be delivered before 4 P.M. by August 31, 1909, addressed to the Secretary of the Royal Sanitary Institute, 90 Buckingham Palace Road, London, S.W.

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ANOMALIES IN BY-LAWS AND REGULATIONS WHICH AFFECT SANITATION.*

(Concluded from last week.)

AMONGST the enormous variety of regulations and practice in connection with all matters concerning house drainage, the provision or deletion of the intercepting trap finds prominence, and the inquiry at present in progress as to its advantage or otherwise under all conditions, provides probably the only necessary exception which may be required to vary owing to local conditions in all that concerns the subject under notice.

There is, however, no room for a variety of form or size in this appliance, nor any exception required in condemnation of all the various forms of this trap at present in common use.

The necessity of the intercepting trap exists in its being the junction between two separate and distinct responsibilities, i.e., the public sewer and the domestic drain, and its trap is against the foul air or gases from the public sewer side of the connection.

To consider this trap as a last line of defence against the misuse of the domestic drain is as unnecessary in argument as it is useless to effect that object with either convenience or safety.

It is clearly wrong to anticipate and make provision for misuse of the domestic drain at any point so far removed from those at which the different pipes or fittings discharge into it. These are (or should be) already provided with gratings or contractions which will indicate the presence of any total or partial obstruction at the earliest possible moment, at points where they or their effects can be easily seen and removed.

That the usual form of these primary safeguards is not to be depended upon does not in the least warrant the provision of an enormous receptacle at the other end of the system, but rather reminds us that they should be made to efficiently do their work at a more convenient point, and one at which there will be less ultimate danger.

A domestic drain cannot be constructed to take scrubbing brushes, bunches of flowers, underclothing, mop rags, fat, &c., and at the same time to fulfil the necessary conditions to ensure effective sanitation; any attempt to serve the dual purpose must be fraught with disaster, and bring about the maze of complications which the duplication of unnecessary safeguards has been shown to involve.

If the purpose of the intercepting trap as a last line of defence to the misuse of the domestic drain is disregarded, the capacity and form may then be limited on the house side of the drain to ensure the whole of its contents being entirely displaced under normal conditions of use, and as the most frequent volume suitable for this purpose is from the discharge of a water-closet, the calculation of the correct capacity may start below a limit of 3 gallons.

For obvious reasons, it is not advisable that the diameter of the full way through the intercepting trap for an ordinary dwelling-house should be less than 3½ inches or more than 4 inches, and this diameter and the desired limit of capacity will fix the depth of seal available.

Although rather a general omission than an anomaly, the absence of any restriction in the number of gullies which may be provided is a matter intimately associated with all that concerns effective sanitation.

This would dictate the necessity of a provision limiting the number of gullies, and each to a minimum capacity for its purpose, as also to ensure that the volume of water will be concentrated with the double object of flushing thoroughly the gully and the drain to which it is connected.

Except in the case of traps which are required for special purposes, such as the retention of grease, all gullies and traps should be of such a form and capacity to ensure that their whole contents are displaced every time when normally used, and the water should be delivered in such volumes and in such a position as to secure this object.

It will be found in practice that with the detached or semi-detached type of dwelling-house one, or at most two, gullies can be made to suffice if all the unfouled water is collected and made to discharge at one point.

To do this it is advisable to collect all the unfouled water on shallow drains without traps or gullies from the rain pipes, and deliver the whole of the water over one or (as pointed out) at most two gullies.

This system would also secure another and most important condition in regard to gullies, which is not dealt with by any by-laws.

Unless for reasons quite impossible to avoid, no gully should be left dependent upon rainfall alone to secure its seal, but should always receive the discharge of some pipe that will ensure its being continually charged and its contents displaced, as instance the discharge of sink, bath or lavatory wastes.

In the matter of soil or fouled water pipes above ground, similar objections can be quoted to those applied to underground drains.

The regulations controlling these vary in different though adjacent districts from light iron or rain-water pipe strength to strong iron, and are for soil pipes usually 4 inches diameter, whether for a number of closets or a single one only, sometimes wholly of iron, or the portion above the top discharge inlet which forms the vent, made of drawn lead pipe.

In jointing these pipes and their fittings the practice embraces putty and paint, with or without spun yarn, lead wire or molten lead, stemmed in with a caulking tool, Portland cement, sulphur and iron fillings rusted in, but where it is necessary to join iron or lead to earthenware the putty and paint joint is the most usual practice.

It is unnecessary to prove that all these methods cannot be right, and that only one, or at most two, will under any conditions effect the desired object, and that in general practice the weakest form of joint is usually found in the most inaccessible and consequently most dangerous positions.

The infinite variety in forms of w.c.'s, sinks, lavatories and baths is open to criticism in an equal degree, and in all cases it would appear that the first object of their use has been made subservient to other conditions. Although in these there may be permitted greater limits of variation without impairing their efficiency than in the case of drains, there is no apparent room for this enormous variety of forms to provide what is in all cases a common object.

Whilst forms of connection or disconnection and the provision of traps may be within the scope of some by-laws, much that appertains to these accessories is usually confined to the particular fancy of the official, but this is not guided by any connected standard or principle which obtains beyond his own district.

To deal only with the most common of these fittings, the w.c. apparatus, and which is directly connected with the drain, will serve as an illustration of the discomfort, if not danger, which attends a departure from principles which direct that simplicity in design and action and economy in area (to be fouled or flushed) should form the chief aims if these fittings are to fulfil their several objects efficiently.

There is no w.c. apparatus on the market which fulfils these conditions, either alone or in association with its several parts.

Some forms depend upon the water area in the pan (a necessary attribute), but not defined by any general acceptance of standard by local authorities. (I have been approached by officials who are members of the Association of Sanitary Inspectors to advise them upon this point.) The water seal is of a variety of depths, but not governed by head of flush or type of flushing tank, quantity of water, capacity of outgo and conditions of soil pipe or drain, all of which must have the most intimate relations one to the other in order to secure the objects of by-laws and regulations. Further, with these conditions correctly adjusted, not only will the operation of flushing the closet be assured, but the cleansing of the drain and its mechanical ventilation made a frequent certainty. Although not so immediately relevant to the subject of the paper, the regulations of the water authority impinge upon those of the building and sanitary authorities over the quantity of water allowed to flush out the w.c. apparatus, but whilst the volume will be usually defined and is often a point of contention between the different officials, its effect will be to some extent controlled by conditions that do not receive the attention of any official or department.

The value of the water to perform its object will depend upon the height of the flushing tank above the closet, and also the diameter of the flushing pipe and the number and radius of the bends in same.

Beyond this the external shape and size of the closet, pot or pan will also materially affect the attainment of its objects. After this the form and size of the outgo trap and the size of the pipes will influence the value of the flush in carrying the contents of the water-closet to its ultimate destination at the end of the branch or into the disconnecting chamber, and also to effect the necessary displacement of air in the drain or soil pipes.

* A paper by Mr. William Challoner, president of the Institution of Plumbers, read before the Midland Association of Local Government Officials on February 8.

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The jointing of the earthenware of the closet pan to the lead or iron is always a weak point, and added to the difficulty of joining such dissimilar materials is the awkward position in which this junction always occurs and the liability to slight movement to which the closet pan is subject by the shrinkage of the floor upon which it stands, which is most commonly of wood.

The omission from the by-laws in many districts of regulations providing anti-syphonage pipes, and the variety of opinions held of their necessity by sanitary or building inspectors, will further affect the action of the w.c. apparatus (similarly, the absence of provision to supply displacements of air affects traps which may occur in other parts of the drainage system).

These are but a few instances which serve to illustrate the anomalies and variation of interpretation to which local by-laws are subject, as also to show that the different appliances, owing to their faulty design and combination, give little or no evidence of that practical knowledge which can only be acquired by an intimate association with all the circumstances of position and conditions which will ultimately test their utility.

In the same way the form and design of such fittings in common use as baths, urinals, slop-sinks, lavatories, are each in their way open to the same criticism as the accessories described, and all leave ample opportunity for revision on common-sense lines of simplicity. There is no room for originality or fads in this matter; in all there is a minimum of size and form which will best secure the object permanently. Certain materials are suitable under all conditions, and the choice of these should not be subordinate to fads or fashion created by those who have the least practical knowledge of their ultimate conditions in use.

It requires little argument to prove that the value of teaching technical subjects which include the principles of plumbing, sanitation and building construction is discounted by the contradiction which the generally prevailing want of standard in everyday actual practice involves and for which anomalies in by-laws are in great measure responsible.

It is easy to imagine the position of a workman or his directing head who has at the technical classes been taught certain principles which, if carried out in actual practice, would be condemned by the official whose duty it is to inspect and approve the work. The common result of this position is that the plumber puts aside the knowledge which he has been at some considerable pains to acquire and which also represents not a little cost to educational authorities and waits to be directed and inspected.

Some of us for the past few years have been intimately associated with technical education, and our efforts have been directed to the object of perfecting the knowledge of the working plumber and directing heads of plumbing firms, instead of relying (as was somewhat the practice in the past) upon the training of the inspector, realising that no amount of official inspection could produce good work from an indifferent workman, but we have not gone far before coming face to face with the anomalies which exist between principles and practice many by-laws embody and the unsuitability of appliances and material obtainable to carry out the work. The drawing up of a standard specification embodying the principles to which allusion has been made would present little difficulty, as in the case of determining the size or capacity of drains. Most by-laws appear to assume that a drain or its accessories cannot be of too great a capacity, which is an entirely wrong principle, and from this fundamental error arises most of the complications which appertain to the subject of sanitation in the conveyance of polluted matter or elements within the curtilage of the domestic drains and often beyond it.

These capacities and sizes should be determined in relation to the work they are intended to perform, instead of, as at present, creating a series of possible dangers by providing for emergencies that may be more easily dealt with by other means. The common practice of providing for abnormal rainfall and carelessness in use in and about the domestic drainage system is to be condemned for obvious reasons. It is far better to leave the risk of the latter to a salutary lesson that will prevent its recurrence than to make provision for emergencies which will themselves all the time constitute a source of hidden danger.

Most sanitary fittings and appliances may be designed to prevent the passage of any complete or partial obstruction beyond a point when it might be easily removed; at present it is often a case of digging up the drain or almost pulling down the house when a stoppage occurs.

In many instances means of warning might be provided (much on the lines of the safety points in an electrical installation) whereby a condition of ultimate discomfort or danger would become at once so apparent as to compel attention.

Under present conditions the warning depends upon a more or less chance visit of the sanitary inspector, or the belated one which is conveyed by the notification form of infectious disease sent by the medical attendant after the damage is done.

In conclusion, I beg to convey my appreciation of the honour conferred upon me by your request to read a paper, and venture to express the hope that some means of co-operation may be found between the important public bodies which are here represented and the craftsmen I have the honour to represent.

IDEAS IN THINGS.

MR. C. F. A. VOYSEY'S second lecture on "Ideas in Things," in connection with design as applied to completed work, was delivered at Carpenters' Hall, on Wednesday last, the 3rd inst. In the building of a home, he said, if the money at disposal would not pay for oak joinery everywhere, he would have it nowhere, as to have the entrance and reception rooms in oak and the rest deal at once suggests the "whited sepulchre." As Augustus Welby Pugin remarked of the dissenting chapel-builders of his day, "And then they thought the Lord to cheat by building the back parts shabby." The same material for entrance hall and lavatory floors will avoid the sensation of the change and loss of repose. Oak that was once the most durable and plentiful building wood in England can now be obtained from Austria better seasoned and much softer to work. It is more quickly grown than English oak, but not so beautiful. In old times when the carriage of materials was more costly, local material was more used, and only the vain rich made use of imported material. A charm attaches to the characteristic colour and texture in the old buildings of different districts, and there is a harmony in nature's materials. After alluding to the many trivial details of home and domestic life, in the belief that great ends have small beginnings, and that if the thin end of the wedge of spiritual significance can be driven in among the common objects of life, it will lead to noble thought and feeling, by which one may hope to advance in character and conduct, the lecturer concluded his interesting address, of which we can only give the above short abstract owing to pressure of space, by saying that the only instruction he had to give was to think of the needs of the spirit more than the needs of the flesh; then, and then only, would there be witnessed really good and great architecture, really good carpentry, and really good work of any kind.

The Design Club, which was formed a few months ago for the purpose of bringing together artists concerned in practical design, has made good progress, and its new premises were recently opened at No. 22 Newman Street, Oxford Street, by Mr. Lewis F. Day and Mr. A. Lasenby Liberty. The new premises are well equipped for the social requirements of the members. It is intended to open a "life" room and further develop the practical side of the work of the club.

The Cambridge University Senate recently considered the plans for proposed literary and mathematical lecture-rooms and departmental library. It is proposed to erect the building on what is left of the Mortlock site, next to the new examination halls. The suggested building will contain eleven lecture-rooms—the largest of these will have seating accommodation for nearly 300 students—a common room for professors, readers and lecturers, and three small rooms for classes and interviews. The departmental library has a floor space of 2,250 square feet. Some of the speakers expressed a hope that no expense would be incurred on architectural features.

A Blue Book recently issued gives statistics as to the cost of public education in England and Wales. The principal amounts include contributions towards local science and art scholarships held in secondary schools, 42,219*l.*; technical institutions, schools of art, day technical classes, art classes, and other schools and classes for further education, 456,573*l.*; scholarships, exhibitions and prizes, 10,252*l.*; Royal College of Science, London, 24,843*l.*; Imperial College of Science and Technology, 5,783*l.*; Royal College of Art, 11,312*l.*; museums and circulation of objects for exhibition, 60,069*l.*; works and furniture (museums, Royal College of Science and Art, Solar Physics Observatory, &c.), 22,484*l.*; Geological Museum and Geological Survey, 21,255*l.*

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NOTES AND COMMENTS.

MR. H. STUART JONES, formerly Director of the British School at Rome, claims to have established certain definite facts about the "Ara Pacis," the famous altar erected by CÆSAR AUGUSTUS in 9 B.C. Mr. JONES regards it as certain that no discoveries were really made on the site of the altar till 1568, when several slabs and the relief of Tellus and the Aurae, now in Florence, were found. He disputes the view that the reliefs, originally belonging to the Della Valle collection and now walled up in the garden-front of the Villa Medici, belonged to the Ara Pacis. He believes that the figure usually identified as that of AUGUSTUS was intended for the *rex sacrorum*, and allocates the relief of Tellus and the Aurae to the east face of the altar and the Lupercal with the fig-tree to the north side.

THE value of the ozone process for the sterilisation of water appears to have been established by the experiments made last year by M. COLMET DAAGE, the chief engineer of the technical branch of the water supply and drainage department of the city of Paris. In these experiments, the results of which have been recently published, DE FRISE sterilisers were used with ozonisers of the Siemens de Frise type. With sand-filtered water from the Ivry waterworks containing 255 bacteria per cubic centimetre, sterilisation reduced the number of bacteria to about 2 per cubic centimetre. With water experimentally contaminated to the extent of 11,000 bacilli coli per cubic centimetre, only one of these germs escaped out of 110,725. When muddy river water from the Marne was added to the extent of about 15 per cent. to the drinking water, producing a mixture containing 10,735 bacteria per cubic centimetre, the ozonised water gave 35 bacteria per cubic centimetre without a single example of colon bacillus. The cost of purification in the experimental installations treating 100 cubic metres of water per hour with electricity at .11 franc per kilowatt averaged .0184 franc per cubic metre of treated water, but M. DAAGE estimates that treating 300 cubic metres per hour with cheaper electricity at .055 franc per kilowatt, the expense would be only .0072 franc per cubic metre of water treated.

VOLUME III. of *The Architects' Law Reports and Review*, by ARTHUR CROW, F.R.I.B.A., and A. J. JENKIN, barrister-at-law, has now been issued, and deals with the more important cases affecting architectural practice and decided in the year 1906-7. As in the preceding volumes, value is given to the reports by the inclusion of photographs and drawings used in various cases. Amongst the most important cases reported are those of ANKERSON *v.* CONNELLEY and ANDREWS *v.* WAITE, both dealing with the effect upon the rights of ancient light brought about by alterations of the dominant tenement; and Attorney-General *v.* METCALF & GREIG, determining the application of certain sections of the London Building Act, 1894. The text is given of the Public Health Acts Amendment Act, 1907, with useful notes on various sections by the legal editor. Critical notes are also included of clause 45 of the Housing, Town Planning, &c., Bill of 1908, and of Part III. of the London County Council (General Powers) Bill of 1908.

ILLUSTRATIONS.

HARCOURT HOUSE, CAVENDISH SQUARE, W.

THIS new building has been erected in Cavendish Square on the site of the old Harcourt House (the residence of the Duke of PORTLAND), and is divided into twenty-eight flats. The main elevation is carried out in Portland stone supplied from the quarries of the Bath Stone Firms, Ltd. The floors of hall, dining-room, and drawing-room are laid with parquetry. The entrance vestibule, main hall, and staircase are carried out in white Pentelic marble with mahogany dado. The roof is covered with green Westmorland slates. The hot water for heating and domestic supply is derived from a central heating chamber. There are service and passenger lifts, supplied by R. WAYGOOD & Co., LTD. The architects are Messrs. GILBERT & CONSTANDUROS, Finsbury Square, E.C.

SMALL COUNTRY HOUSE AT POTTER'S BAR.

THE small house illustrated to-day has been erected on an estate at Potter's Bar, Middlesex, which is being developed in order to provide detached houses of an economical description on half-acre plots within easy access of town. The accommodation provided is shown on the plans, a feature being made of the square staircase hall. The ground floor rooms are panelled to a height of 7 feet with Oregon pine. The house is solidly erected with 14-inch external walls, rough cast, and the roof is covered with red tiling. There are no plaster ceilings to the ground storey, the joists being stained, and supporting two layers of floor boards with felting between. The architects are Messrs. BANISTER FLETCHER & SONS.

CHURCH OF ST. JOHN BAPTIST, HOLLAND ROAD, KENSINGTON.—REREDOS IN CHANCEL.

THE original reredos was erected by the late JAMES BROOKS in 1892, and was then separated from the walls of the apse by an ambulatory. Subsequently it was surmounted by a statuette of the Good Shepherd and twelve figures of angels, and the arcades were filled with painted panels of saints and angels given as memorials. As it was found that in its first arrangement it encroached too much on the floor space of the sanctuary, it was in 1899 re-erected with considerable modification close to the apse walls, the height was reduced, and four of the angels were relegated to the western gallery. These changes resulted in the reredos appearing too flat and ineffective, and it was determined to again re-erect it, with increased height and as much relief as could be obtained without unduly reducing the floor space. With this object in view the three sides have been separated by projecting piers carried up above the general line, and the whole has been raised on a new arcade, which has been extended beyond the line of the reredos on either side to carry on the lines of the screens in the side arcades of the chancel. These wings were intended to be left in plain stone to correspond with the screens, and the result of the painting and gilding which has been applied to them has been to separate them too much from the walls of which they should have appeared to form a part. The work has been carried out by Messrs. H. H. MARTYN & Co., of Cheltenham, from the design of Mr. J. STANDEN ADKINS, of the firm of JAS. BROOKS, SON & ADKINS. It is intended to fill the arcades in base of reredos and in wings with panels of coloured marble presented as memorials. The first three sections of this work are being prepared by Messrs. DYKE & SON, of Highgate Road.

CHURCH OF ST. JOHN BAPTIST, HOLLAND ROAD, KENSINGTON.—REREDOS IN LADY CHAPEL.

THIS reredos, the benediction of which took place on Christmas Eve, has been executed by Messrs. H. H. MARTYN & Co., of Cheltenham, from the design of Mr. J. STANDEN ADKINS. The wall arcade shown on the south side, which has not yet been carried out, is intended to receive small marble memorial tablets, of which a considerable number have already been temporarily attached to the wall of the chapel.

PREMIATED DESIGN FOR PRIMITIVE METHODIST CHURCH AND HALL, CONSETT, DURHAM.

THE design published herewith was awarded first place out of thirty-five submitted for the above competition. The assessor in his report remarks that a number of the designs indicate considerable ability in planning and knowledge of the class of buildings required. Of the winning design, the assessor says:—"It will need some amendment to meet requirements, which I consider the author will be able to make within the limits of the stipulated cost." The successful architect is Mr. J. W. F. PHILLIPSON, Newcastle-on-Tyne.

DESIGN FOR A TOWN RESIDENCE.

THIS shows the detail of front entrance to a town house suitable for a professional man. The materials proposed to be used are red brick, with Portland stone dressings, together with wrought-iron railings.

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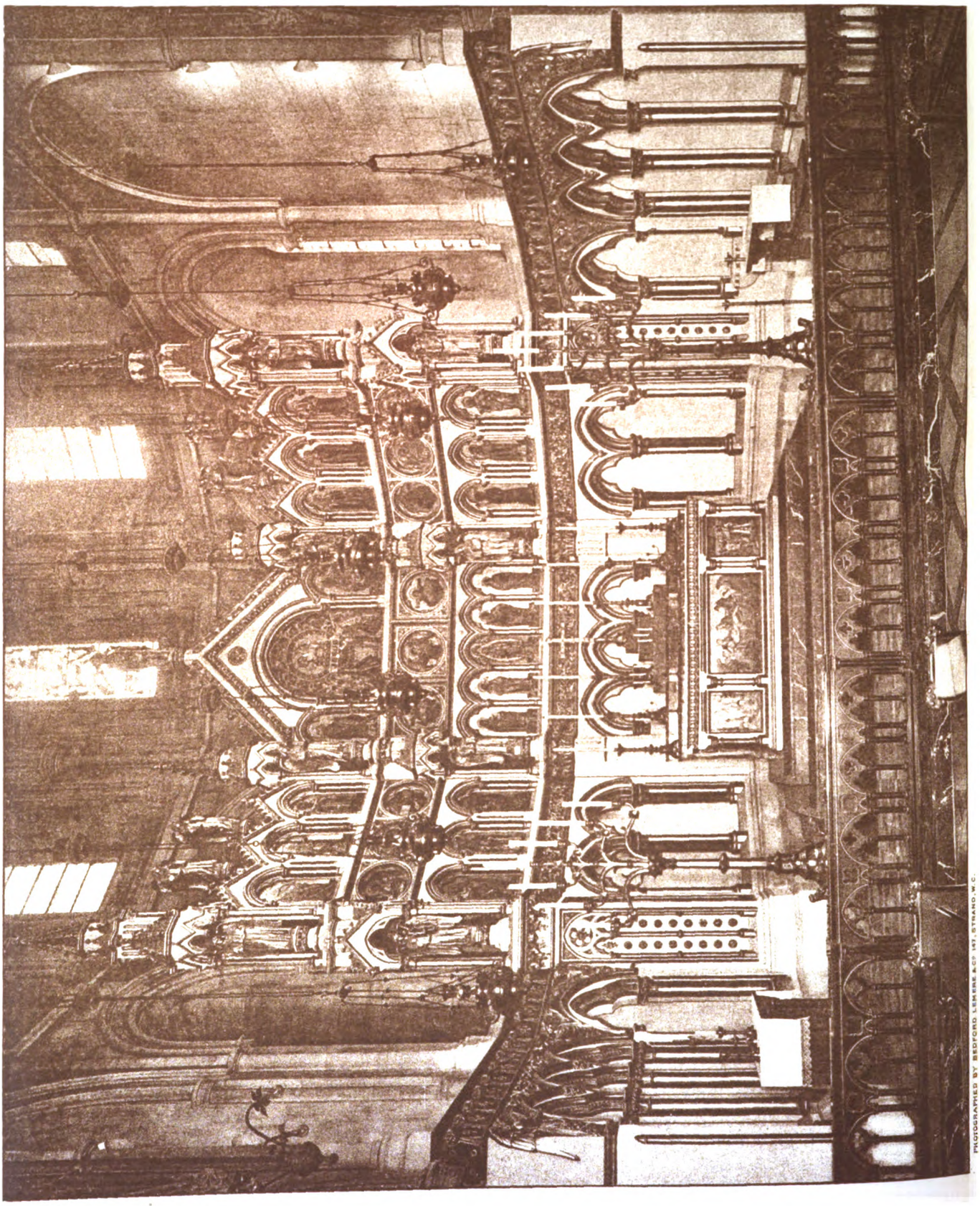


PREMIATED DESIGN FOR PRIMITIVE METHODIST CHURCH AND HALL, CONSETT, DURHAM.

J. W. F. PHILLIPSON, Architect.

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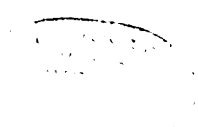
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CHURCH OF S. JOHN BAPTIST, HOLLAND ROAD, KENSINGTON: REREDOS IN CHANCEL.

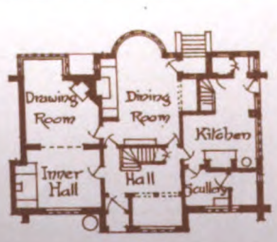
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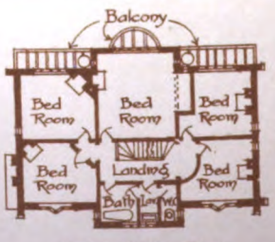


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GROUND FLOOR PLAN



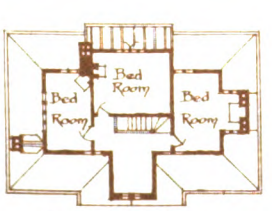
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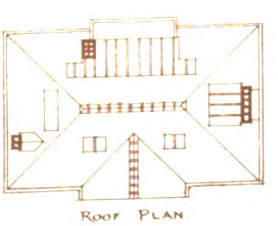
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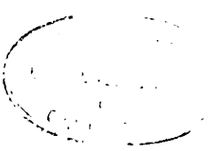


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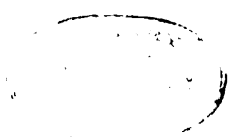


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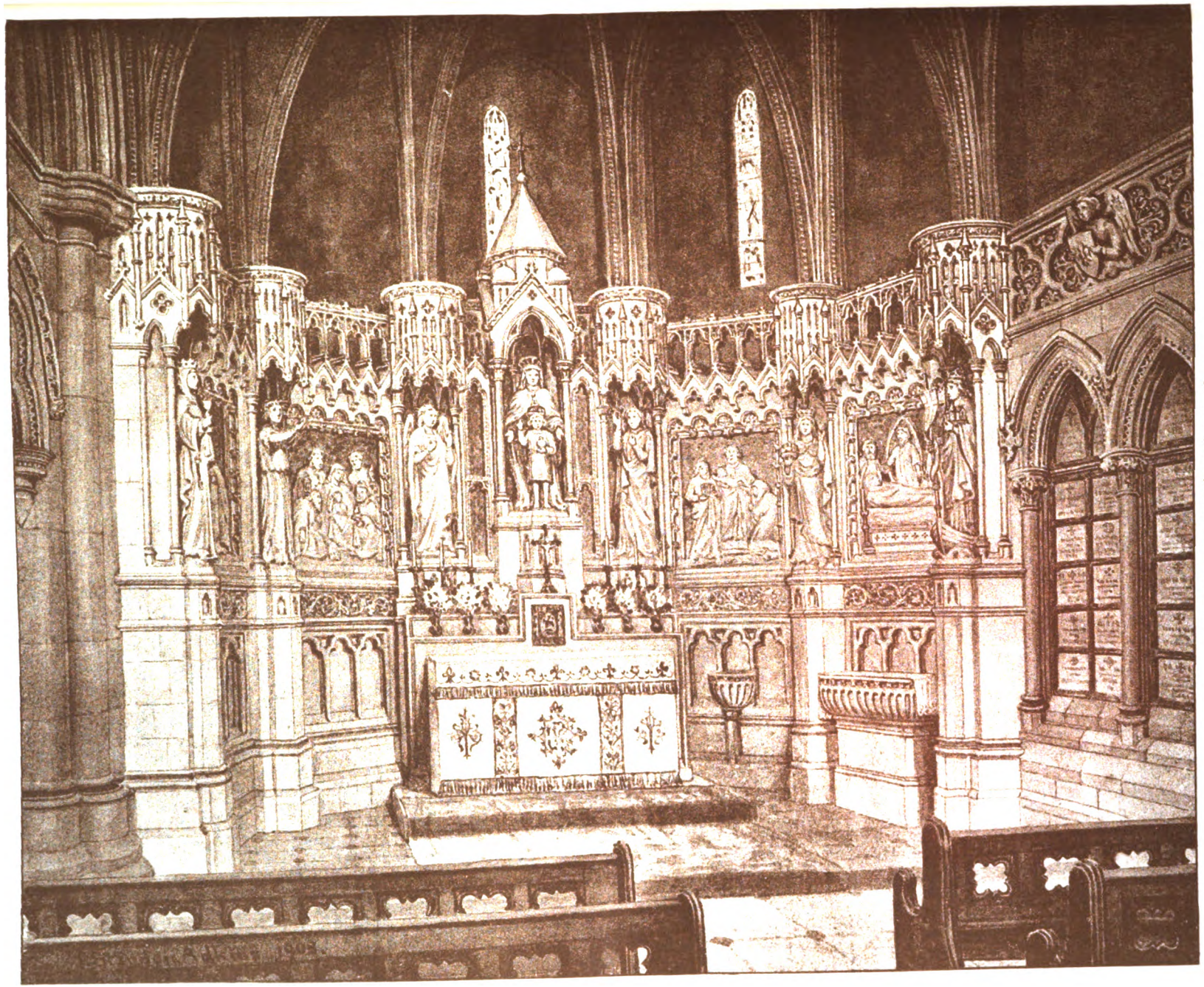
HARCOURT HOUSE. CAVENDISH SQUARE, W.

Messrs. GILBERT & CONSTANDUROS, Architects.

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CHURCH OF S. JOHN BAPTIST, HOLLAND ROAD, KENSINGTON: REREDOS IN LADY CHAPEL.

J. STANDEN ADKINS, Architect.

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ARCHITECT'S HOUSE.



ELEVATION.

SIDE ELEVATION.

DESIGN FOR AN ARCHITECT'S HOUSE.

By WALTER M. EPPS. A.R.I.B.A.

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THE PRESS AND ARCHITECTURE.*

(*Concluded from last week.*)

THE influence of environment upon the development of the community, as affecting not only its health, but its moral welfare, has received but scant attention in the daily Press, though the awakening knowledge of hygienic necessities has developed more interest in the matters of housing. Even now I suggest that so important a subject as this has not received the attention it demands. As evidence of this I would mention Mr. John Burns's Town-planning Bill, which seems to have been considered more from the point of view of making political capital than any other. Plenty has been written about the slums of our big towns and cities. Plenty has been written about our villages, but who has dealt adequately with our suburbs? I do not mean the suburbs with their detached or semi-detached residences nestling amid greenery and trim gardens, but the drab, gloomy, interminable streets of dull and sordid houses—all ground out of the same mill—with little to relieve the monotony of sooty bricks and mortar, save utilitarian lamp-posts and untidy back yards. Has it been realised what drab, gloomy and monotonous existences are led by the unfortunate individuals who are compelled to inhabit these grey and colourless vistas of miserable *monotony*? Has it been fully realised what effect this environment has upon the lives of these people? Is it saying too much to assert that if the Press had done its duty these acres of dreary monotony would have been an absolute impossibility?

Our cities and towns should have been girdled with garden cities. Our pretty suburbs should have been safe from ruin by the brick and mortar fiend, who devours all be told that the "masses" do not know and do not appreciate the difference, that they are content to drag along dull and sordid lives in dull and sordid surroundings. It may be so. But why? Because they have been bred in the atmosphere and have never known any other, because they have never been taught that there can be any other environment than the drabness they have been accustomed to. Teach them that their hard lives can be cheered and brightened by different surroundings; teach them what those new surroundings can be, and I will warrant the difference will be appreciated, and quickly, too.

Surely it is a matter of education, and the Press could raise its powerful voice to urge so necessary a reform. Why should our land be blotted and spoilt by ugly towns and villages for lack of the necessary teaching? We architects cannot do it for fear of the accusation of "touting" for work; but the great Press can and should. The Press has the power to mould public opinion for good towards the betterment of the community. It has done it before, and now that it has discovered that such beings as architects actually exist, and that there is such a thing as architecture as distinct from building, let it cease from jibing and deal with great issues. At present it is tempted to revile architects because speculative houses do not consist mainly of cupboards, or because a little lack of common-sense is responsible for burst water-pipes. Still, it is something to be thankful for that architects are credited with the control of these things. Hitherto the builder got the credit—or discredit. A daily paper recently published an article on cupboards, holding architects up to derision for their neglect in this particular. It was not a good article, and the criticism was unjust. We architects are not perfect, and no one is more aware of our failings than ourselves, and that is why we ask for criticism, for fair, well-judged criticism written by men competent to criticise. We suffer because we are compelled to look upon our work from our point of view only, and we want to see the other side. And that is why this paper should have been read by a Pressman. As an architect, I want to know my architectural faults, but I want to have them pointed out by those most affected by my failings, and not by my brothers in the profession.

things that are green and beautiful. Absolute lack of intelligence and consideration has governed the laying-out of innumerable estates, simply owing to the absence of any guiding authority. We study the people's health by hedging them around with innumerable sanitary and building regulations, and rightly so. But these regulations might actually have been framed to stifle the development of the beautiful which, I suggest, is as essential to the health of the community as the hygienic restrictions that have been more or less the outcome of public opinion. Curiously enough, two days after the foregoing was written, an article appeared in an evening paper dealing with this very drabness and dreariness of suburban life in these ill-laid-out estates, and emphasising the deadly monotony of the existence led by the inhabitants. The cause was attributed rather to the Englishman's inborn love of privacy, and the suggested remedy was towards a communal state of existence leavened with a dash of privacy. The idea is by no means a new one, and several serious attempts have been made to develop estates on the principle, but so far as I know with poor success. Possibly the crushing weight of the servant problem will lead to a revival of the idea, and in the future the clerk or artisan, and, for the matter of that, the workman, will live in a quadrangle of well-designed dwellings around a trim and well-kept garden, his food supplied from a common kitchen, and his washing done in a common laundry, and with a common room for his relaxation with his fellows, and maybe a crèche for his babies. I do not suggest the common dining hall, which will never succeed until the Englishman changes his nature.

Compare the vision with the maddening uniformity of the parallel streets, destitute of verdure, endless vistas of dreary dulness, the houses of the same deadly pattern with no outlook but bricks and mortar at the front, and bricks and mortar at the back over the rubbish heap of a back yard called by courtesy a garden—each house having less individuality than a numbered convict. What sort of race are we breeding in these howling brick-and-mortar wildernesses? Why has our great and powerful Press been dumb? I may

Now I turn to another phase, which I think has received no attention at all. It is wonderful to me that the Press has been so long in discovering the human nature in architecture—human nature as expressed in every feature, every moulding, every piece of timber, every worked stone. Does not the Press see the history written or unwritten in architecture? Has it not dreamt of the romance wrapped in every ancient building? Its view of architecture has generally been from a hard, matter of fact, bricks and mortar, money-grubbing, utilitarian point of view, tempered by occasional articles from unusually well-informed contributors who have drifted abroad, and dish up hashed epitomes of the guide-book with a flavouring of sentiment. Occasionally an English town, which has achieved temporary notoriety through some event, will have a maudlin outpouring over its picturesqueness. How rarely are we favoured with a really instructive and pleasantly attractive article that would create enthusiasm and bring out the human interest underlying the picturesqueness? Some of the best it has been my lot to read dealt with Bruges at the time of the great pageant a few years ago.

It is a pity that the pageant craze has not drawn more attention to the analogy between architecture and history. Would that our Press could see how history has written itself in architecture. A new vista would open, now narrowed to the belief that Cromwell and his Ironsides were responsible for all visible iconoclasm. And the unwritten history, if it could only be revealed! What a mine of interesting facts awaits those who will dig beneath the surface! And the romance of it all! What a storehouse of fascination for those who can tear the secrets and even the sermons from the grey stones. Why, I know a little church on our English coast nestling in the greenery of a coombe amid the downs, a quiet and charming spot, with no special architectural merit, but notable for its picturesqueness, and as being typically English. That is how it would appeal to the average Pressman. But what does it tell those who can read its history as they would read an open book? It tells of a sleeping village surprised by French raiders, of battle, murder and sudden death, of women and children taking refuge in the old church tower, of fire and a dreadful holocaust, and of the slow repairing of the loved building by an impoverished little community of survivors. What a tale could be woven round these facts—for facts they are without reasonable doubt.

If the Pressman wishes to make use of this material, to place it on record for all time, he must make haste, for the modernising spirit of the age is laying heavy hands upon the open pages which are being obliterated one by one so that none may read them, and the book, once closed, is closed for ever. I have wondered if ever a Pressman visits Westminster Abbey and views with astonishment the vast crowds who throng the great building, gazing with veneration and awe on the vast storehouse of history before their eyes, and gazing ignorantly for the most part because no one enlightens them, and guide-books are a weariness to the soul. It is not as if they did not want to know. They do, as many can testify, and the Press does not help them.

* A paper by Mr. A. Needham Wilson, read at the last meeting of the Architectural Association.

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The pity of it! Well, I do not want to labour the point, and I admit readily that much of the sting of my criticism has been blunted by the awakening of the Press, and by one journal in particular, whose efforts in promoting a well-conducted competition met, I think, with due appreciation from the profession.

Again I disclaim any advocacy of advertisement for architects, merely pleading that since the eyes of the Press and public are opened the knowledge of the latter may be intelligently guided. I am only desirous that the efforts of the Press should be directed in the right way for the furtherance of an art so intimately associated with the life of the people, and the perfection of which both artistically and practically is essential to the well-being of the nation.

It is not as if we architects had stood still. We have made great efforts to advance our profession, and, I think, with success, for surely modern architecture never stood on so high a level as it does now. That being so, we can appeal with confidence to the great power of the Press to lead in the further advancement and development of our art in the public interest. We are prepared to collaborate. Then in due time we may see our land no longer seared and defiled with all the hideousness of bald utilitarianism, hardly regardful of the bodies, certainly not of the intellects of the people. We may see created a public opinion born of knowledge which will demand as a right that the lives of dwellers in houses may be brightened by an artistic atmosphere, produced unconsciously, and not as a result of forced effort. It is a brave ideal, which much misunderstood men have devoted their lives to, and mostly in vain, because they had not the support of the Press. But their example lives with us, and at last we can welcome the signs that the long looked for support will be forthcoming.

An architect's career is scarcely one to be envied. It is a severe struggle to most of us, and hitherto has been embittered by the indifference of the public. But the era of obloquy and oblivion seems to be passing away, and perhaps the mighty hand of the Press will lift us into the embarrassing splendour of full recognition, with weightier responsibilities for ourselves and our art. Let us take care how we use the opportunity, and let us set our house in order against that day, for with increasing knowledge comes increasing criticism, and we shall be judged by results. It will be our fault if we are weighed in the balance and found wanting.

Mr. EDWARD SALMON, of the *Saturday Review*, who proposed a vote of thanks to Mr. Wilson for his paper, said that as a Pressman he thought he ought to say that the treatise had been delivered to the wrong audience. It really seemed to him that the lecturer had been preaching to the converted, and it must have occurred to the meeting that the proper audience should have been composed of Pressmen. They were not however altogether unused to that sort of criticism. They had their art critics, political writers, legal writers and gossipers of high society, and whenever they met anyone who knew something about a particular subject under review it was perfectly certain they would be informed that the writer was all wrong. They had Mr. Wilson's high authority that the Press was well informed, "our otherwise excellent Press" were the words used, on all matters except architecture, and after hearing the paper he was convinced the Press knew absolutely nothing on that subject. He derived nevertheless some comfort, in spite of all the criticism, from the fact that Mr. Wilson had adduced his evidence of ignorance, not from daily or weekly papers, but from novels. The novelist was privileged in this respect, and could take liberties even with their lives and destinies, and if that liberty was denied him his profession was gone. The purpose of the paper, however, he took quite seriously, and agreed that something should be done to remove the abysmal ignorance which had been exposed, but the Press could only hope to accomplish such a task by having the assistance of experts, the architects themselves.

Mr. LOUIS AMBLER seconded the vote of thanks, and said Mr. Wilson had mentioned amongst other things that young architects were apt to seize on almost impossible opportunities for displaying their knowledge, or perhaps, in some cases the want of it by rushing into print and going in for what had been called wild cat schemes. An imaginary dome on St. Paul's or the Bank of England, with additions as a sky-scraper, had been referred to. As a matter of fact he knew of one such instance. A young architect with whom he was acquainted, and who was an assistant at the time, was approached by one of the editorial staff of a newspaper who wanted to write on the subject of the possibilities of showing how the utilitarian qualities of a certain building might be increased. The young architect was asked to make a drawing setting out the arrangement, and this he did, the drawing afterwards being paid for and published. He believed the Press could do much towards the enlightenment of the people in the need for artistic and healthy homes. Buildings should be regarded as works of art and described as such, and he hoped the paper would induce the Press to adopt that view and so help the architectural profession more than it had done in the past.

Mr. F. D. CLAPHAM attributed the indifference of the public and the Press in architectural matters to the spirit of commercialism which prevailed at the present time. Architecture was not popular, the profession was not recognised at all, and no interest was taken in a building until it was noised abroad that royalty was going to open it. They had heard that there were art critics, and he asked therefore why did they not criticise architecture? The Press, he thought, did not know quite what to make of architects as a profession, and to the ordinary everyday person the architect was looked upon as a sort of glorified plumber. That want of recognition was entirely due to the profession itself, which still had no status. Why was it that the painter and the sculptor should get all the credit in the Press for what they did on a building when the architect of it was not even mentioned?

Mr. A. E. MUNBY said there were two sides to the question of responsibility. He did not think the Press were entirely to blame for its attitude towards architecture, because architects themselves often differed in the sense of what was good and bad in their art. If there was this divergence of opinion among themselves it must necessarily be very difficult for the Press to adequately express any views. He thought the absence of registration had something to do with the lack of recognition, and until the profession was embodied by a status of that kind it would be very difficult for them to call attention to the want of appreciation of architecture as an art because of the enormous number of men who practised in an unauthorised way. When they had a consensus of opinion on the subject of registration general views on architecture could be formulated, and then the profession could intimate to the Press the merit they should look for in their work.

Mr. ALAN POTTER questioned whether the architectural societies were not to a great extent to blame for the lack of interest taken in architecture by the public in that they seemed to treat themselves as bodies existing entirely for the benefit of architects, and not for public benefit. What trouble was taken to bring their proceedings before the public or the Press?

The CHAIRMAN in some concluding remarks to the discussion said he did not think architects would be properly recognised until they were a closed profession. How could they expect it to be otherwise when they were not registered, and anyone could call himself an architect?

ARCHITECTURAL EDUCATION.

DR. HONEYMAN, in the course of a paper read at a meeting of the Architectural Section of the Royal Glasgow Philosophical Society recently, first referred to the works in Glasgow in the earlier half of last century, and also, more particularly, to those designed by architects who were in practice there when he commenced business himself more than fifty years ago. He submitted that they compared favourably with the work of their successors, although they had to depend for their professional training on the old-fashioned apprenticeship system, when masters still recognised the fact that an indenture imposed certain obligations on them as well as on their pupils. In those old days, although masters were comparatively few, apprentices were also scarce; now competent and conscientious masters were scarce and pupils were superabundant. There was no doubt that apprenticeship had outlived its day, and ought, along with premiums, to be abolished. It had become a mere farce, and, in offices where the staff was large, little better than an economical method of providing principal draughtsmen with fags; hence our concern about a substitute. He thought it would be difficult to improve on the course proposed by the Liverpool School of Architecture, or on that recommended by the Educational Board of the R.I.B.A. The Glasgow School of Architecture and several others had adopted similar courses of study, but the weak point, he thought, in the Liverpool scheme was the too intimate association of the school with the University. He thought

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they could not expect Universities generally to amalgamate in such a manner with schools. He thought they should maintain their distinctive character and help in the scientific side of architectural education only. Glasgow has shown how this may be done by recognising the value of the teaching in the evening classes of the Technical College and allowing them to be taken into account pro tanto in their course for the B.Sc. degree. This, he thought, was about all we could expect. Universities should have nothing to do with art or anything which cannot be made a subject of examination on clearly defined and identical lines in the case of all co-operating Universities, so that their degrees may all be rightly regarded as of equal value. He thought that obligatory examinations were only required, up to a certain point, to prove the acquisition of those branches of science now deemed essential for an architect. At that point all would be on an equality, whether members of the Institute or not. The point he referred to was this: Having passed the intermediate examination, or what the Institute had agreed to accept as its equivalent, or having taken a University degree, from these no further evidence of fitness to practise should be required. Of course, it would remain for the Institute and other associations to impose any special conditions they pleased to qualify for admission to their membership, but he thought such requirement should partake more of a voluntary character than hitherto. Uniformity in art examinations would have a prejudicial effect. He thought it hardly possible to specify hard-and-fast rules for examinations in art subjects. In the Institute's final examination each candidate for membership should be left free to define the scope of his examination and encouraged to "profess" as much as he chose, so that the examiners should get, not a mere knowledge of his qualifications up to a certain point, but, it might be, a long way beyond any point they would, according to the usual course, have thought of prescribing. This, he thought, would stimulate emulation and impart elasticity to the final examinations. Speaking generally, his view was that a broad line of distinction should be drawn between the scientific and the artistic sides of the architectural student's education. He would advise that the Institute's Educational Board should define exactly to what point in the civil engineer's course the architectural student should go, and a universally applicable and rigid examination would then test his knowledge. But the test of his artistic ability should be somewhat variable and elastic. They would observe that his intention was to warn rather than to advise. All were probably at one in the opinion that architects in future should have more systematic scientific training than hitherto. Such training would only conduce to freedom in designing and would do no harm, although all had reached exactly the same standard. But we cannot speak of the same standard in art training in the same way. For example, if we suppose a hundred young men finishing their course in one of our excellent schools of architecture on equal terms, and the same number (having identical scientific attainments) finishing their course in the old-fashioned apprenticeship way, from which lot should we expect the best architecture? From the second lot, he had no hesitation in predicting. It might be objected that their taste might be warped by mannerisms. But would it be better to have a hundred architects with a hundred different mannerisms (which would be modified or obliterated according to individual idiosyncrasies), or, in the other case, only one mannerism, but that indelibly stamped on each of the hundred? The difficulties he had referred to in the way of returning to the old apprenticeship system were not insuperable. Nevertheless, the scholastic was destined to be the method of the future. He had no difficulty in predicting that this would result in the production of a great many superfluous architects and a corresponding increase in the intensity of the scramble for employment. What the effect on our twentieth-century architecture would be he must leave time to tell.

The Edinburgh Architectural Association have made the following changes in the Associate Section Prize Scheme:—Competition A 1: Design for a public hall for a country town. The handing-in day has been altered to March 15. First prize, 3*l.* 3*s.*; second prize, 1*l.* 1*s.* Competition A 2: Design for the terminations of the western towers of a large town church. The handing-in day has been altered to March 31. First prize, 2*l.* 2*s.*; second prize, 1*l.* 1*s.* Competitors are not now obliged to submit drawings for both designs. The handing-in day for apprentices' competition remains as before.

ART APPLIED TO DECORATION.*

THE impulse to decorate a useful object is one common to all mankind. It is merely to continue a little further the labour of simple manufacture. With this instinct is involved the equally natural impulse which drives men to imitate those objects about them by which they are chiefly interested. Decoration must not interfere with the utility of the object decorated, but must rather express, or at all events be conformable (in spirit as in shape) to that utility. As long as an object is only intended for use, it is not a work of art, though it may indeed be beautiful. Some of the world's best decorative art has been in the decoration of walls and ceilings. Raphael's best work is the wall colouring of a suite of apartments in the Vatican; many of his cartoons were made for tapestry. Michel Angelo's best work is the decoration of a ceiling in the Pope's private chapel; while Titian and Veronese put some of their best work on the outside of the walls of houses in Venice.

Very few architects or decorators give enough thought to colour or design. In the past there has been a great gulf between the architect and the decorator, but it is generally recognised now that the artist and the craftsman cannot rightly be parted from one another without serious injury to both. "Decoration" is the most natural expresion of an artist's feeling for his material, it is vitalised by the energy which is behind the tool, and is addressed to the senses of "seeing and feeling." It tells of a man's impressions, of his environments, of his susceptibility or dulness of nerve in the receiving and imparting of impressions of sense. Constructive design has a mission to fulfil, a purpose to serve apart from ornament. Ornament is a matter quite apart from constructive design, and is excusable and allowable only so far as it fulfils its own mission of being beautiful. This quality of beauty is again only to be considered in its suitability to the material from which it springs, to the place it is to occupy and the purpose it is intended for.

Applying these principles to our houses, &c., it may be said that as much as possible the windows of houses should be glazed in a style suitable to the architecture of the building or its surroundings. For instance, one often sees leaded glass panels of a very ornate design put into windows of houses that were built only about eighty to a hundred years ago, and large squares of glass put into so-called modern Queen Anne villas. It is a great pity that such mistakes should be made to-day by both architects and decorators.

This also applies to decoration. For instance, in an old house in Queen Anne's Gate, the interior of which has the original Adam ceilings, cornices, and friezes, the decorator who did up the house some few years ago thought it correct to cover the walls of the principal rooms above the surbase moulding with a raised Tynecastle paper, and covered the dado with a Japanese paper, and in most of the rooms removed all the good old marble mantelpieces and put wood ones of a very wooden un-Adamlike design instead. All the big London landlords should stop tenants removing valuable mantelpieces and making alterations and so-called improvements without their consent. In a house which is to let on one of the big London estates the late tenants removed a valuable mantelpiece and they propose allowing a sum of money to replace it.

Too much pattern is used by the ordinary architect or decorator, he overloads the ceilings and walls with pattern; then the upholsterer comes in and puts more pattern on the curtains; after that, the carpet man steps in with a big design for the carpet, and then the climax is reached when the lady of the house chooses her big flowery chintz loose covers. The result is a nightmare, no rest anywhere. If we have enriched or decorated ceilings and cornices, we should have plain or panelled walls; or if a simple ceiling and cornice, we should have a good frieze with a self-coloured wall under it, with curtains of a bold design and of a colour to harmonise with the walls, and a carpet almost if not quite plain, of the same tone as the curtains.

There is every reason to believe and hope that with the present reawakening of the handicrafts connected with our technical schools throughout Great Britain design and colouring will improve if design is properly taught, and that at some future date we shall have beautifully decorated houses; also that the art of decoration may not be despised by men of education and refinement, and that the public may understand and appreciate colour and design in its simplest and in its most elaborate forms, according to the possibilities and requirements of the particular style of house they occupy.

* Abstract of a paper entitled "Art Applied to Decoration," by Mr. W. Stewart-Greene, read before the Incorporated Institute of British Decorators at Painters' Hall, E.C.

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With regard to wall-papers it may be mentioned that what is known as flock wall-paper was invented about 1634, and was probably used on the walls of the picture galleries at Hampton Court Palace in the reign of Charles I. There is little doubt that Chinese wall-papers were used in the time of Queen Anne. Some writers are of opinion that we copied the Chinese wall-papers about 150 years ago. In 1786 a Mr. Sherringham of London employed a number of artists, who turned out some very fine wall decorations. Machine-made papers are first mentioned as being made about 1837, but it was some years later, after much trouble and money had been expended, that they became a success, and to-day it is very wonderful what an effect can be produced. The sale of hand-printed wall-papers during the last few years has suffered through customers being able to get cheap machine-printed wall-papers.

In conclusion it may be asked what is art? Everybody from the big stores to the art student is talking about it, writing about it, and more or less interested in it, and it is sincerely to be hoped that we shall in the near future arrive at a solution of the problem.

THE TECHNOLOGY OF DECORATIVE AND PROTECTIVE PAINTS.

TWO well-attended lectures on the above subject were recently given by Mr. J. Cruickshank Smith, B.Sc., F.C.S., to the Architectural School of the Polytechnic, Regent Street.

The lecturer said that no words of his were necessary to impress the importance of paint from the standpoint of the architect and the property owner. It is obviously to the interest of the property owner that his property should be protected in an efficient and tasteful manner from the various destructive influences to which it is exposed, and it is plainly the business of his professional adviser, the architect, to be in a position to advise his client in the best manner as to the proper materials to use under given conditions.

A distinction is to be drawn between decorative and protective paints. The latter class, being used with the special object of protecting the surfaces on which they are applied, they have to be manufactured with the greatest care, and the choice of materials used in them is more limited than is the case when merely decorative paints are in question.

The Component Parts of Paints.

Speaking in the most general terms paint consists of two portions, a solid portion and a liquid portion. Each of these component parts is of great and equal importance and they must be considered together, as the finished paint owes its properties to the suitable adjustment of the solid and liquid portions. Linseed oil is looked upon as the base of the liquid portion of paints, and it is important to remember the great variations that are liable to exist in this material. The term linseed oil by no means carries with it any definite guarantee as to composition, except that the material so described is understood to be the unadulterated product of the seed of the flax plant. The great fault with much of the linseed oil used by painters is that it is far too new. There is an enormous difference between a new oil and a well-matured or tanked oil.

The pigmentary part of paints is now engaging the attention of scientific men in connection with the paint industry, and one point that has been thoroughly well proved is that the more finely ground a pigment is the better it will be for paintmaking purposes. This consideration has induced paint manufacturers to devote much thought to the improvement of their paint machinery. The extremely workman-like and efficient nature of the various machines and pieces of plant which now form part of the stock-in-trade of every well-equipped paint maker is worthy of all praise.

In order to appreciate the technology of paints it is well to fix attention in the first instance on the pigment itself. The characteristics looked for in a satisfactory paint pigment are opacity, absence of crystalline structure, chemical inertness, fine state of division, insolubility and the property of amalgamating readily with the vehicle. It is now understood that the causes and conditions which go to the making of a successful paint are not only chemical but physical; that is to say, it is not merely the chemical composition of the paint that determines its value, but also its physical and mechanical properties, these being due in great measure to the physical properties of the pigment contained in the paint.

Theoretically a film of protective paint should consist of a number of closely packed small spheres of equal size, in perfect equilibrium chemically and physically, embedded in a permanent cementing medium. This theoretical state of things has not yet been reached in practice. All that we can do is to endeavour to approach it as nearly as possible. The opacity of a paint depends both on the pigment and on the medium, and the opacity of certain pigments varies considerably, according to the medium in which they are placed. Thus, for example, ordinary whiting possesses a high opacity when suspended in a medium consisting of size and water, but a low opacity when suspended in linseed oil. White lead has a much higher opacity in turpentine than it has in linseed oil.

Destruction of paint films may be due to internal chemical action between the particles causing a change of bulk in the individual particles and thereby setting up strains and stresses inside the paint film. It is also due to internal changes caused by physical forces between the vehicle and the pigment, causing rearrangement of the particles. It may be due also to chemical decomposition of the pigment from outside sources, such as sulphurous gases in the air, &c. Destruction is also caused by chemical decomposition of the vehicle, whereby the latter becomes saponified or hydrolysed. Again, destruction may arise from moisture affecting the ground, the chief effect of the latter being rusting if the ground is iron or steel. So far as protective paints on iron are concerned, rusting is by far the most important cause of destruction, partly because it is so difficult to prevent it. The prime cause of rusting is moisture, and there are three sources from which this moisture may arise:—(1) It may be in the ground itself, iron being porous and absorptive of air and vapour; (2) it may exist in the paint; (3) it may come through the paint, and it has been proved that no paint film of which linseed oil is one of the chief constituents can be made thoroughly impervious to moisture.

The causes of the discoloration of paint are numerous, and a paint may become discoloured without being absolutely destroyed. In the case of white paints discoloration is frequently due to the linseed oil which they contain. Linseed oil always causes yellowness in paints. It is found that such discoloration is more apparent in cases where the paint has not been exposed to light.

The final lecture was devoted to a consideration of zinc paints, the lecturer describing in detail the leading classes of such paints and showing practical examples of work done with them. He also indicated the respective properties and merits of oxide of zinc and sulphide zinc white, concluding by giving suggestions as to the mixing and application of these materials.

At the close of the course the principal of the Architectural School, Mr. Charles Mitchell, in proposing a vote of thanks to Mr. Cruickshank Smith, expressed the hope that next year he would be able to give them a longer and more complete course of lectures on the same or a similar subject.

ST. JOHN THE DIVINE, NEW YORK.

A DETAILED constructional account has been published by the *Engineering Record* showing the progress up to date of the new cathedral that is being erected in New York from the designs of Messrs. Heins & La Farge.

The cathedral of St. John the Divine, now under construction on Morningside Heights in New York City, will, when completed, be the fourth largest church in the world, being exceeded only by St. Peter's in Rome, and the cathedrals of Seville and Milan. It will be cruciform in plan, 520 feet long, 165 feet wide across the nave and aisles, 288 feet wide across the transepts, and will cover 99,500 square feet. The crowning detail will be an imposing central tower and spire, planted on a base 100 feet square, directly above the crossing, and rising to a height of 425 feet. Two smaller towers are located at the front of the building, and four in the angles formed by the intersection of the nave and transepts.

The cathedral occupies a commanding site on the crest of the heights, at a ground elevation of 124 feet above tide, overlooking a large part of New York City, the Borough of The Bronx, and Long Island. The plan is of the central area type, which affords, in the crossing, space for accommodating a large congregation close to the sanctuary. The architectural style is Romanesque, influenced by the Byzantine. The completed structure is estimated to cost $10,000,000. The corner-stone was laid in 1891 and work has been advanced as fast as funds, which come from volun-

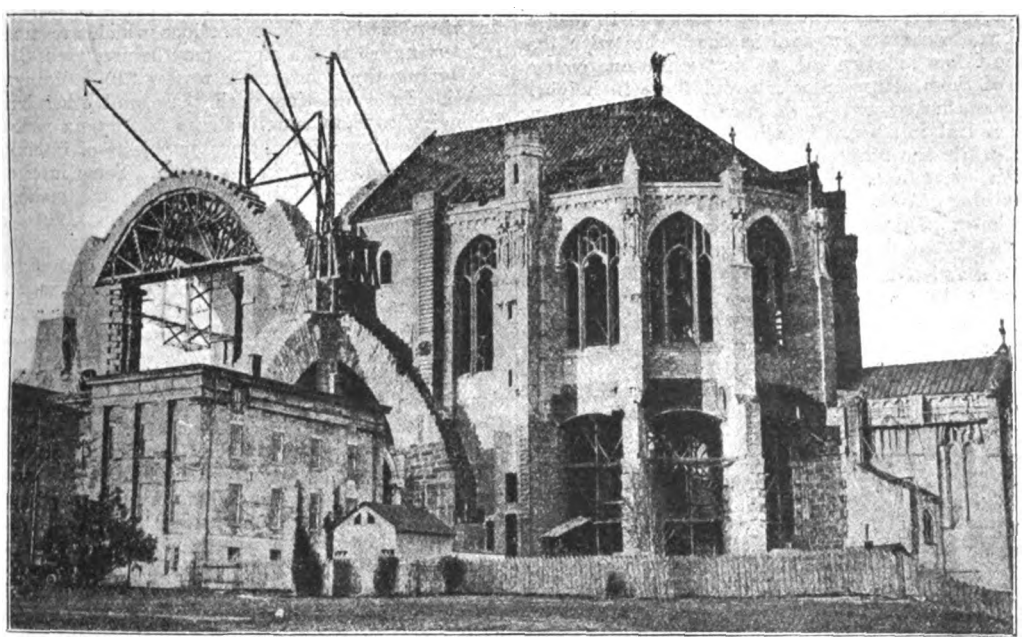
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tary contributions, have allowed, the progress in the last year being much greater than in any other similar period.

The most interesting structural features, so far as the work has progressed, are the four great arches, each with a clear space of 85½ feet and a rise of 57 feet 9 inches, which form a square of 97½ feet and carry the 425-foot tower, imposing a weight of 12,600,000 lbs. as the reaction of one arch upon the pier, and giving a total weight of 34,178,000 lbs. at the base of each of the four corner piers from which they spring. They are each 12 feet wide, 14 feet 3 inches thick at the springing line, and 12½ feet at the crown, and contain 1,180 cubic yards of granite masonry. The intrados is three-centred, with a radius of 62 feet 9 inches beginning at the springing line, succeeded by a radius of 73½ feet across the haunches, and a radius of 30 feet 9 inches at the crown. The springing line of the great arches, at elevation 198, is 74 feet above original ground level, and the intrados at the crown is at elevation 255 feet 9 inches or 131 feet 9 inches above the ground. Each of the main piers is 21 feet square and has bearing against it two flying buttresses, one for each of the great arches resting upon it. The buttresses have an average thickness of 12½ feet, are 13 feet 3 inches wide, and have a radius on the intrados of 43½ feet. The span is 21½ feet, the rise 37 feet, and they rest on piers 44 feet high. The great arches, piers, and flying buttresses, all of which are constructed of granite, will be concealed, when the cathedral is finished, either by the exterior architectural features or by an inside finishing of Frontenac, Minn., buff-coloured limestone, and by a ceiling dome, which will be supported by two small piers measuring 6½ feet by 12 feet 3 inches and 102 feet 9 inches high above ground level, adjacent to each of the main piers.

The easterly great arch, marking the eastern boundary of the crossing and the beginning of the choir, and the lower parts of the westerly main piers and those adjacent to them, were finished in 1900. The construction of the upper parts of the westerly piers was taken up in August, 1907, and since then not only the piers, but the three remaining great arches have been finished. The methods and centres employed differ greatly from those used in erecting the easterly arch. In that case the derricks for placing the voussoirs were seated during the early part of the work on one of the small piers, adjacent to each main pier, and later were transferred to the tops of the main piers to finish the work. The arch centres were of very heavy construction, consisting of segmental trusses, one on each side of the crown, supported by a post carried on an A-frame. The flying buttresses for taking the thrust of this arch were not constructed at the same time as the arch, and therefore the centres were left in until the present construction season, when the buttresses were built and the centres cut out, the latter operation proving so difficult that two weeks were required for the work. As in the case of the centres for the later work, they rested upon the tops of the small piers adjacent to the main piers, and were used for only the upper part of the arch, the skewback portion, for a height of 28 feet 9 inches, being laid against brick spandrel walls built on short arches between the small and main piers.

In carrying on the present work instead of placing a derrick upon each pier a tall timber tower was located in the crossing and supported two stiff-leg derricks, which, without being shifted, were able to build the upper parts of the piers and all three arches. A tower of the desired construction had previously been used in building the choir, and since it was no longer needed in that position, was jacked up, placed on rollers and hauled out into the crossing where, after being revolved through a horizontal angle of 45 degrees, it was seated on a 25-foot base of similar construction previously prepared for it. The tower was 30 feet square, about 143 feet high from the derrick bases to the floor of the crypt, on which it rested, and was built with 12 by 12-inch posts, 15 feet apart on all sides, and braced with horizontal and X-bracing of 3 by 14-inch timbers. Interior bracing was built between opposite sides passing through the centre of the tower, thus dividing it into bays, 15 feet square in plan. One corner was opposite the crown of each arch, so that the sides were at an angle of 45 degrees with the planes of the arches. Upon the corners near the northerly and southerly arches derricks, with 63-foot masts and 74-foot booms, were located. They were operated by 8 by 10-inch Lidgerwood double-drum hoisting engines, located at original ground level, 100 feet north of the nearest corner of the tower.



VIEW SHOWING ARCH CENTERING AND ONE ARCH RING IN PLACE.

The skewback portions of the great arches were built up to the tops of the small piers against brick spandrel walls. Timber centres were then set upon the small piers, for supporting the haunches and crown. Four centering trusses, spaced 3 feet apart, were required to carry one arch. In general, it took two days to raise the trusses from the ground to their position, place the transverse bracing, and wedge up to proper elevation. The same length of time was also required to remove them after the arches had been completed. Only one set of centering was used for the three arches, work being carried on with only one arch at a time. The complete centering for one arch, including the four trusses and the transverse bracing, contained a total of 23,500 feet b. m. of lumber and 8,500 lbs. of bolts and washers.

The centering trusses were built at the base of the timber tower in the crossing, and two of them were connected with timber battens and hoisted to place by two sets of falls, one set being attached to the centre of each 8 by 12-inch batten. A pair of these trusses thus connected was able to stand without lateral support if the wind did

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not exceed 20 miles per hour. After the four trusses were in position the transverse bracing was placed, the trusses meanwhile being tied together transversely. The bracing consists of pairs of 4 by 6-inch yellow pine horizontal and diagonal members.

The wedges inserted under the supports for dropping the trusses preparatory to removing them from beneath the completed arch are quite simple. The wedge is drawn up against an upper and a lower bevelled block by 1-inch bolts which have threaded ends 6 inches long. Four ¾-inch bolts are passed through both the wedge and bevelled blocks and bear against 4 by 6-inch blocks on each side. When it is desired to drop the centres, the ¾-inch bolts are removed, the nuts on the 1-inch bolts holding the wedge slacked up about ¼ inch and started by striking them with a maul. This is continued until the wedges have moved out 4 inches, when the ¾-inch bolts are replaced in the other set of holes in the upper and lower blocks. The centering will then have dropped 2½ inches vertically, which is enough to allow them to be moved sideways on pipe rollers and taken out. The material of which the trusses are made is yellow pine throughout except for the battens, which are white oak.

The staging hanging from the trusses extends about 24 feet below the bottom chord and was constructed for marking the centres of the radial joints. Wires were attached at the centre points and when stretched through the proper point for the voussoir, as marked on the lagging, gave the proper direction for the joint.

The granite voussoirs are cut to 4 by 6 feet and 20 inches thick and alternate courses are laid in the arches with the 4-foot and the 6-foot sides radial, so that while one course contains two of these stones in width and three in height, the two adjacent courses contain three in width and two in height. The radial joints are 1 inch thick and filled with 1:2½ mortar, while the other joints are 4 inches thick and are filled with concrete made in proportions of 1 : 2½ : 5, the aggregate being gravel. Giant Portland cement has been used. The lower ring is first built completely over the entire arch and keyed, before beginning the top ring. In order to insure the exact placing of all the stones the position of each voussoir was painted on the centering by the engineer in charge and with these marks and the centres for the radial joints as guides all three arches closed without any variation.

Since the buttresses on the westerly main piers have not been built at present, the thrust of the three arches built during the past year is taken in each case by six 2⅝-inch rods which take bearing on 12-inch channels on the back of the masonry. These rods have been placed at the level of the tops of the small piers, 28 feet 9 inches above the springing line.

The floors, domes and roof are built entirely with flat tiles about 1 to 1¼ inch thick, laid in Portland cement mortar, without any structural steel whatever, except where skylights are inserted in the roof. The tiles vary in length from 12 to 18 inches, and are about 6 inches wide. No matter where used the construction always consists of arches, and since the weight of a couple of courses, which quickly become self-supporting, is small, the centering required is extremely light, consisting in ordinary cases of a couple of 1-inch boards placed on edge and trussed lightly to hold the arch form.

The floor of the choir, forming the ceiling of the crypt, is composed mainly of a series of large vaults of about 56-feet span divided into ribs and domes springing from supporting granite piers spaced 20 feet, and in some instances 25 feet, on centres. The ribs are composed of from ten to fifteen courses of tile and the domes springing from them are usually four layers in thickness. In order to bring this vaulting to a level floor, light cross walls have been erected on the haunches and upon these counter arches two courses in thickness have been built. The ambulatory floor running around the choir is likewise composed of ribs and domes, springing from the inner to the outer line of piers. The choir floor directly under the altar terminates in a half-dome. Owing to the heavy loading expected on this floor, which served temporarily as a platform for the various building trades engaged on the structure, particularly for derricks for hoisting the stone work during erection, it was built for a safe load of 400 lb. per square foot. The first crypt vaulting was constructed about 1899, and the crypt has been used ever since as a temporary place of worship.

The ceiling of the choir was built during the last construction season, is about 125 feet above the floor, and varies in span from 50 to 55 feet. Over the sanctuary the form is that of a half-dome and the choir portion is in the shape of Gothic vaulting, with intersecting ribs. The filling is of tiles, laid herringbone for a finished soffit. The portion over the sanctuary will be decorated with elaborate mosaic.

The domes which form the ceiling of the choir are considerably below the main hipped roof, which is also of tile construction, carried by large main supporting ribs of about 60-feet span. Between these are sprung a series of secondary ribs upon which the masonry roof rests, the latter composed of three layers of tile, the outer one being of porous material, so that the copper roofing can be nailed directly to it. The main supporting roof ribs are about 4 feet wide, 2½ feet thick, and are of cellular cross-section.

The entire ceiling and roof construction necessitated only the usual bricklayers' light staging, built parallel with the walls at a distance of about 10 feet, and from this brackets or cantilevers were thrown out until they arched over the interior, thus obviating the necessity of any heavy timber work or centreing, which would have been required had brick, stone or concrete been employed.

HISTORICAL BUILDINGS IN LONDON.

IN connection with street improvements and other works, says the local government committee of the London County Council, the Council frequently acquires premises with a view to demolition. These premises sometimes possess noteworthy architectural features or are historically interesting, and photographs are taken of such premises, or drawings made of those portions which are architecturally interesting, so that a record may be preserved.

During the year under review 210 buildings were surveyed. In connection with these and other buildings not belonging to the Council, sheets of fifty-six measured drawings of portions of buildings or objects of interest were prepared and 165 photographs taken. Some interesting pieces of carving were obtained, including the mahogany balustrading of a staircase with carved brackets, fluted newels and spiral balusters, carved oak and deal door trusses, lead rain water heads, stone date tablets, coins and mediæval tiles. H.M. Office of Works gave permission for surveys to be made on the site of the New Post Office buildings in Newgate Street, where, as a result of excavations, remains of the old City wall and other rubble walls were being exposed.

Consideration is also given to such cases of alteration or demolition by private owners or authorities other than the Council of buildings in London of historic or architectural interest as are brought to the Council's notice. The district surveyors under the London Building Acts have been requested to notify the Council whenever it is brought to their notice that buildings possessing interesting architectural features or historical associations are about to be demolished or substantially altered. For purposes of record, photographs are taken and drawings made of the buildings and objects of interest therein. The owners of buildings about to be demolished usually allow the Council's officers access to the premises to enable records to be made, and assistance is rendered by other persons supplying to the Council copies of drawings and photographs of buildings of architectural interest. Through the notification of the district surveyor, particulars were obtained of certain chalk and rubble wall remains in the City of London, and a few examples of Samian pottery were also secured.

Crosby Hall, Barnard's Inn, Battersea Riso House, Ely House, Eltham Palace and the Ironmongers' Almshouses, Kingsland Road, were the chief buildings surveyed during the year and of which records were obtained.

Crosby Hall.

Early in the summer of 1907 it became known that Crosby Hall, Bishopsgate, had been sold to the Chartered Bank of India, Australia and China, which proposed to pull down the building and to erect bank premises on the site.

On July 2, 1907, the matter was brought before the Council by the committee, who in their report mentioned the principal historical associations connected with Crosby Hall. The hall was erected in the fifteenth century by Sir John Crosby, an eminent City merchant, and among notable persons who resided there were Richard, Duke of Gloucester, afterwards Richard III., and Sir Thomas More; and the building was the recognised scene of one of the most famous incidents in Shakespeare's drama of "Richard III." The hall was saved from destruction in 1832 and restored by means of public subscriptions.

A letter was received from His Majesty the King expressing the hope that means might be found to preserve the historic building.

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In October 1907 a scheme was approved at a public meeting at the Mansion House, by which it was proposed that an alternative site in Bishopsgate Street, contiguous to the property acquired by the bank, should be offered in exchange for Crosby Hall and a small additional site adjoining, and a committee was appointed to raise funds and to carry out the scheme, estimated to cost 150,000*l*. The Council, on October 22, 1907, agreed to contribute 1,000*l*. to the fund, and the City Corporation promised a similar contribution. In the following month, however, it was announced that although about 50,000*l*. had been subscribed to the fund, the bank directors would not allow further time for proceeding with the scheme unless the Corporation or some other responsible body guaranteed that the scheme would be carried through and the substituted site transferred to the bank without any payment by the bank.

On the failure of the negotiations of the preservation committee, the committee brought the subject again before the Council, which on December 17, 1907, authorised the committee to ascertain whether the City Corporation would co-operate with the Council in securing the site of Crosby Hall, and whether the subscribers to the preservation fund would transfer their subscriptions to the Council in order to assist in saving the building, subject to the scheme not entailing any charge on the county rate. Negotiations were thereupon entered into with the bank directors and the several bodies concerned, as well as with the Board of Trade, which had expressed its willingness to consider a proposal that the Commercial Intelligence Branch of the Board should be housed in Crosby Hall and the immediate vicinity.

Several schemes were outlined and discussed with the officials of the Government departments concerned and at conferences at the Mansion House at which the Council was represented. All these schemes presented financial difficulties and were further complicated by the fact that, having regard to the proposed public user of the hall, the Office of Works regarded less than one-fourth of the superficial area of the hall as effective for Government purposes. Additional accommodation had therefore to be sought elsewhere, thus increasing the financial burden. None of the schemes involved less than an expenditure of 100,000*l*., after deducting the sum collected as the result of public subscription, which would have required the net rental to be about 5,000*l*. a year, whilst the officials of the Office of Works would not recommend concurrence in a scheme involving payment of a rent calculated on other than a commercial basis; that is to say, they would not have any regard to the special interest attaching to the building. An appeal was made to the Government, and on January 27, 1908, a deputation, headed by the Lord Mayor and consisting of members of the Council, the City Corporation and other bodies interested, waited upon the First Commissioner of Works, who, however, stated that he could not see his way to recommend the additional expenditure required for the purpose of housing the Board of Trade at Crosby Hall, and that he could not, as suggested by the deputation, advise the Government to make a contribution for the acquisition of the hall under the Ancient Monuments Acts, especially as there was no precedent for the Government acquiring by purchase monuments of historic interest. The bank directors would not consent to further delay to allow of any fresh proposals being put forward.

In reporting to the Council on February 4, 1908, as to the efforts made to save the hall the committee drew attention to the insuperable difficulties met with. The bank directors were not prepared to use Crosby Hall for their own purposes nor to surrender it unless provided with a site which, in their opinion, was equally convenient. The only site which would be accepted in exchange for the Crosby Hall site was a larger and more important one, and as a cleared site its value was double that of the site of Crosby Hall. The large expenditure needed to purchase this alternative site financially crippled the preservation scheme.

The directors of the bank were good enough to make arrangements for the preservation and storage of the fabric of the hall, and at the close of the year the committee were considering whether the Council should take any action in regard thereto.

Ancient Monuments Acts, 1882 and 1900.

The efforts made to save Crosby Hall having shown that the existing statutory provisions relating to the protection of monuments and buildings of historical and architectural interest were inadequate, the committee considered whether steps should be taken to extend the provisions of the Ancient Monuments Acts, 1882 and 1900, with a view to preventing the demolition of buildings of a similar character. In France a schedule is kept of all monuments and buildings deemed worthy of preservation, with the result that no such monument or building can be destroyed, even in part, without the consent of the Government.

A Royal Commission was appointed during the year to make an inventory of the ancient and historical monuments and constructions in Scotland and to specify those which seemed worthy of preservation, and on the recommendation of the committee, the Council on March 31, 1908, decided to approach His Majesty's Government, with a view to the inquiries of the Royal Commission being extended to, or a similar inquiry being undertaken in respect of, England and Wales.

No. 17 Fleet Street, E.C.

On April 3, 1900, the Council decided to acquire, restore and preserve No. 17 Fleet Street. This building was erected in 1610, and covered the site previously occupied by a building known as the "Prince's Arms." At least as early as 1617 the council chamber of the Duchy of Cornwall was located in Fleet Street, and this fact, combined with the title of the house and the design referring to Henry Prince of Wales in the centre of the ceiling in the front room on the first floor, tends to make it probable that this room was used as the council chamber.

During the building works, which were considerably delayed owing to legal difficulties, it was found that behind the façade visible from Fleet Street stood the original half-timbered front, with portions of the essential features intact. These included six fine carved solid oak storey posts and jamb mouldings of the bay windows, the storey beams and carved storey bracket, and portions of cornice mouldings. The ceiling of the room on the first floor is an excellent example of Jacobean enriched plaster work, and is unique in design. The ceiling was taken down in sections, and cleaned and strengthened under the supervision of Sir Caspar Purdon Clarke, C.I.E., C.V.O. The oak panelling with pilasters and cornice on the west wall of the room on the first floor belonged to the original building. The fir panelling on the east and south walls is eighteenth-century work, and includes a mantelpiece with some good carving. The staircase from the first to the third floor is also a good specimen of work of the same period. The stone archway leading to Inner Temple Lane has been rebuilt on the new frontage line, and the Society of the Inner Temple have rebuilt the southern arch in stone to accord with that in the front.

The net capital cost of acquiring the premises and the cost of the works up to March 31, 1908, was 24,860*l*. 10*s*. 4*d*. This involves an annual charge of about 1,246*l*., decreasing as the debt is paid off. The premises are let on lease for twenty-one years at a rental of 600*l*. a year, so that the charge will disappear by the forty-seventh year.

Mr. C. Y. Sturge, a member of the Council, was good enough to insert appropriate stained-glass panels in the windows of the room on the first floor, which, as it was associated with Henry Stuart, Prince of Wales, son of James I., has been named "Prince Henry's Room." Mr. Sturge has from time to time presented for placing in the room engravings of old buildings existing or formerly existing in the vicinity.

Prince Henry's room was opened to the public on July 26, 1906, and may be visited on week-days (except Good Friday and Christmas Day) between the hours of 10 A.M. and 4 P.M. from October 1 to March 31, and from 10 A.M. to 5 P.M. from April 1 to September 30 in each year. During the year ended July 25, 1907, 5,155 persons visited the room. When the room is not open to the public, it is available for the purposes of meetings.

LIVERPOOL CATHEDRAL.

AT the annual meeting on Tuesday the Liverpool Cathedral committee reported that they had received over 306,000*l*. towards the erection of the new building to complete the work in hand, in addition to 10,000*l*. raised by the Masonic Order for the chapter-house in memory of the late Lord Lathom.

In recording the progress of the building operations, the committee state that the walls of the choir have been advanced on an average 12 feet, and now stand at 40 feet above the floor. The lantern piers and arcade piers now stand 29 feet above the floor, and the four tower piers which are under construction are 23 and 25 feet in height. Some modifications have been introduced in the design of the choir, which the committee consider will add dignity and grandeur. The east window will be of large size, and in harmony with the general proportions of the building. The

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walls of the lady chapel have been completed, and stand 58 feet above the floor, and the stone vaulting has been recently commenced. The order for the stained-glass windows in the lady chapel has been placed with Messrs. James Powell & Son, of Whitefriars, London. The committee invited competitive designs. The Earle family have made further contributions towards the cost of the construction of the organ, which relieves the committee of any financial responsibility. The committee have decided that the chapter-house to be erected by the Freemasons as a memorial of their late Provincial Grand Master, the Earl of Lathom, shall be representative of that body, and the architect, Mr. Scott, is now preparing a design to give effect to their decision. "The funds at present available," the report concluded, "are not sufficient to complete the choir. Further contributions to the extent of about 70,000*l.* are necessary, and the committee are very anxious that this sum should be raised, as it will not only enable them to complete the choir for divine service, but it will place them in a position to take over the property which has been set apart for the endowment of the Chapter, and thus give the diocese the advantage of a fully equipped cathedral and an endowed Chapter."

Correspondence

Illustrations in "The Architect."

Sir,—In common, I doubt not, with many of the readers of your valuable journal, I beg to express my disappointment that you have now discontinued, during this year, the issue of any more of the Cathedral series illustrations, which have been such an interesting feature in the publication for many years past. I think I saw a notice that you were intending to give some supplementary ones of certain of the earlier cathedrals which were not very fully illustrated, such as you have given lately of Southwell Cathedral. I do hope that you will still complete, in the same way, illustrations of some of the buildings which deserve a fuller treatment. May I also ask whether the College series of illustrations is not to be continued?

Thanking you for the great pleasure these beautiful photographic views of our grand historic buildings have given me, in common with hundreds of others,—I am, Sir, yours very truly,

James Sibree,
Missionary Architect in Madagascar.

Bromley, Kent: March 2, 1909.

[We certainly hope to publish some further Cathedral views. The College series will be continued.—Ed.]

Sir,—I hope you have not terminated the illustrations of British colleges, of which the last that I have seen was of Wadham on October 30 last. I am looking forward to binding these views, and I shall be very sorry if they have come to an end.—Yours very truly,

Robert Gladstone.

Woolton Vale, Liverpool: March 1, 1909.

[We published two views of Wadham in November; the next college will be published in April.—Ed.]

Poor Law Commission and Architects.

Sir,—It is a most injurious statement in the report just issued, placing on architects the onus of the increased expenditure on Poor Law institutions, and it is none the less injurious in that it is inserted as a careless passing suggestion, and not as a direct and definite charge. Of course, architects like to produce buildings that will do them credit; but it is in the hands of the building committees and the boards to prevent unnecessary expenditure on architects' schemes. The general public treats members of our profession as though our sole object is to "make money—honestly if we can, but anyway make it." A more callous, uncalled for, and iniquitous charge against a generally honourable body of men is not to be conceived.

And this charge, as more than shadowed forth in the Poor Law Report, is one that is made also both covertly and openly by individual clients *to*, though not of necessity *against*, individual architects, and is often made without conveying any sense of justified reproach or censure, which, to my mind, only increases the evil.

Cannot the Royal Institute of British Architects take up the question and make a public protest?—I am, Sir, faithfully yours,

March 3, 1909. A London Architect.

GENERAL.

The Wood Green District Council have decided to instruct the health committee to consider the question of providing public baths for Wood Green, with a view to inviting competitive designs from architects.

The Blackpool General Purposes Committee have given their assent to the proposal to include accommodation for a museum in the new building, to cost 2,000*l.*, which Messrs. Grundy have promised to give to Blackpool for the purposes of an art gallery. Messrs. A. Cullen, Lochhead & Brown, Hamilton, near Glasgow, the architects for the library, are to be instructed to prepare the necessary plans for the new building, which will be erected alongside.

Major Lewis Henry Isaacs, of Verulam Buildings, Gray's Inn, W.C., architect and surveyor, for forty-two years surveyor to the Holborn Board of Works, who died on October 17, aged seventy-eight, left estate of the gross value of 49,627*l.* 7*s.* 4*d.*, of which the net personalty has been sworn at 40,993*l.* 18*s.*

Hogarth House, Chiswick, has been offered to the Middlesex County Council in trust for the public by Lieut.-Col. R. Shipway, who saved the house from demolition some seven years ago. During the past three years it has been thrown open for inspection on three days a week. The offer is under consideration.

Professional Circles in India are somewhat exercised over the rather peculiar proceedings of the Calcutta Corporation. Having abolished the post of architect to the Corporation on the pretence of economy, it immediately invented other posts which swallowed up the economy, and now proposes to appoint an arboricultural adviser. It is difficult for our colleagues in India to understand that a city like Calcutta needs an arboricultural adviser but not an architect, and we share with and sympathise in their mystification. We trust that the recent movement here in favour of afforestation will not lead our embarrassed Chancellor of the Exchequer to decree the abolition of the posts of architect to the Board of Education and the Local Government Board.

The Design of Mr. William Bakewell, F.R.I.B.A., architect, of Leeds, has been selected in a competition for new premises at Leeds by the directors of the Pearl Life Assurance Company, acting upon the advice of their consulting architect, Mr. Percy Monckton, F.R.I.B.A., F.S.I.

The Royal Institute of British Architects held a special general meeting on Monday, when it was formally resolved that, subject to His Majesty's sanction, the Royal Gold Medal be presented this year to Dr. Arthur John Evans. At the subsequent business meeting three Fellows and forty-four Associates were elected, as well as M. A. Delpy, of Brussels, and M. Charles Louis Girault, of Paris, as hon. corresponding members.

The Architects' Benevolent Society will hold the annual general meeting in the rooms of the R.I.B.A., 9 Conduit Street, on the 9th inst. Mr. Ernest George, the president, will take the chair.

The Competition for plans of new Wesleyan church, schools and other premises at Lynton has resulted as follows:—(1) Messrs. Latrobe & Weston, F.R.I.B.A., 44 Corn Street, Bristol; (2) Alec W. Percival, P.A.S.I., 12 George Street, Plymouth; (3) Allen T. Hussell, F.R.I.B.A., Market Square, Ilfracombe.

A Quarterly General Meeting of the Glasgow Institute of Architects was held on February 17 within the secretary's chambers, 115 St. Vincent Street, Mr. John B. Wilson, A.R.I.B.A., vice-president, in the chair. Messrs. Hamilton Neil, 65 Kilbowie Road, Clydebank, and Alexander Neilson Knox, 144 Bath Street, Glasgow, were unanimously elected Fellows of the Institute. It was reported that Messrs. Vernon Constable, 38 Cornhill Street, Springburn, and Alexander David Hyslop, 124 St. Vincent Street, Glasgow, had been elected associate members. The secretary submitted a report on the matters which had been dealt with since last meeting. The associate members committee had awarded the prizes for summer sketches as follows:—First prize, 2*l.* 2*s.*, to E. G. Wyllie; second prize, 1*l.* 1*s.*, to A. Robertson. The Alexander Thomson Memorial Studentship, value 60*l.*, had been awarded to Mr. David Robertson, 2 Croft Road, Cambuslang, and the second prize of 20*l.* to Alexander Thomson Scott, High School, Stirling. Six sets of drawings were submitted, and the standard reached, especially in draughtsmanship, was higher than in any of the previous competitions. A selection of the R.I.B.A. prize drawings would be received for exhibition about the beginning of April next. Attention was called to the unsatisfactory nature of conditions of the Hutcheson's hospital competition, and it was remitted to the committee on public architecture and competitions to take action in the matter.

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The Architect.

THE WEEK.

ARCHITECTS not infrequently have to superintend the erection of buildings, the construction of which necessitates the use of cofferdams to temporarily keep out water from the works, or the provision of retaining-walls to do so permanently. Therefore the sad disaster at Birkenhead Docks is not without concern to us, and may serve to remind us of two important facts that should always be borne in mind when we have to deal with waterside buildings. The first of these is that it must not be assumed that the water is quiescent, that the pressure which the cofferdam or the retaining-wall has to resist is merely that of so many feet head of water. It was not, in our opinion, the fact that the cofferdam that failed was 40 feet high, or that it had to resist the pressure of the huge body of water in the 59 acres of the East Float that caused the collapse, but the unusual circumstance that under the pressure of a strong wind the water of the East Float was in motion, and this the swaying motion that is set up by wave movement in a confined area. If the water had been quiescent it would not matter whether there were fifty-nine or a thousand and fifty-nine acres of water kept out by the cofferdam but when the body of water is swaying its volume tells. It should always be remembered, therefore, that water may be set in motion, and particularly in tidal water that not only the ordinary rise of tide has to be taken into consideration, but when wind is against tide wave-motion of an intense character is set up. It appears from the statement of DAVID JONES, the crane driver, "The water must have got under the timber supports and forced them away," that the second point on which we wish to comment may possibly have been a factor in the Birkenhead catastrophe. This is that in waterside building it should always be presumed, and will almost invariably be the fact, that the water is not only at the side of the building but below it, and if the water is tidal, there will be tidal action beneath, so that when, as frequently is necessary, basements below the high-water level are constructed, their floors must be strong enough to resist the blowing-up effect of the pressure due to the head of the high-water level. The tidal action of the Thames, for example, extends, we know, to quite half a mile from its present channel.

"ALL over the world every kind of man has had for the high places of his country or for the high places he has seen in travel (though these last have made upon him a lesser impression) a sentiment closely allied to religion, and difficult to fit in exactly with common words." "It is to be noticed that where men cannot satisfy this emotion by the spectacle of distant hills, or by the presence of nearer ones which they can climb upon occasion, they remedy the defect either in their architecture or with their trees." Thus Mr. HILAIRE BELLOC, M.P., in his weekly column in the *Morning Post*. And he illustrates his view by reference to examples of high buildings in low lands, Beauvais, Flanders, Strasburg, Salisbury, Chichester, Bordeaux. These are certainly cases in point, and we might add "Boston Stump," and the other instances amongst the churches of Lincolnshire and the Nene Valley. But Mr. BELLOC goes on to state the converse proposition, that in the neighbourhood of mountains or hills, buildings are low, that there is "hardly ever a building of the plains in the mountains." Yet it occurs to us that some of the notable buildings of the world are set on a hill, the Parthenon, Laon Cathedral, Mont St. Michel. Perhaps Mr. BELLOC would say that these simply emphasised his original proposition, and being more or less isolated, hills are crowned with architecture's effort to enforce and intensify the provision of nature. We may grant that the village churches of the Pyrenees or the Sussex Downs appear to bear out Mr. BELLOC's theory, but if we take the churches of East Anglia as supporting his view, how are we to consider the towers of Somersetshire? This is a fairly hilly district for England, that is, and if we want something on a larger scale we may look at Auvergne, where the churches are not what we should call low and modest in height, and the configuration of the country is sufficiently mountainous. Probably the presence of wealth, industry, and large communities in the plains, of poverty and sparse population in the mountains have had much influence on the character of buildings in past ages, though we may admit it as æsthetically right that it is unwise to attempt lofty structures when they are dwarfed by a background of nature's uplifting, even if it is allowable to crown a peak when the opportunity offers.

POLITICS in general are outside our range, but Mr. BIRRELL has made special reference to the building trade in his advocacy of Free Trade, instancing in particular the import of cheap doors from Norway and Canada. He stated that we "did not pay for those doors in gold." But that is exactly what we do. The English builder who buys a cheap foreign door does not pay the Norwegian with granite or brick, but with gold, or at least a bill or some other form of promise to pay gold. When the Norwegian has got the money, he is under no compulsion to spend it on buying cotton or woollen goods from England, he can buy from his own protected fellow countrymen. Even if he did buy from England it is no consolation to the joiner who is out of a job. It is no consolation to the architect that with the help of Norwegian doors he can build a cheap house if the joiner, out of employment, cannot pay the rent even of a cheap house. True, if the joiner were the only sufferer and everyone else flourishing because doors were cheap we might send round the hat and pension the joiner. But all manufacturing trades are suffering, and the goods we send abroad do not pay for the goods that we import. Our imports for the first two months of this year were of the value of 103,979,556*l.*, and our exports 56,827,498*l.* Can anyone believe that our exports paid for the imports, and that the foreigners were such bad men of business that they allowed us to make 47 millions profit on the 56 millions worth of goods we sent them? The effect of the trend of international trade upon architecture is, we think, to be found in a comparison of the imports of raw material with the exports of manufactured goods. Taking in each case the first two months of the year we learn that in 1907 we imported raw material valued at 50 millions, and exported manufactures valued at 55 millions, or a profit of 5 millions; in 1909 the raw material imported stands at 44 millions, and the manufactures exported at 45 millions, thus there is less profit to be spent on bricks and mortar.

INTERESTING as are the particulars that Dr. M. A. STEIN gave at the Royal Geographical Society last Monday of his explorations in Central Asia, we shall have still to wait some time before the full importance of his discoveries is before us, as he estimates that the mere unpacking and first arrangement of the archæological objects he has brought away will probably not be completed before July. One interesting ethnographical fact he appears to have established is that the ancestors of ATTILA and his Huns were the Hsiong-nu, against whom were erected the defences discovered by Dr. STEIN of the western extension of the empire of China afterwards abandoned.

OUR friends in France are paying us the flattering tribute of imitation by the Bill deposited in the Chamber of Deputies by M. CRUPPI, Minister of Commerce, modifying the French patent law so as to enact that French patents must be worked in France under penalty of forfeiture, in the case of new patents within three years, and in the case of existing patents within a time fixed by the Courts. A similar provision is proposed with respect to the proprietors of "designs or models."

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THE ARCHITECTURAL ASSOCIATION SKETCH BOOK.

THE twelfth volume of the third series of the A.A. Sketch Book worthily maintains the reputation and high standard of former volumes, whether one regards it as an exhibition of the draughtsmanship of present-day architectural students or as a museum of valuable records of excellent architecture of the past. The catholicity of our modern study and appreciation of all that is good in old work is reflected in the range of subjects illustrated, extending as it does in date from Greco-Roman work to Le Petit Trianon, in locality from Shropshire to Constantinople. The care and discrimination of the editors, Messrs. W.G. B. LEWIS and THEODORE FYFE, are shown by the fact that there is not a single one of the seventy-two plates that any reasonably minded critic would wish omitted, or would consider unworthy of a place in a representative collection of old work.

Partly, perhaps, by reason of our present-time sympathies, but chiefly, we think, from the character of the past achievements of the A.A. Sketch Book in the thirty-five volumes that have preceded the one now before us, Renaissance work predominates over Mediæval, but even so we have such interesting buildings in our own country measured and drawn as the late Norman Keep of Castle Hedingham; the Priory Church of the Holy Trinity, Twynham, better known as Christ Church, Hants; the choir and lantern tower of the Abbey Church of the Holy Cross, Pershore; whilst the measured drawing of two bays of the cloisters of Norwich Cathedral is both a valuable record and an admirable example of careful study. An interesting specimen of our latest English mediæval work is the rood-screen from Charlton-on-Otmoor, which a young student might easily mistake for earlier work but for the elaborately enriched shafts and the green paint in the colouring. Green, if original, is always a mark of late date in fifteenth-century decoration, the earliest examples of which in screen work are restricted to white, red, and gold; then later we have black and blue, and last of all green. The picturesque in English mediæval work is represented by sketches of half-timber work at Ludford and Ludlow by Mr. A. N. PRENTICE, and at Shrewsbury by Mr. EDWIN FORBES.

Greenwich Hospital and Hampton Court Palace are the principal subjects illustrating English Renaissance work. Of the former we have a general plan marking the various parts erected from the designs of the several architects employed, which should be useful to students for reference. We wish to protest against the mis-spelling of HAWKESMOOR'S name that is now the fashion and is followed in the plan. He himself spelt it with an "e." We have measured drawings and details of the principal fronts of King CHARLES'S block and King WILLIAM'S block as well as the dome of Queen MARY'S block, all very useful and interesting. We are particularly struck with the refined character of the mouldings by JOHN WEBB in the river front of King CHARLES'S block, which, though Renaissance in form, are quite Greek in delicacy, yet at the same time not deficient in vigour. We take it for granted that though the reproductions are reduced to about one-quarter full size the originals accurately represent the actual contours. From Hampton Court we have sections through the Fountain Court and Chapel, with details more particularly of the Chapel.

The chief Renaissance examples from abroad are the Palazzo Pietro Massimi alle Colonne at Rome and the Porta del Palio (Porta Stuppa) at Verona. The former was the work of BALDASSARE PERUZZI and one of his best. The parts of the palace here illustrated by measured drawings are the cortile and the entrance loggia, with the columns, from which is derived the popular name by which this palace is distinguished from the adjoining one of the owner's brother, ANGELO MASSIMI, although, as Mr. ANDERSON says, the columns were themselves perhaps introduced in punning allusion to or symbolism of the full name of the ancient MASSIMI family. The details given well illustrate the Greek feeling of PERUZZI'S design for the Massimi palace, and it is quite pleasant to be able to compare this work of the Italian master of the sixteenth century with that of our own JOHN WEBB, on which we have already remarked, and to speculate as to whether WEBB was influenced by this work of PERUZZI'S or whether he was led to a similar result by a cognate line of thought and taste. The excellence of the work produced by both is at least for us a lesson of the value of the departure each alike pursued.

The Porta del Palio, Verona, is a characteristic work of the great engineer-architect, MICHELE SAN MICHELI, and as a study of expression in architecture is worthy of record by the perspective drawing and detailed elevations contributed by Mr. MAURICE LYON, travelling scholar of the Liverpool University School of Architecture.

A measured drawing of the cornicione of the famous Strozzi Palace is a desirable inclusion, though its value would have been considerably increased if the delineator had investigated and shown how the 7 feet 4 inches projection is constructed and supported. In the days of the Gothic revival in the last century architectural students were always admonished to measure every stone and to ferret out the construction of everything they drew; nowadays it is too much the habit in studying Renaissance work to regard architecture as entirely a matter of surface and profile. In the present instance not a single masonry joint is shown, and the cornice might be in plaster or reinforced concrete for all the indication of construction that is given. In all good architecture design is regulated by construction, and to attempt to study design without construction is to grasp the shadow without the substance, the effect without the cause.

The plan and elevation of the façade of Le Petit Trianon, Versailles, the latter tinted in the French manner, is an admirable example of effective rendering of geometrical drawing, and well conveys the charm of this little gem of the later French Renaissance, the design of JACQUES ANGE GABRIEL, dated A.D. 1766.

The Flamboyant work of the church of Notre-Dame, at Caudebec-en-Caux, the little old-world town on the lower Seine, is well illustrated by wash perspectives of the west-end and tower by Mr. C. WONTNER SMITH, and excellent measured drawings and perspective sketches in pencil by Mr. A. E. MARTIN, who gives a plan of the whole church, an internal elevation and section of one bay, and details of parts. The spirit of Flamboyant work has seldom been better expressed than in the sympathetic sketches by Mr. MARTIN of two of the smaller internal doorways of the church.

Curious are the panels from Dordrecht and Malines sketched by Mr. A. E. MARTIN, particularly the wall panel from a now demolished house in Dordrecht, representing Old London Bridge, as is shown by its inscription, "inde Londen Bruick," and dated 1617. Not only curious but informing are the examples of metal work in bronze and wrought-iron from Siena and Venice, excellently drawn by Mr. C. WONTNER SMITH, albeit the flagstaff-holder from the Palazzo del Magnifico is a well-known example.

A valuable set of drawings comprises plan, sections, and elevations of the highly interesting Romanesque church of S. Maria Maggiore at Toscanella, with its round-arched Italian Gothic west front, the date of which with the two western bays is given as A.D. 1206, that of the eastern portion being A.D. 1050.

From Constantinople we have an expressive drawing, though somewhat depreciated in reproduction, of the interior of Santa Sophia by Mr. ARTHUR E. HENDERSON; a measured drawing of the elevation of the Palace of the Porphyro-genitus or Palace of Belisarius, by Mr. JAMES B. FULTON; Byzantine work between the dates A.D. 912 and 958, and perspectives of the exterior and interior of the Moslem mosque of Sultan SULEIMAN, date A.D. 1550-6, by Mr. HENDERSON. Moslem work is further illustrated by Mr. A. N. PRENTICE'S measured plan and section of the Torre de la Cautiva at the Alhambra.

Greco-Roman is represented by a drawing of a pilaster capital, probably from Athens, and now in the British

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Museum, the interest of which lies mainly in its kinship to a favourite type in use amongst Renaissance designers, particularly in Italy and France, and emphasising the truth that there is scarcely a form of decorative feature employed by the men of the Italian Renaissance that has not its prototype in the classic work of Greece and Rome, if we only knew where to look for the originals.

Drawings of coloured decoration necessarily largely suffer by reduction of scale and monochromatic rendering in reproduction, but it was worth while to include the examples from the Baptistery at Ravenna, RAPHAEL'S work at the Vatican, and the Palazzo Publico at Siena.

The frontispiece of the volume is adorned with a pencil sketch by Mr. REGINALD BLOMFIELD of a cartouche in stucco by IL ROSSO in the gallery of FRANÇOIS I. at Fontainebleau, so wonderfully reproduced that one gets even the sheen of the lead.

ARCHITECTURE: ITS TRUE PRINCIPLES.—V.

By R. OWEN ALLSOP.

ARCHITECTURAL EFFECT.

THE true value of public criticism is scarcely appreciated. It prevents a prostitution of end to effect. Thus the opinion was once expressed to us by an architect, that all window cills should internally be seven feet from the floor line. The assigned reason was the fine space for a showy dado round the room. Common sense and the public rightly say that this is ridiculous; the one pointing out that nothing is so depressing as high lighting, and the other naturally enough that they want a window to look out of. So in music, the composer tends towards that which shows technical difficulties overcome —the public say they want a tune. The artist will admire a work greatly because of the skill shown in technical management—the buying public ask for an intelligible picture. The worship of technique leads the professional man—he that lives by practice of the art—to extremes, generally losing sight of the main end and aim; for no better chief principle can be laid down but that art should be as practical as nature—that is, serve some practical end. Of this exaggerated technique we get societies established for finding out what a poet really meant—if indeed he meant anything at all. The useful "man in the street" who keeps things generally within reasonable bounds, would say that he prefers intelligible poems.

It is especially a failing of the architectural critic to run down popular criticism, whereas this same criticism it is that keeps a house a house, a church a church, and neither of them a mausoleum. The plain man asks for an ornamental building and naturally feels hurt with a barn. It is one of the affectations, writes RUSKIN, that ornament may be overcharged. The sentence and its context is too widely known to need repetition. It is a fact worth much that the populace can always appreciate a really fine work of architecture. They may not necessarily be able to differentiate between that which is excellent and that which is bad, but the natural untrained eye quite fully appreciates that which is superlatively excellent. This is an important point in any consideration of the nature of architectural effect. It is always necessary to distinguish between want of education and genuine bad, warped taste. If the fact—of which we need not doubt—that the public will admire a design if elaborate and ornamental, were founded on bad taste, there would be no power of appreciating that which is excellent. Bad taste is positive; lack of knowledge or deficient education negative.

It is not supposed that every one appreciates the rationale of the *entasis*. Yet all with a natural eye should be able to appreciate its effect. The true entasis we know, merely a correction, be it noted, of a If "natural" then the natural eye must ciate, no especial education would be a fine dome, it is an object of the artist it is no more—to The principle whereby the effect of magnificence was produced is another matter. It does not concern the beholder. Principles being means to an end, it is not requisite that all should have a knowledge of such. It is the business of the creator of his object to attend to this matter.

Does not the public appreciate fine architecture? If we say no, then vain is the work of the architect. All our efforts are for ourselves, the microscopically small minority. The truth is that the "whole" effect of a building is plainly perceived by all, probably more heartily at times by the natural eye than by that satiated with much consideration of architectural forms. Where, then,

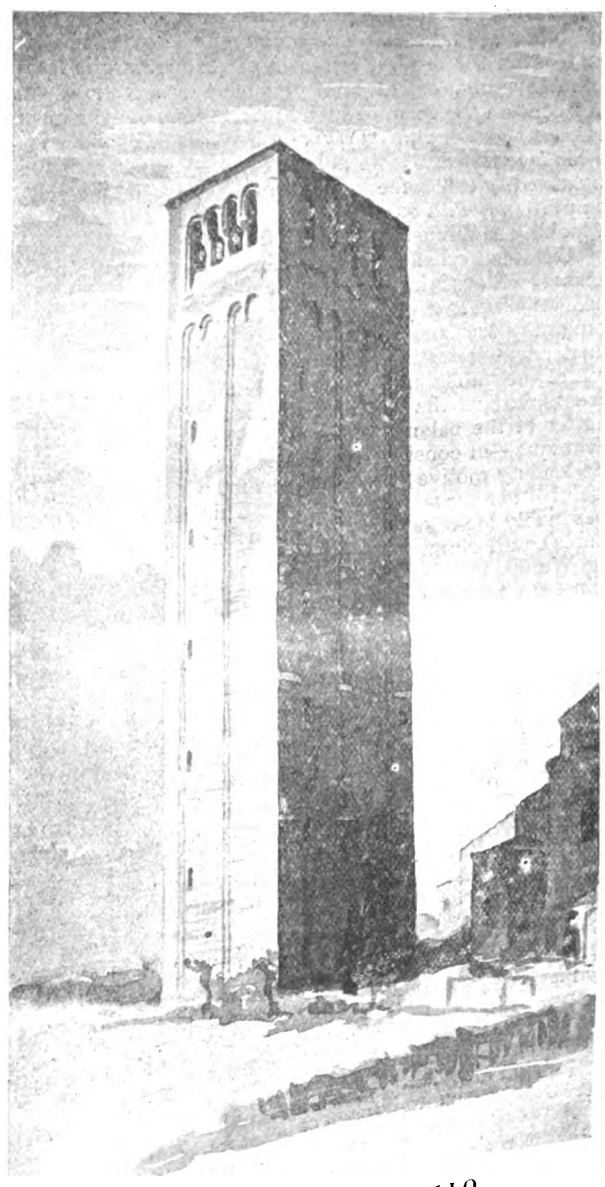


FIG. 14.—CAMPANILE, TORCELLO.

the sense of this abuse of the public? There is far too much thrusting of peculiar views down the layman's throat.

The finest part of architectural effect, the harmonious grouping and large broad effects of composition, does verily appeal to the public eye, and he that under an impression of lowering himself to suit a lower taste produces the "ornamental" as distinct from the "architectural," does truly lower himself to a very low and contemptible plane indeed.

It is frequently urged that public taste, or what is, inconsiderately, called want of taste, influences modern architecture. The only way in which such an effect can

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arise is an indirect one: that, inasmuch as the architect comes out of the body public, then if the taste of the community is corrupt, the individual cannot free himself from the original sin. Where is the architect of long-standing practice who will solemnly aver that his clients have swayed him in his design? If there be any such instances, they must either result from wilful pandering or a despicable weakness of character. Whatever modern architecture may be, it is the creation of modern architects. To endeavour to lay the blame on the public is a miserable subterfuge. Quite recently Professor HERKOMER has dilated on the *benefits* (to art) of the existence of the Philistine. In architecture, as we have suggested, such a one prevents the making of seven-foot window cill lines, and other absurdities. The architect who does not give ear to even the crudest criticism of architecture is losing valuable hints, or, at least, ignoring observations that may contain the germ of such hints. None but the inconsiderate boor, or the very young in years, will tell a man to his face that his taste is bad. If one cannot rather, as suggested, glean some golden grains of truth, the call is to uplift and, with considerateness, suggest a different way of looking at things.

Architectural effect in the main concerns great building masses, relieved in sunlight, shadow, and shade. Immediately we lose sight of the fact that it is only a small something over and above the great art of well building we must needs go astray in the fields of dilettantism. The pull of the public and the pull of the architectural profession maintains the art *in equilibrio*; for equilibrium is a matter of the balance of forces. The one force tends to technique—in constructive matters to a *tour de force*—as the leading motive; the other to that which is practically useful either *per se* or in its effect. This being so, we might reasonably look for many true principles at the position of stable equilibrium.

We are most of us pleased with the interior of Westminster Cathedral, mainly, doubtless, from great weariness of expressionless and hackneyed ornament; but Philistinism will hint at barns and railway arches, and we are perforce brought to remember that buildings may be both bold and expressive in mass, and rich and refined in subordinate parts. The Campanile on the Isle of Torcello, at Venice, will always interest the architect, from its mere proportioning—contrasted dimensions—and its effective concentration; but the plain man will ask what it is, and himself adjudge that it is an ordinary kind of water tower, neither more nor less. While we are all so ready to talk of simplicity and plainness as chief merits, we have a sense of misgiving that, after all, magnificent architecture may—and often must—have abundant richness, unless that which is purely dignified, forbidding or awe-inspiring, is the designed end and aim. And we must all often feel that one great problem in architectural design is how to gain richness without sacrifice of breadth—an impossible problem possibly to solve in terms, any more than we could discover some secret as to how others could produce a TURNER masterpiece in rainbow hue. We may perhaps see that a rich effect in true architecture has something to do with geometrical simplicity of great parts and the constant appearance in subordinate parts of what—taken by themselves—might be considered harsh and uncompromising geometrical lines. Such can be plainly seen in works of the greatest richness, such, for example, as the western façades of Amiens or Rheims. The principle involved would seem to be to contrast the rigour of that which is mathematical with the free abandon of forms that give a wealth of broken light and shade; with, as resultant, that mutual enhancement which seems observable when, for example, a fanciful silver vase is placed upon a plain velvet-covered cube as base.

There is architectural form, and also architectural effect from such form, from a multitude and from a galaxy of forms, harmoniously composed. The porch of St. Mary-le-Strand has elegant columns and entablature; but the main effect is in the disposition of parts; and, added to this, after midday the sun's rays aggrandise the effect of the architectural form, and the whole is relieved by a magnificent asymmetrical shadow. It would seem as though, to many, elegant columns and entablature constitute a whole effect, whatever the disposition of parts—the composition. This, which might be suggested as the characteristic of the half-education architectural, does not pertain where the wholly unsophisticated eye is concerned, which naturally sees whole effects and is not greatly concerned as to whether the section of a moulding is cylindrical or parabolic. In the result it seems suggested that a main principle of architectural design should lay down that refinement in mass—for that is what it comes to—must precede refinement in detail, otherwise a possible grand conception will be lost in petty littleness. True architectural effect concerns main masses of building—solids and voids, arches, lintels, piers, columns, and the like. These are the pot-hooks and hangers of the art, and style details the flourish and the curl, and of about the same significance and value when compared with the power of conveying thought by definitely formed characters.

(To be continued.)

TUDOR ARCHITECTURE.*

WHEN the first part of this book appeared last year it received enthusiastic praise on every hand for both its matter and the manner of its production. Part II., which has now been issued, attains the same high level, and we have no doubt that the remaining part when it appears in the course of the next few months will give equal pleasure to subscribers—the set of three volumes forming (to employ a much-abused phrase) a valuable and almost indispensable addition to every art-lover's library. It might be well to again mention that the compilation of the work was first entrusted to Mr. THOMAS GARNER by Mr. BATSFORD, who was anxious that his series of monumental publications on old Domestic architecture in England should be completed by the inclusion of one dealing with the eventful Tudor period. When Mr. GARNER died the materials were put into the hands of Mr. ARTHUR STRATTON, who, like Mr. GARNER, had shown himself especially attracted by this phase of architectural evolution. The completed work is to consist of 180 folio plates, of which 120 will be collotype photographs, the remainder being sheets of measured drawings and sketches of details by E. GARRATT, W. H. GODFREY, A. STRATTON, W. TWOPENY, H. TANNER, junr., and others. An important feature of Part I. was an illustrated introduction treating of the Tudor period. The descriptive text in the second part is confined to particular buildings in their historical and architectural aspect.

The first house dealt with is Compton Wynyates Manor House, Warwickshire. There are four plates of it in this part, two of which are beautifully-produced photographic views; the third is made up of details of the entrance porch, and the fourth of details of the large bay window at the daïs end of the hall. The house may be regarded as typical of the large number erected about this time, when the owners were divided between the military tradition of previous generations and the necessity for obeying the peace-compelling laws of HENRY VII. The letterpress says:—"A moat, which was filled up in CROMWELL'S day, originally surrounded the house, and to the west, facing the principal entrance, was a second piece of water: defence by water and the situation of the house being the only essentially protective measures discernible. Indeed, this is one of the earliest examples of a manor house that is not only non-castellated but makes no pretence of being so." The present south-west front has, however, something of a martial air through the additions carried out in the reign of HENRY VIII.; but they are only sufficient to increase the picturesqueness and could never have been seriously intended for defensive purposes.

* *The Domestic Architecture of England during the Tudor Period.* Part II. Illustrated in a series of photographs and measured drawings, accompanied by an historical and descriptive text, including a large number of plates and details, by Mr. Thomas Garner and Mr. Arthur Stratton. (London: B. T. Batsford.)

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However, like many other houses of the period, the principal hall is at the back and accessible only through a gatehouse and across a courtyard. Compton Wynyates has a strong claim to be accepted as in the true vernacular style. Sir WILLIAM COMPTON, to whom the building mainly owes its present appearance, was a much-travelled courtier, but, fortunately, he was not inspired to make any ostentatious show of being fashionable in the sense of being convinced that things are better done abroad. The English craftsman was, he considered, good enough to erect and adorn his country seat, and in consequence there is no trace of foreign influence even in the ornament which is lavished upon the interior.

Layer Marney Hall, Essex, is another instance of a building whose owner, though inspired by no warlike ambition, was unable to entirely cast aside the traditional instinct for securing self-protection. The entrance gateway is in a tower eight storeys, or 70 feet, high; as a contrast to this military feature the windows are remarkable for their number and size. The customary battlement on top is replaced by a parapet, which, like much else of the ornament, has a strong Renaissance feeling. In the letterpress it is remarked that its pretentiousness suggests that the owner who erected the entrance gateway was thinking of a personal monument after the manner of the *nouveau riche*. It would almost appear as if a large proportion of the most prominent men of the reigns of HENRY VII. and HENRY VIII. were self-made men who, when their days of prosperity came, were able to found their house wherever their fancy prompted, instead of being bound down by any family tradition to some particular site.

An exception was Cowdray, near Midhurst, which belonged to successive generations of DE BOHUNS until the male line became extinct in 1499. It was sold by a son-in-law to the Earl of SOUTHAMPTON, who obtained a Royal patent to add to his park at Cowdray and to build there an embattled castle of stone. From him it passed to Sir ANTHONY BROWNE, his half-brother, and then to the latter's son, who became Viscount MONTAGUE. We are told that Cowdray must at this time have been as beautiful and complete a Tudor house as any in England. Unfortunately the north and south wings were destroyed by fire in 1793. According to the book under review the story of the fire is one of extraordinary carelessness:—

> The family were not living in the house at the time, as it was undergoing repairs. The fact that the fire arose from the workmen burning charcoal in the room used for their carpenter's shop at the top of one of the towers shows that no very careful supervision was exercised: it is also said that the fire hose and buckets were locked up in the small hexagonal stone building a short distance away to the north, the key of which was mislaid. The north gallery, where nearly all the pictures and valuables and much of the furniture had been put temporarily, was immediately below the room where the fire broke out. The destruction could hardly have been more complete.

A quite different type of building is shown in the Guildhall, Lavenham, a timber-framed structure dating from the early sixteenth century. The growing power of the merchants is here indicated in the possession of so important a meeting-place. On the suppression of the Guild of Corpus Christi it was utilised as a town hall, then as a prison, a workhouse, a set of cottages, a granary, and a wool store.

Grey Friars or Ford's Hospital, in Coventry, is another "plebeian" building included in Part II., which was erected with as much or more attention to ornate detail as any residence for the nobility or gentry. It was endowed and built by WILLIAM FORD in 1529 for the accommodation and maintenance of five poor men and one woman. The west front, we are told, presents some of the most beautiful sixteenth-century half-timber work to be found in the country. Mr. E. GARRATT has produced a noteworthy page of details, which acts as a worthy supplement to the striking photograph showing the interior of the narrow courtyard, on each side of which the dwellings are arranged. The barge-boards are covered with pattern, and the design of the window tracery shows the greatest variety. A third building serving a humble purpose, but with strong claims to attention, is the "Marquis of Granby Inn," Colchester, which contains a wonderfully fine ceiling with moulded and carved beams of excellent design and workmanship. It is sometimes held that this inn was originally an important mansion. Possibly these decorative features may have been taken from some residence in the neighbourhood—a method which then, as now, found considerable favour among those who were enriched by the transaction.

The Domestic architecture of the Tudor period is full of suggestion to architects of the present day. It marks the highest attainment of native mediæval talent and was the outcome of many social changes which brought the sixteenth century at a bound considerably nearer the ideas of the present day. The plates, general and detail, in this second instalment of the interesting portfolio on the subject are heartily to be commended as revealing the beauty of England's possessions in houses throughout the length and breadth of the land at that period.

THE BUDDHIST AND HINDU ARCHITECTURE OF INDIA.*

THE literary records of India, beginning with the Rigveda, go back to about 1500 B.C., an earlier date than those of any other Indo-European people; but they supply hardly any information about chronology. We are accordingly very largely dependent on archæology in its various branches for the reconstruction of the external history of the religious and social institutions as well as of the political events of early times. The study of archæology is, therefore, relatively more important in India than in perhaps any other country of the present day. But the ancient monuments in which so much information lies buried have been disappearing from the face of the land. Thousands have been lost for ever. Vast numbers were destroyed or mutilated by the Mohammedan invaders in bygone centuries. Many others have from time immemorial been used as quarries by neighbouring villagers. Others have fallen into irretrievable ruin simply through the ravages of time. Some antiquities of priceless value are known to have been destroyed within the last century. Thus the great Stupa of Amaravati in Southern India was standing less than 100 years ago, but now there is hardly a trace of it left, though several of its sculptures have been rescued for museums. It is recorded that about sixty cartloads of ancient Buddhist sculptures were removed from Saranth, near Benares, and thrown into the neighbouring river to form the foundations of a new bridge about a century ago. Much damage has thus been done in the process of making roads, railways, and bridges. Great harm is also done, in Southern India especially, by the practice of pulling down old shrines and using the materials for building new ones. Buried sites have further been often greatly injured by the operations of untrained and irresponsible excavators, and innumerable sculptures of great archæological value have been thus dispersed and lost. This disastrous state of things at once attracted the attention of Lord Curzon on his arrival in India as Viceroy. Without delay he proceeded to reorganise the Archæological Department on a permanent and systematic footing. He then, in the year 1904, passed the Ancient Monuments Preservation Act, by which he has conferred a benefit of the very greatest importance on India. The ancient monuments of the country are now under the direct charge of the Archæological Department. All that survive will henceforth be carefully preserved and kept in repair. Archæological finds will be placed in Government museums and all traffic in them put a stop to.

In the pre-Buddhistic phase of Indian religion from which Hinduism is directly descended, carved images of the gods and temples for worship were equally unknown. And in the absence of images, structural places of worship would not be wanted. The fire and Soma ritual of this early age was conducted in an open air enclosure, or in connection with the domestic hearth. None of the architectural or sculptural antiquities which survive in India can, with one exception, be dated earlier than 260 B.C. These earliest remains are all connected with Buddhism. The one excep-

* Abstract of a paper read before the Society of Arts by Professor A. Anthony Macdonell, M.A., Ph.D., F.B.A.

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tion is a brick Stupa or relic mound at Piprahwa, on the Nepal frontier, which was explored ten years ago, and has, with probability, been assigned to 450 B.C.

It is with the reign of Asoka (264-27 B.C.), whose rule extended practically over the whole peninsula, that the history of Indian art can really be said to begin. Originally an adherent of the Brahman religion, he became a convert to the doctrine of Buddha and devoted himself to promoting its interests during the remainder of his life.

The history of Buddhist architecture in India extends over about nine centuries, and may be divided into three roughly equal periods. The earliest period reaches from 250 B.C. to 50 A.D. The monuments which survive from this period are almost exclusively the work of Buddhists. It was the Buddhists who introduced the use of stone in architecture at the commencement of this period. For some centuries before, the architectural use of brick had been known, as is proved by the Stupa of Piprahwa, which probably dates from 450 B.C. But the ornamental buildings of the pre-Asokan age must have been built of wood, like the modern palaces of Burma, only the substructures being made of brick. The whole history of Indian architecture points to previous construction in wood, the stone monuments being, to a large extent, imitations of wooden models. The second, and as far as Buddhist sculpture is concerned, best period, extends roughly from 50 A.D. to 350 A.D., the third period from 350 to 650 A.D.

The remains of Buddhist art in India are almost entirely architectural and sculptural; sculpture practically always appears in connection with the architecture, and invariably in the service of religion. Early Buddhist architecture may be divided into three main groups;—(1) "Stupas," or relic mounds; (2) "Chaityas," or places of worship, corresponding to our churches; and (3) "Viharas," or dwellings for the monks.

The "Stupa" is a dome-shaped structure which was a development of the low sepulchral tumulus or mound of earth, in which baked bricks were substituted for earth with a view to durability. Their purpose was to serve as monuments enclosing relics of Buddha or of Buddhist saints, which were placed in a stone coffer. Some, however, contained no relics, but were only commemorative of important events or miracles connected with the history of Buddha.

As representative of this form of structure we may take the large Stupa at Sanchi in Central India, dating in all probability from the third century B.C. Upon a low circular drum a hemispherical dome was erected. This dome was surrounded by a procession path forming the upper rim of the drum. On the top of the dome was a boxlike structure surmounted by an umbrella (the Indian emblem of sovereignty), and surrounded by a stone railing. This structure is usually called a tee (a Burmese word). The tee has disappeared from all the Indian Stupas, but its form can be seen from the Stupas surviving in Ceylon, as well as from stone models and sculptural representations preserved in great numbers in India. The Stupa itself was surrounded by a massive stone railing, with gates on four sides, enclosing a procession path and a sacred precinct. Both the rails and the gates were unmistakable imitations of wooden models.

The earliest Stupas were very low in proportion to their diameter. The oldest known example stands only about 22 feet high, with a diameter at the base of 116 feet. As time went on the relative height increased. Thus the great Stupa at Sanchi, erected some 200 years later, is 54 feet high, while the basal diameter of the dome is 106 feet. The Stupa of Sarnath, near Benares, was erected several centuries later. Here the height is 110 feet above the surrounding ruins and 128 feet above the plain, with a diameter of 93 feet. In other words, the Stupa shows a tendency to assume the shape of a tower.

Concurrently with the elongation of the Stupa we can see an elongation taking place in the tee also. The next step is a further elongation of the tee with a corresponding diminution and flattening of the main body. In an example in Nepal the umbrellas have disappeared and assumed the shape of thirteen roofs. In the Indian rock-cut specimens there are never more than three umbrellas, but in many of the model stone Stupas in Behar there are nine. Proceeding to Burma, we find the process going still further. Finally, we come to the last development in China, where the tee is practically all that is left.

I do not think it would be easy to find a more remarkable example of evolution in art. The process of development, when pictorially represented in its successive stages, almost resembles that of growth in the vegetable world. Here you have an Indian architectural ornament, consisting of a few superimposed umbrellas only a few feet high, finally transformed into a nine-roofed Chinese pagoda reaching the height of 200 feet. Fergusson, in his "History of Eastern Architecture," suggests that the Chinese pagoda is derived from the Stupa, but he nowhere tries to prove the connection, though some of the illustrations in his own work supply part of the evidence.

The second class of Buddhist religious buildings, the so-called Chaityas, are the exact counterpart of Christian churches, not only in form, but in use. Till recently only rock-cut examples, to the number of about thirty, were known in India. The existence of these is a great advantage for the history of architecture in India, because they are still the same as when they were originally designed, some of them well over 2,000 years ago.

The typical Chaitya consists of a nave and side aisles, terminating in an apse or semi-dome. The pillars separating the nave from the aisles are continued round the apse. Under the apse and in front of its pillars is the rock-cut Stupa, nearly in the same position as that occupied by the altar in a Christian church. The tee was doubtless usually surmounted by a wooden umbrella, but this has everywhere disappeared except at Karli, the finest Chaitya cave in India. The roof of the Chaitya is semi-circular. The door is opposite the Stupa. Over the doorway is a gallery. Above this is a large window shaped like a horse-shoe. This window is constantly repeated on the façade as an ornament. The outward appearance of the structural Chaitya was for a long time somewhat conjectural, but some recent discoveries of ancient structural Chaityas in the Bombay and Madras Presidencies have confirmed these conjectures, especially as regards their wooden origin.

The excavation of these Chaityas extended from 260 B.C. to about 600 A.D., and the development of their style can be followed step by step throughout these nine centuries. The most important of them is called the Lomas Rishi Cave (the Cave of the Hairy Sage). The front is carved so as to represent in rock the form of the structural Chaityas of the age. The posts, the five rafters, and the blocks at the sides are all imitations of wood. The door has also the primitive feature of jambs sloping inwards, in imitation of wooden buildings. The hall inside has a semi-circular roof. It is adorned with no kind of ornament, but the granite surface of the rock is highly polished throughout. Beyond the hall there is an almost circular apartment. This is a remarkable feature, because it represents an experimental stage in rock-excavation. It is evidently an attempt to represent the shape of a Stupa in the form of a hollow chamber, instead of, as in later excavations, leaving a mass of rock at the end of the nave to be carved into a solid Stupa. All the most important examples of Chaityas occur at six places in Western India. As we pass from the earliest to the latest specimens, we can clearly trace progress towards stone construction on the one hand, and degeneracy of cult on the other. In the oldest the pillars of the nave slope inwards, as in wooden structures, to resist the thrust of a circular roof. The rafters as well as the screen were made of wood, but these have long since disappeared. In later specimens, the pillars of the nave and the jambs of the door become straight, and the screen consists of rock.

At Ajanta there are four Chaityas. The second oldest of these shows a very interesting transition from wood to stone. For while the ribs of the vaulted roof of the nave were of wood, the ribs in the aisle are of stone, copied from wooden forms. The third Chaitya at Ajanta is at least four centuries later, dating probably from the fifth century A.D. Here all trace of woodwork has disappeared, earlier wooden forms being everywhere reproduced in stone. The rail ornament so common in the earlier caves has vanished, while the horse-shoe window-heads employed as a decoration on the façade are dwarfed. A striking change is the fact that figure sculpture has superseded the plainer architectural forms of the earlier caves. The greatest change, however, is this. Buddha has now been introduced in all his attitudes. Only ordinary mortals are sculptured in the earlier caves, while Buddha never appears. Now he is even the object of worship, his image being placed in front of the Stupa itself, which alone was adorned in the older Chaityas. In place of the atheism of the Buddhism of an earlier age, we find ourselves here confronted with an overwhelming idolatry. In the last of the Ajanta Chaityas, which dates from about 600 A.D., the sculptures are more mythological than in the previous cave, evidently approximating to the iconography of Brahmanism.

Finally, we have at Kholvi what is probably the latest Buddhist Chaitya cave in India. The Stupa which it con-

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tains is no longer solid, but is hollowed out into a cell in which an image of Buddha is placed. This marks the last step in the development of the Buddhist temple. A link connecting this formal stage with the later Jain and Hindu temples is to be found in an old structural Vishnu temple dating from about 700 A.D. Here the Stupa is superseded by a cell for the image, but this cell still has a semi-circular back and is separated from the outer wall by a passage for circumambulation, which is a continuation of the aisles as in the Buddhist Chaitya. The transition is completed by the next step when the cell is made square.

Thus Buddhism, which had originally emerged from the older Brahmanism, again relapsed in India, after more than 1,000 years, into a later form of the same religion.

Besides the structural Stupas or the rock-cut temples, there arose Viharas or monasteries, as residences for Buddhist monks. Our knowledge of these is still more dependent than in the case of Chaityas on the rock-cut examples. There are about 900 Buddhist caves of this class in India, besides about 100 belonging to the Jain and Brahman religions. According to the rock-cut specimens, the Viharas consisted of a hall (sala), generally square, but sometimes oblong, surrounded by a number of cells or sleeping cubicles, and shaded by a verandah in front. The cubicles in the oldest caves usually contain a stone bed. There is generally only a single floor, but examples of two-storeyed Viharas are not wanting. The only examples of Viharas in Eastern India are found at Udayagiri, in Orissa.

All the rest are found in Western India. Probably about forty of these were excavated before the Christian era. The four most important of these occur, one each at Bhaja and Bedsa, and two at Ajanta. That at Bedsa is specially interesting because the Vihara here has an apse. The second of the early Ajanta Viharas, dating from about the end of the first century B.C., is a transitional example. For here we first meet with a Vihara ceiling supported by pillars in the centre, four in number. In all these early Western Viharas there is no figure sculpture, no reliefs, no carved emblems even. The only ornament consists of horse-shoe arches and the Buddhist rail as a string course, with an occasional pilaster.

Ajanta has more Buddhist Viharas than any other place, the number being twenty-two. These are specially important as supplying a complete series of examples of Buddhist art, without any admixture from Hinduism or any other religion, extending from 200 B.C. to 600 A.D. As they contain many inscriptions the dates of the caves are fairly well known, and thus help to fix the chronology of other groups. The caves of Ellora are, however, the historically most interesting with reference to the inter-relation of the three Indian religions, Buddhism, Brahmanism, and Jainism. For here we have side by side three groups of caves (altogether thirty-three), distinctly representing those religions, while the transitions from one to the other can be clearly traced. Of the Buddhist group of twelve, eleven are Viharas. The sanctuaries of most of these contain figures of Buddha seated, but with the feet down and not folded under them. Thus, the Buddhist monastery is becoming a place of worship in which figures of Buddha are ousting the monks from their cells. These Viharas come down to about 700 A.D., at which point the earliest Brahman examples begin. There are here three two-storeyed caves which illustrate clearly the transition from Buddhism to Brahmanism. The first is entirely and unmistakably Buddhist. The second is similar in plan, and the sculptures are still all Buddhist, but these deviate sufficiently from the usual simplicity to have justified the Brahmans in appropriating this cave as belonging to their religion. The third is very similar in plan to the preceding one, but the sculptures are all unmistakably Brahman. It is evidently the earliest Brahman cave, being a close copy of the preceding Buddhist example.

We have thus arrived at the beginning of the Hindu period of Indian architecture. We have seen that the Buddhists were the first builders and carvers in stone in India, beginning in the third century B.C. It is only on Buddhist monuments that we find the earliest representations of Hindu deities. But the oldest remains of independent Hindu art, either sculptural or architectural, only date from several centuries after the beginning of our era. These considerations in themselves justify the presumption that Hindu architecture is derived from the older art of the Buddhists. This presumption is borne out by the fact that the earliest extant Hindu samples are practically identical in form with the latest Buddhist specimens, differing from these latter only in having the image of a Hindu deity, instead of one of Buddha, placed in the shrine. Again, at Ellora, some of the sculptures in the earliest Hindu cave temples are hardly distinguishable from those of the latest Buddhist caves at that place.

(To be continued.)

GLASGOW INSTITUTE OF ARCHITECTS.

THE annual general meeting of the Glasgow Institute of Architects was held last week in the rooms, 187 Pitt Street, Mr. George Bell, F.R.I.B.A., president, in the chair. The Secretary submitted the forty-first annual report, which stated that the membership now stood as follows:—Eighty-six fellows, eighty-one associates, forty lay members and twenty-two student members, giving a total of 229. Several architects practising in Bournemouth approached the Council regarding the question of municipal officials and architectural work, and a reply was made expressing the willingness of the Institute to co-operate in any practicable scheme of reform. The attention of the Council was called to the condition of the local wood carvers in consequence of unemployment. Sympathy with these craftsmen was expressed, and the members agreed to do what they could in the direction of giving a preference to local labour where possible and in the best interests of the works under their charge. From the report it appeared that the provisions of the Town-Planning Bill, as introduced by the Government last session, were the subject of consideration by the Council in view of the far-reaching effects of such a measure in matters of the utmost importance to architecture. While the principles of the Bill were generally approved of, the Council was of opinion that the benefits which it is likely to confer would be increased and the danger of maladministration lessened by the inclusion of clauses providing for (1) the statutory creation of locally appointed committees of experts to whom town-planning schemes should be referred and whose suggestions should be submitted to the Local Government Board; (2) specific permission for the R.I.B.A. and its allied societies to appear before and make representations as "persons affected" at inquiries held by the Local Government Board before the approval of town-planning schemes. The Scottish members of Parliament on the House of Commons committee were written to, asking them to support the foregoing recommendations. A new clause embodying them in part was ultimately accepted by the committee and will be incorporated in the Bill on its reintroduction this session. On the suggestion of the R.I.B.A. the Council has appointed a town-planning committee for this district, which will give special consideration to the subject and will be prepared, on the Bill being passed, to advise and assist such local authorities within the Institute's province who contemplate taking action under its provisions. The report further states that the acquisition of more suitable premises for the Institute has from time to time been the subject of serious consideration by the Council. With the assistance of the house committee, negotiations have latterly been entered into with the Institution of Engineers and Shipbuilders in Scotland for a share of their handsome new premises at 35 Elmbank Crescent. These have now resulted in an agreement, under which the Institute will obtain occupation at Whitsunday. The threatened demolition of Newark Castle was brought before the Council. After full consideration a letter was forwarded to the owner, Sir Hugh Shaw-Stewart, Bart., pointing out the irreparable loss to art and history if this beautiful and characteristic example of early Scottish architecture were demolished, and expressing the hope that its removal would be averted, unless imperative considerations necessitated it. The Council were glad to note that on the representation of the Institute and others, Sir Hugh had now decided to allow the castle to remain. The report was adopted, and the Council for the ensuing year was elected as follows:—Messrs. James M. Monro, Alexander M'Gibbon, Andrew Balfour, Thomas Baird, jun., George Bell, Alexander Skirving, Robert Miller, John B. Wilson, John A. Campbell, John James Burnet, James A. Morris, Henry Mitchell, John Watson, R. D. Sandilands, Neil C. Duff, J. K. Hunter, James Lochhead, Alexander Wingate and W. J. Blain. The treasurer's accounts, which were submitted and approved of, showed that the funds were in a satisfactory position. A meeting of the newly elected Council followed, at which office-bearers for the year were appointed, viz.:—President, Mr. George Bell, F.R.I.B.A.; vice-presidents, Messrs. John B. Wilson, A.R.I.B.A., and Alexander Skirving, F.R.I.B.A.; auditor, Mr. James M. Monro, F.R.I.B.A.; secretary and treasurer, Mr. C. J. MacLean, writer, 115 St. Vincent Street. The various committees for the year were also appointed.

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NOTES AND COMMENTS.

A CHARMING apology for tradition in architectural design and for the Orders as the expression of that tradition is Mr. PAUL WATERHOUSE's parable, "A Goodly Heritage," read before the Edinburgh Architectural Association. Yet whatever degree of regard or even of reverence we may hold for the works of the great past we in no way need to feel ourselves bound by the formulæ of PALLADIO, of VIGNOLA, or of CHAMBERS. In all ages, until the birth of the Italian Renaissance, architecture advanced by each man endeavouring to improve and sometimes succeeding to improve on the work of his immediate predecessor. We have lost touch in this twentieth century with our immediate predecessors; we must therefore go back to something and try to advance from the standpoint we select, remembering that originality does not necessarily consist, as some of the early exponents of l'Art Nouveau have seemed to imagine, in doing something so bizarre that no sane individual has ever done it before.

THE Special Commission on Concrete Aggregates appointed by the British Fire Prevention Committee has issued an interim report. This is not of much value, as it really only tells us what materials the Commission hopes to test, with the intimation that a final report cannot be expected before 1912. Even the provisional specifications lack the determining factors that would make them real definitions. The latest reports issued by the British Fire Prevention Committee deal with fire-extinguishing apparatus made by Messrs. AMMENTORP, of Copenhagen—firstly, as used to cope with burning masses of sundry varieties of inflammable material, and secondly, when used to extinguish burning petrol. In the latter case the extinguishers had a chemical effect upon the burning spirit leading to its extinction, but still left something to be desired in simplicity of operation and the density of the fumes created.

"LANDHAUS UND VILLA," published by the Westdeutsche Verlagsgesellschaft, of Wiesbaden, is illustrating a series of English designs for small country houses of the bungalow or cottage type, purchased by the German Emperor for the encouragement of the growing taste amongst the German middle-class householders for a little place in the country, an ideal home with a garden. The English architects whose designs are illustrated are Messrs. LAWSON & REYNOLDS and Mr. F. B. WADE. With the exception of Mr. WADE's half-timbered group of three cottages, which is capable of holding its own in any company, the examples selected are scarcely representative of the best English work in this direction, and suggest that their designers have been unduly hampered by considerations of cost. There is, however, a good deal of cleverness in the plans, notably in the one-storey bungalow by Messrs. LAWSON & REYNOLDS. The same publishers have issued also the first part of a guide-book for the prospective German investor in a house of his own with a garden, in lieu of a flat in town, entitled "Das eigene Heim und sein Garten." This compares the rent and accommodation of a town flat with that of the small country house, and shows how more accommodation and more comfort, as well as more healthy surroundings, can be obtained in the country at the same cost. It is worth noting, however, that the result is obtained only by limiting the return on capital to 4 per cent. One of Messrs. LAWSON & REYNOLDS's designs and one of Mr. WADE'S, as purchased by the Emperor, are given, and numerous designs by German architects, as well as photographs of executed buildings. In these picturesqueness of roof treatment is a strong point.

EVEN in Canada they are beginning to feel a failure in supply of building timber, and are suggesting the use of what they call "clay-lumber" or "terra-cotta lumber," meaning that class of clay goods in which brick-earth, mixed with sawdust, is burnt to produce a light and porous material. The potentialities of this material, of which we have at present only a few manufacturers in England, are no doubt considerable, but its general use as a complete substitute for timber is scarcely conceivable. Still, if the Canadians will use "clay-lumber" instead of wood for the walls of their houses, they may continue to spare us some of their pine for a longer period than would otherwise be possible.

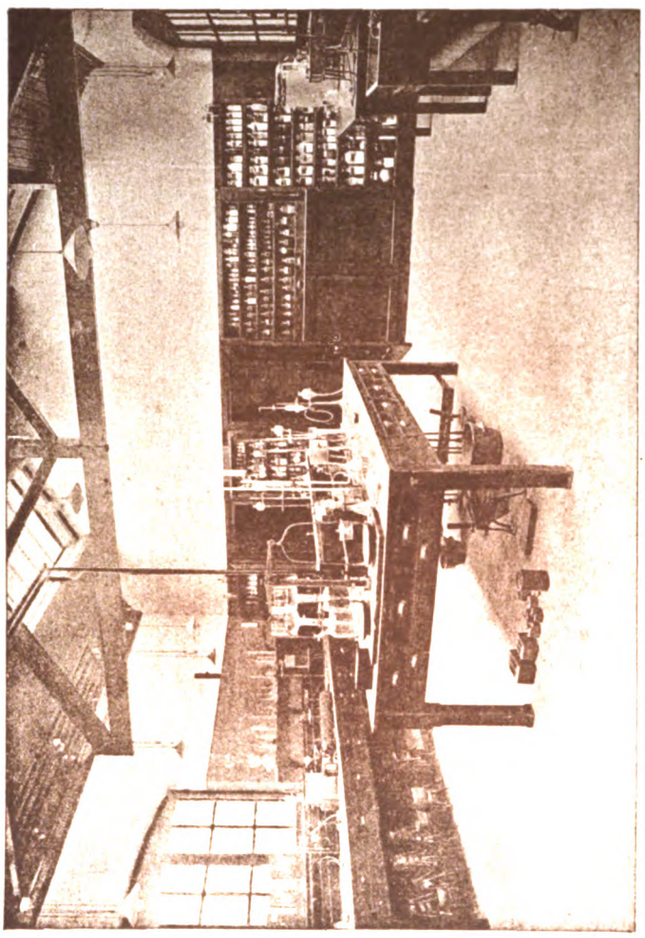
As it frequently happens, and particularly in underpinning, that concrete foundations have to be laid in sections, the series of tests described in *The Engineering Record* as having been made at Lafayette College are of general interest. The tests were carried out to determine the strength of joints made between concrete laid at different times, and for this purpose beams of 5-feet span were tested under a transverse load, the load being applied 1 foot each way from the centre of the span. The following kinds of joints were tested:—Dovetail joints, the male part of the dovetail being 4 inches thick and the neck 3 inches thick; vertical joints roughened with a cold chisel; vertical joints reinforced with two ¾-inch round iron bars, 18 inches long, with nuts at each end; scarf joints, with a diagonal scarf one-third the length of the beam; similar joints scrubbed with oxalic acid; similar joints scrubbed with oxalic acid and treated with a paste of neat cement; step joints or parallel half and half scarfs. The reinforced joint proved to be the strongest joint tested, failure occurring not at the joint but beyond the reinforcement. The splayed scarf joints came next, those scrubbed with oxalic acid being a little stronger than those not scrubbed. The treating of the surface of the joint with a paste of neat cement, from the results of these tests, proves to be of but little value. The dovetail is the next strongest joint, but although stronger than the remaining kinds, seems to be much weaker than the splayed scarf joints. The vertical joints roughened and the step joints or parallel half and half scarfs were the weakest of all tested, and gave very low results.

MANY British architects would like to have a client like MARK TWAIN, who has lately had built for him a country house amongst the hills of Redding, Conn., which, the *American Architect* says, is characteristic in that, "until the house was finished, Mr. CLEMENS never saw the property which was bought for him, and refused to even examine the plans after his first general discussion with the architects, and never saw the house itself until he arrived one evening, with the servants installed, dinner served, and a box of his special cigars open in the billiard-room." Given a client who is able to tell his architect at the start what he wants, MARK TWAIN'S method of procedure is one that makes not only for the comfort of all concerned—client, architect, and builder—but for the right realisation of an artist's conception, economy of cost, and absence of extras. We know of one case where the client, having signed the contract, went abroad, and only returned when his building was finished—to his own and everyone else's satisfaction.

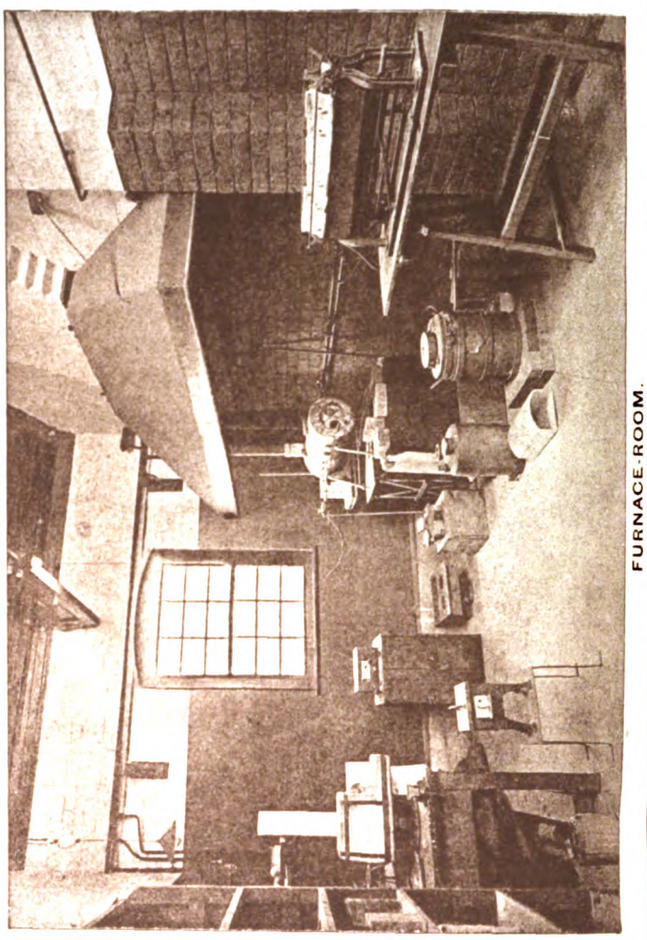
IN this country the use of concrete blocks for building is in its infancy. It is well, therefore, to know from American practice that curing the blocks by steam possesses many advantages. A steam-cured block is stated to be harder and stronger after twenty-four to thirty hours than one cured by sprinkling or spraying that is seven to ten days old. The colour of the blocks also is more uniform, regardless of the cement used, whether dark or light, and the steam gives them a lighter colour than it has been possible to obtain before. Another advantage is that the making and curing of the blocks is independent of the weather, and they can accordingly be made throughout winter frosts. The saving of time in curing admits of blocks being delivered in thirty-six hours from the receipt of orders.

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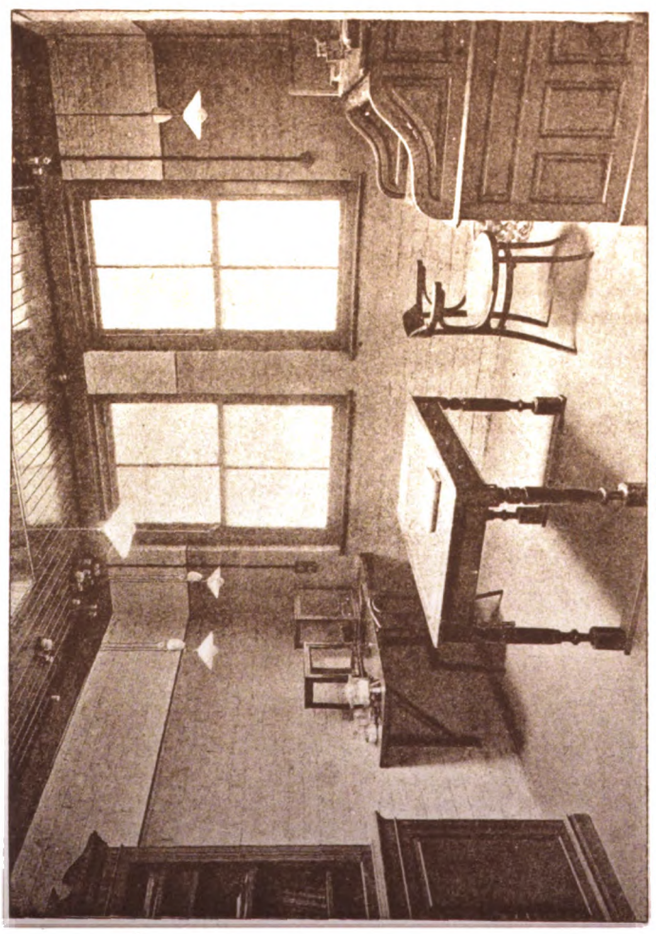
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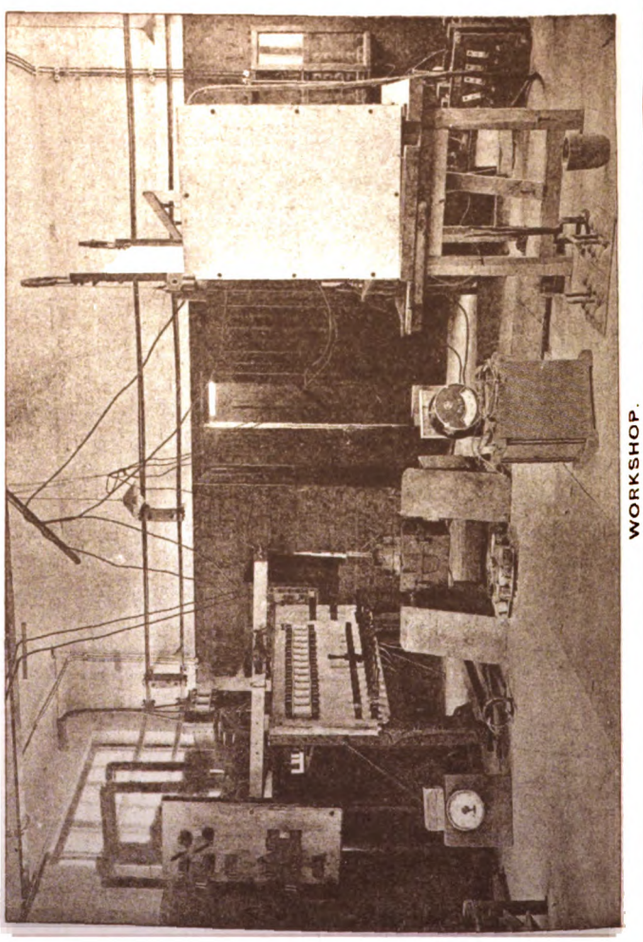
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OFFICE.



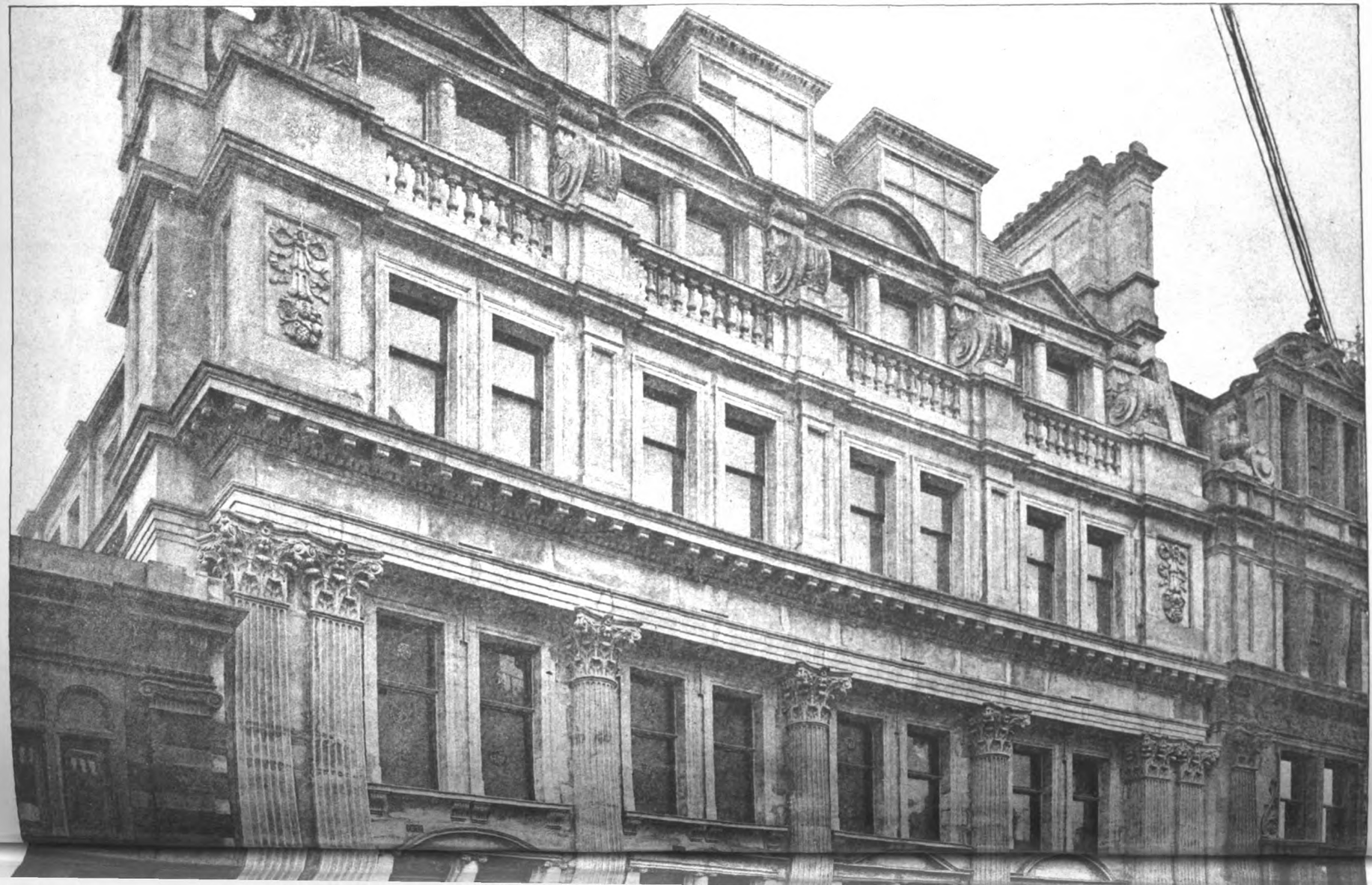
WORKSHOP.

NEW BUILDINGS, WALLSEND-ON-TYNE.

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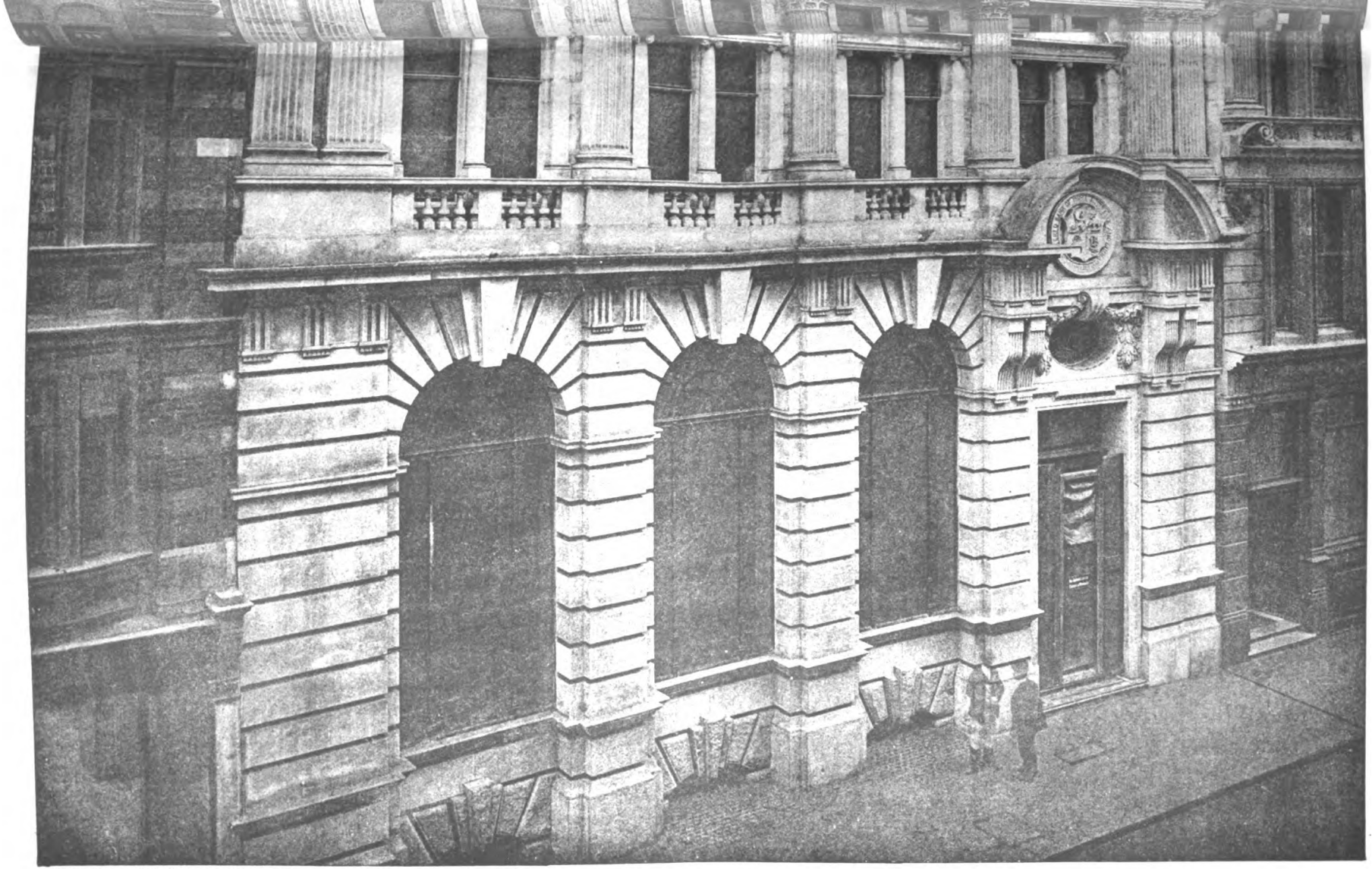


PHOTO BY A. E. WALSHAM, 60 DOUGHTY STREET, W.C.

THE CHARTERED BANK OF INDIA, AUSTRALIA, AND CHINA, BISHOPSGATE STREET, E.C.
(ON THE SITE OF CROSBY HALL.)

Messrs. GORDON & GUNTON, Architects.

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THE "HAMBURG-AMERIKA LINE" OFFICES, COCKSPUR

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12th 1909.



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PHOTOGRAPHED BY BEDFORD LEMERE & Co 147, STRAND, W.C.

THE "HAMBURG-AMERIKA LINIE" OFF[ICE], COCKSPUR STREET,
ARTHUR T. [BOTTOMLEY], A.R.I.B.A. Architect.

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Mar. 12th 1909.



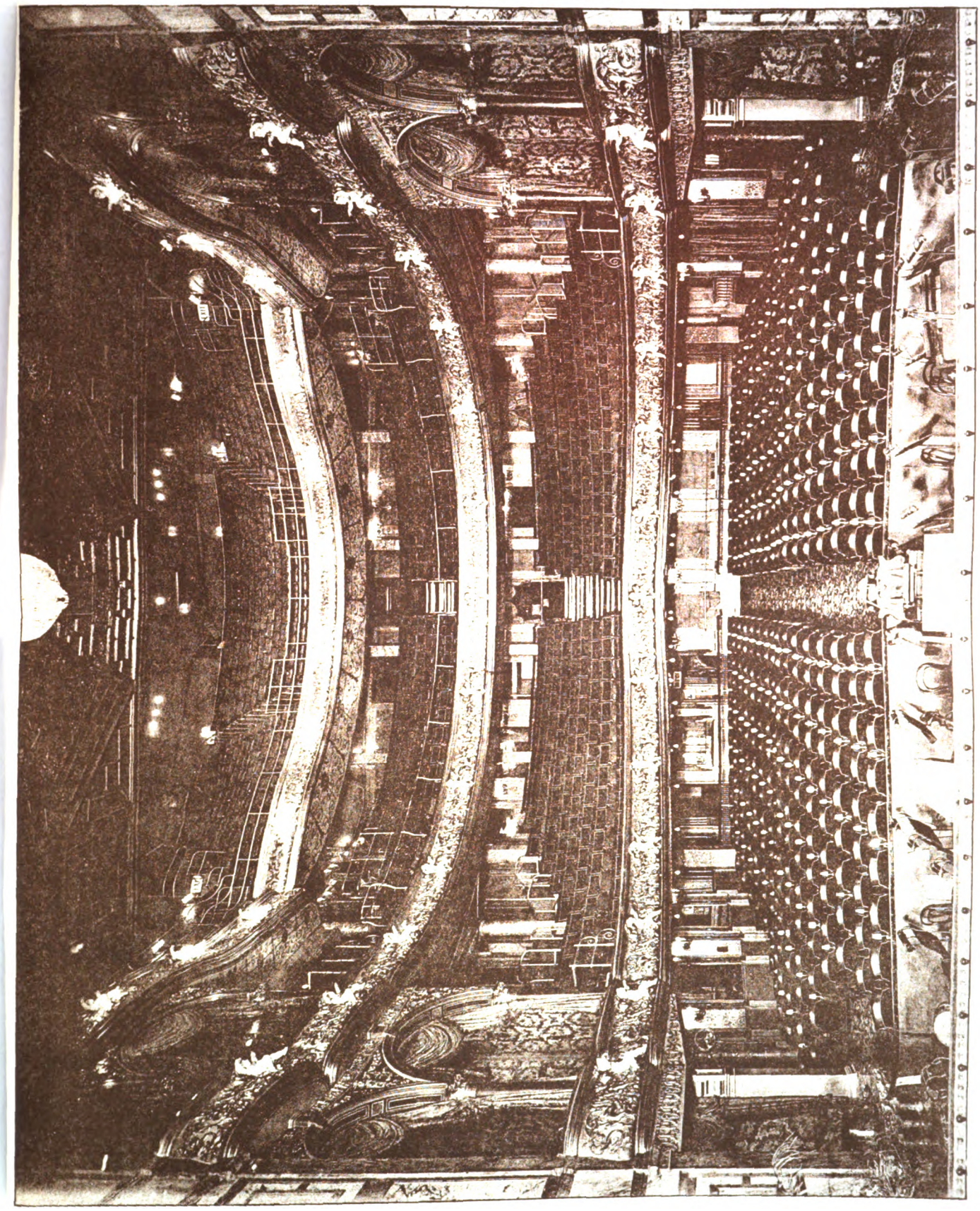
CKSPUR STREET, S.W.: GENERAL OFFICE.

I.B.A., Architect.

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ADDITIONS TO THE PALACE THEATRE.

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ILLUSTRATIONS.

THE "HAMBURG-AMERIKA LINIE" OFFICES, COCKSPUR STREET, S.W. GENERAL OFFICE.

ERECTED by the Disconto Gesellschaft, the main portion of the ground floor and basement of the Hamburg-Amerika Linie building, 14, 15 and 16 Cockspur Street, S.W., is now occupied by the H.A.L. for their enlarged offices, the remainder of the building being available for letting, to be divided into suites to tenants' requirements.

The building, which is of seven storeys and is of steel construction, stands on two different properties, and the main setting out has been unalterably determined by the conditions of the site and the requirements of the freeholders, and the exigencies of the light and air of the adjoining properties. The main shipping office is about 75 by 40 by 18 feet high, and is treated as one large room, the left-hand side devoted to the cabin and the right-hand to the tourist departments, with the cashier in the centre. Behind the cashier's department are the telephone cabinets and the typewriters.

In the basement beneath are the baggage-room with strong-room, goods lift to the back street, and extra office accommodation, lavatories, &c.

The manager's room in connection with the main office is approximately hexagonal in shape, and has a domed ceiling; the walls are white-painted panelling with a marble fireplace.

The main office ceiling is of modelled plaster of considerable scale and relief; the walls are panelled 11 feet high in choice Cuba mahogany, with specially selected veneers in the upper tier of carved panels. The dividing pilasters are inlaid with mother-of-pearl selected colouring, and the caps and bases of the secondary pilasters are of ormolu. The mahogany is of natural colour, polished but not stained, and is of golden yellow brown in colour.

There is a frieze of modelled plaster 6 feet deep above the panelling, the principal bays having ovals representing by figure composition the four continents. All the modelling has been carried out by Mr. SCHACHT from the architect's drawings, and the casting was executed by Mr. AUBREY. The central columns on the dividing line of the properties are of steel encased in concrete, and have been finished on the solid with superfine KEENE'S cement and polished by Mr. MINSHULL to a white marble face, the bases being finished black while the caps are gilded and in part burnished.

All the elaborate joinery, fittings, and furniture have been carried out by Messrs. WARING & GILLOW at their Hammersmith factory, from the architect's drawings, and Mr. RAYMOND has been responsible for the solid mahogany carving. The mother-of-pearl inlay was supplied and cut by Mr. LUCAS. The floor is of interlocked indiarubber, laid out in white bands with a solid black filling. Irish green marble from Connemara has been used in the fireplace in combination with Pavonnazzo and Italian brescia.

The large and elaborate chandeliers and other fittings, the ormolu and bronze screens, door-plates, &c., and the large wrought-iron screen and gates to the main entrance, and also the balcony railings have all been executed at Birmingham, from the architect's drawings, by the Birmingham Guild of Handicraft. The external bronze work, including the large panel with life-size figures over the entrance to the shipping office, was modelled by Mr. J. WENLOCK ROLLINS, and cast by Mr. BURTON, of Thames Ditton.

The sculpture in Portland stone on the façade comprises two large figures in half pediments, representing Germany and America, and a frieze of nine bas-relief panels across the curved lines of the bay windows, the subjects being the chief travel-stories of antiquity. These were all modelled and carved by Mr. W. B. FAGAN.

The work has been in progress about eighteen months, and the total cost approaches 50,000*l*.

The architects are Mr. ARTHUR T. BOLTON, A.R.I.B.A., and Messrs. STOCK, PAGE & STOCK, F.R.I.B.A., of Victoria Mansions, 28 Victoria Street, S.W.; and the quantities were taken out by Messrs. WIDNELL & TROLLOPE, surveyors, of Tothill Street, S.W. Mr. SANDALL has been clerk of works, Mr. BROOKS general foreman, and Mr. ROSCOE foreman in charge of all joinery and fittings for Messrs. WARING & GILLOW, the builders being the Waring-White Building Co., Ltd., the following firms being employed:—Portland masonry, the Bath Stone Firms; joinery (deal and hardwood), Messrs. WARING & GILLOW, Ltd.; mother-of-pearl inlay, Mr. LUCAS; steelwork, Messrs. M. T. SHAW & Co.; plastering, Messrs. WHEATER; paving, the Dolmite Company; plumbing and drainage, Messrs. DENT & HELLYER; electric wiring, Messrs. BEAVEN; heating, Messrs. NICHOLSON & Co.; electrical fittings, and Birmingham Guild; bronze screens and wrought-iron work, the Birmingham Guild; party wall, doors, and safes, Messrs. RATNER & Co.; grate interiors, Messrs. WRIGHT & Co.; hydraulic and electric lifts, Messrs. WAYGOOD & Co.; casements, Messrs. BURT & POTTS; plate glass, Messrs. WOOTON; show-cases, Messrs. STANLEY JONES & Co.; hardware, locks, staircase, handrails, &c., Messrs. HART, SON & PEARD; tiling and marble work, Messrs. VAN STRAATEN; mosaic floor vestibule, Messrs. BURKE & Co.; rubber flooring, the Peerless Rubber Floor Company; parquet floor, Messrs. TURPIN; asphalte flats, &c., Messrs. THOMAS FALDO & Co.; painting, &c., Messrs. WARING & GILLOW, Ltd.

THE CHARTERED BANK OF INDIA, AUSTRALIA AND CHINA, BISHOPSGATE STREET, E.C.

THE futile efforts to save Crosby Hall which were continued by persevering enthusiasts for more than six months were chronicled in our columns last week. The directors of the bank gave many weeks of grace before they commenced to pull down the historic building, and when that work had been completed they stored and preserved the remains at their own expense. The new premises erected on the site (which are to be opened to-morrow) have the grave dignity that might be looked for in a large bank. A detailed account of the strong-room, which is of special interest, is given elsewhere. The architects are Messrs. GORDON & GUNTON, Finsbury House, E.C.

NEW BUILDINGS, WALLSEND-ON-TYNE.

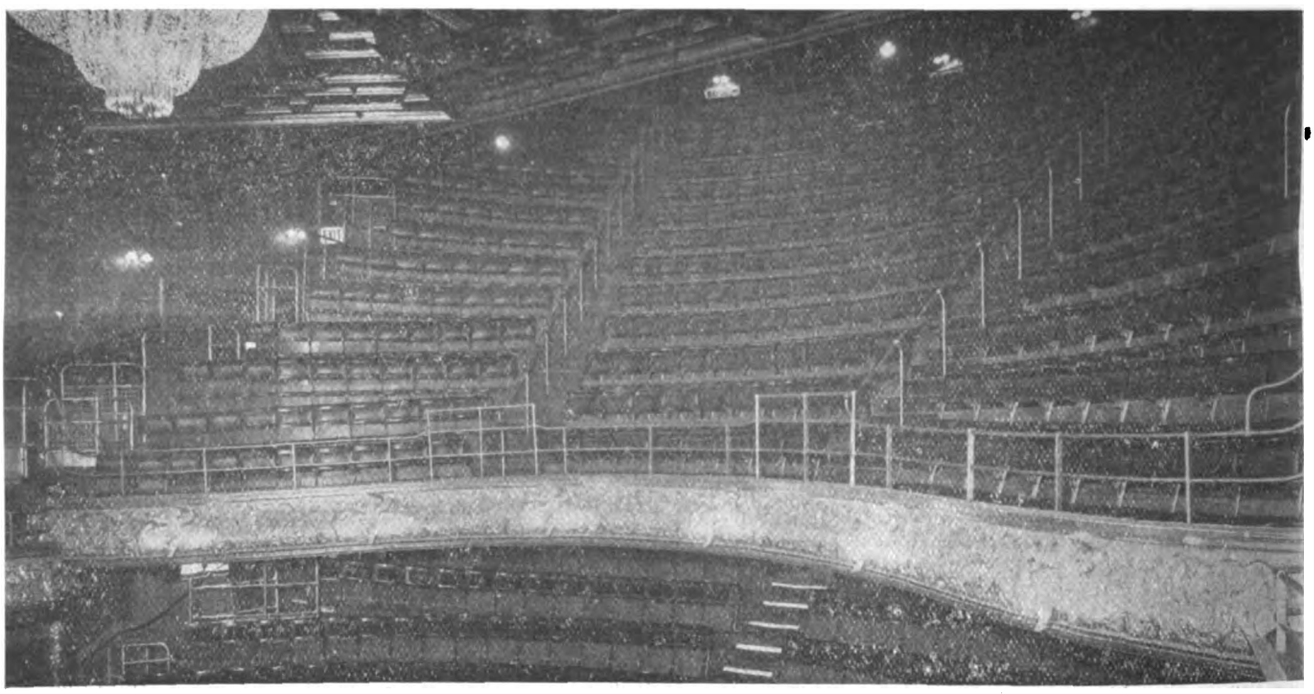
THIS building has been erected in Neptune Road, Wallsend-on-Tyne, for Messrs. the Thermal Syndicate, and contains entrance hall, large workshop, with battery room and store on ground floor, and laboratory, furnace room, and office, &c., on first floor. Externally the building is faced with red pressed facing bricks, with stone sills to windows, and the roof covered with small Welsh slates. The windows are wood casements, and the main cornice of wood painted white. The building was designed by Mr. EDWARD CRATNEY, of Wallsend and Newcastle (for Messrs. DAVIDSON & CRATNEY), and the contractor was Mr. J. MACHAIG, of Wallsend. The cost of the building, exclusive of fittings, was 700*l*.

ADDITIONS TO THE PALACE THEATRE.

LAST autumn the new amphitheatre at this house was opened to the public after entire reconstruction, as shown in our illustrations. When this theatre was built, two places, amphitheatre and gallery, formed the topmost tier, which were divided by a drop in the steppings of about 4 feet. For many years past these two parts had been used together, as amphitheatre, at one uniform price, but this drop in the steppings prevented intercommunication, and as the rows of the amphitheatre seats held from forty to sixty persons and the only access to or escape from these seats existed at the extreme ends of each row, they were most inconvenient. To form passages to the old amphitheatre walls existed cutting off the sides of the gallery; these walls have been entirely removed and the space so wasted has been utilised, thus enabling the formation of one large open circle of seats, numbering upwards

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of 400 arranged in one even slope with regular steppings, each row being 2 feet 5 inches wide. Inlaid mahogany "tip-up" chairs have been fitted throughout, and dividing the tier into three sections two gangways have been formed through these seats, right from the front row to the back, and in addition to these the five front rows have separate exits into the gangways on both sides. Every seat without exception commands a good view of the whole stage. The procedure was to cut away completely the two front rows and all their steel construction, and then, to what was left, attach new constructional steel, arranged to different lines on plan and in height, projecting in parts some 2 feet farther forwards. On this and the old steel work was formed the new steppings to an entirely new shape of front line. Short lengths of the old amphitheatre have been left at the sides, forming small independent side galleries, the spaces behind which have been considerably raised and slightly projected and protected by strong iron railing forming well-sighted standing spaces with comfortable leaning rail. These alterations have raised the soffit underneath so much (about 18 inches) that combined with the changed shape of the line of front the circle below has been very greatly improved as to its view of the stage and its airiness. This (the first) circle has also



been considerably altered by the removal of the dwarf walls at sides and back and the substitution of ornamental iron barriers instead; the steps in the side gangways have also been so altered that each and all of the several rows of seating have ingress and egress at both ends. It also has been completely reseated with inlaid mahogany, velvet covered "tip-up" arm chairs, and the auditorium and its ceiling have been redecorated. The whole of the foregoing works were begun and finished in the record time of six weeks; the gallery was of necessity closed, but the whole of the remainder of the house, including the first circle, was open to the public as usual for eight performances a week. As the scaffolding necessary for the removal of the old gallery and the putting in the new steel work had to be removed and set up daily, great credit is due to Messrs. HY. LOVATT, Ltd., of Wolverhampton, the builders, and Messrs. RICHARD MORELAND & SONS, Ltd., of London, the constructional engineers. Mr. J. EMBLIN WALKER, of Uxbridge Road, W., was the architect, who had previously altered and reseated the stalls and royal circle and carried out the suggestions of the L.C.C., and who has now in hand the formation of a new suite of offices to accommodate the theatre staff. The whole of the reseating throughout the house has been done by Messrs. SHOOLBRED. The various alterations have added greatly to the comfort of the public and the safety of the building, and the management claim that "this theatre possesses the most comfortable and luxurious amphitheatre in the world."

BUILDINGS AND ENGINEERING WORKS BILL, 1909.

IN the last session of Parliament a Bill entitled the Building Operations and Engineering Works Bill was introduced by the Government, but did not reach the second reading stage owing to the necessity of giving precedence to other important measures which the Government had in hand. A similar Bill has been again introduced in the present session.

The London County Council's Parliamentary committee reported on the provisions of the Bill on November 24, 1908, when the undermentioned resolution was passed:—

"That an amendment of the Building Operations and Engineering Works Bill, 1908, be sought to provide that the work of inspection in the County of London under the Bill shall be carried out by the Home Office in lieu of the Council, or, that if the work of inspection be carried out by the Council, the expenses thereof shall either be reimbursed by His Majesty's Government, or met by fees to be paid by the builder or owner in the same manner as fees for supervision are now paid under the London Building Act, 1894."

In order to give effect to the above instruction a deputation, consisting of the chairman, Mr. Felix Cassel, K.C.; vice-chairman, Mr. Stuart Sankey; the chairman of the Building Act committee, Mr. Frank Goldsmith; and Mr. St. John Morrow, the chairman of the works committee, waited upon the Right Hon. Herbert Samuel, M.P., the Under Secretary of State for the Home Department, on February 16. Mr. Felix Cassel, K.C., stated on behalf of the deputation the views embodied in the report of November 24, 1908, and in the resolution above referred to.

Mr. Samuel, in reply, expressed his sympathy with the anxiety the Council felt in a proposal which was likely to lay additional charges upon it, but felt himself unable to consider any of the alterations asked for by the Council except an amendment to enable the Council to employ the district surveyors as inspectors to carry out the provisions proposed by the Bill.

The work of inspection under the Bill would be a matter of the utmost difficulty; buildings would have to be constantly inspected and the costs would be very great. The superintending architect has intimated that this cost would probably amount to at least 10,000*l.* a year, and the Parliamentary committee feels that this amount might be very largely exceeded.

The administration of the Factory Acts has hitherto been and is a national charge even so far as those Acts relate to buildings. The present Bill is, the committee argue, merely an extension of the principle of the Factory Acts, and they consider that the expense ought to be met out of the National Exchequer and not out of local rates. They therefore recommend:—

"That an amendment be sought in the Buildings and Engineering Works Bill, 1909, to provide that the expenses incurred in carrying out the provisions of the Bill be defrayed out of the National Exchequer and not out of the local rates as provided by the Bill."

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ENGINEERING PLANT AT POOR-LAW INSTITUTIONS.

IN October 1907 Mr. John Burns, M.P., appointed Mr. A. Belmore Lowry, Mr. B. Taylor Kitchin, F.R.I.B.A., and Mr. H. Ross Hooper, M.Inst.C.E., as a departmental committee to inquire and report:—

(1) As to the machinery for lighting, heating, laundry and other purposes installed at some representative Poor-law institutions in London and elsewhere; as to any matters incidental to the running of the machinery, including the classes, numbers and remuneration of the officers employed; and as to the way in which Poor-law institutions compare in these respects with other places where such machinery is in use. (2) As to the most economical kinds of machinery which may be installed for these purposes at Poor-law institutions, regard being had to cost of running and efficiency of service as well as to cost of purchase, and to any special considerations attaching to particular classes of institutions; and (3) as to the classes, numbers and remuneration of the officers required, and as to any other matters incidental to efficient and economical administration where such machinery is in use.

In the course of their report, which has now been issued, the following valuable suggestions (which are applicable to other institutions besides those immediately dealt with) are given as to machinery and plant:—

General Considerations.—At many institutions the engineering arrangements have not been well designed. In many cases, also, plant in excess of requirements has been installed. Sometimes the explanation may be that the plant has been installed to provide for future developments. But even where this is so, the expediency of making such provision is doubtful, especially having regard to the increased cost of running plant which is larger than is required. The cost of generating electricity, for instance, may be very materially increased if the generating plant has to be run at a low load-factor. The special characteristics of an institution—such as its size, the purpose which it is to serve, the local conditions in regard to fuel, water and light—are factors of such importance in determining what plant should be installed as to render it impracticable for the most part to make any but tentative and conditional suggestions in respect of the kind of plant most suitable for Poor-law institutions. Moreover, in seeking to arrive at general conclusions the committee have found themselves seriously handicapped by the scarcity of continuous records at Poor-law institutions. In the absence of the material which records should supply for comparison of the efficiency and cost of different plants or systems, it is difficult to judge confidently of their relative advantages. It should also be recognised that, where improvements are so frequent as in engineering, no system of determining or supervising the installation of plant can be satisfactory which does not provide means for keeping abreast of the latest knowledge and experience. Subject to these necessary qualifications, however, the committee think it will be of service if they set out some of the conclusions on particular kinds of plant to which they have been led by the information gained during their investigations. As regards engineering plant generally, the committee have been strongly impressed with the desirability that it should be as simple as possible. There has undoubtedly been considerable waste in places, and the more elaborate the plant the more as a rule the opportunities for waste. So many different kinds of plant are required at a large institution that for economy and efficiency of working it is undesirable that there should be any undue elaboration of any part of the plant. Where inmates are employed in connection with the plant there is still greater reason why it should be as simple as possible.

Steam Boilers.—Lancashire or Cornish boilers are the most suitable types. They are simple in design and do not require special skill for their working or maintenance. Water-tube boilers are not recommended for institutions, and vertical boilers, while they may be suitable in certain cases, should not as a rule be adopted for permanent work. Where electrical generating plant is to be installed, high-pressure boilers, to work generally at not more than about 120 lb., will be necessary, but where steam is not required for electrical generating plant a higher pressure than about 70 lb. should ordinarily not be needed.

Mechanical Stokers.—Evidence was given by Mr. Hatch, engineer-in-chief to the Metropolitan Asylums Board, of economies effected at institutions under his supervision by the use of mechanical stokers. He stated that he had not in any case been able to reduce the staff by using these appliances, and that the economies had been effected by the use of cheaper fuel. He also commended the use of mechanical stokers as tending to reduce smoke. Local conditions are important in determining whether mechanical stokers will prove economical, and therefore they should not be adopted without thorough investigation. Where their use is desirable care is needed in the choice of a mechanical stoker adapted to the particular circumstances of the case and in proper regulation of its working. Further, with careless handling the expenditure on repairs and renewals may more than neutralise any pecuniary advantage which might otherwise be gained from the use of such appliances.

Economisers.—In order that the waste heat from the boilers may be utilised and the temperature of the feed-water be raised, it is desirable to instal an economiser where there is large central boiler plant. But the use of economisers should only be adopted on skilled advice and only at places where there are competent engineers to look after them. The quality and degree of hardness of the water to be used as boiler-feed should also be taken into account in determining whether an economiser should be installed.

Chimney Shafts.—In some instances which came under the notice of the committee there was not sufficient draught. Where the draught is insufficient there may be frequent trouble from smoke, or perhaps only a costly coal can be burnt, or mechanical draught has to be introduced. Chimneys should generally be built of sufficient size to admit of the burning of low-grade fuel without the use of mechanical draught.

Heating.—Large institutions are generally heated by hot water or low-pressure or atmospheric steam and by open fires or stoves. The hot-water system has much to commend it, and it was stated that, as compared with steam, on account of the lower temperature, there is less loss by radiation in transmission and less need of protecting pipes and radiators lest children or other persons be burnt; that joints, valves and fittings are less costly to maintain; that, especially when the hot water is supplied from a central source, the corrosive action of condensed water on iron pipes is largely avoided, as also is the risk of waste from steam traps; and that, for these reasons and others, the hot-water system was more economical and the life of the plant longer. It was asserted, on the other hand, that for some institutions steam is the less costly and that the readier control of temperature possible with a steam system is an advantage. The committee do not find it practicable to pronounce upon the relative merits of the different systems as applied to Poor-law institutions with the data they have been able to obtain. The want of adequate records at these institutions leaves them unable to form an approximate estimate of the relative cost of the different systems. They hope that the measures which they propose will gradually result in the accumulation of valuable information on this subject. More attention should be directed to the use of economical types of grates or stoves. Open fires are used more than should be necessary. In the main wards of infirmaries, for instance, there are often in use two or more large stoves, in addition to a system of heating by hot water or steam. Such duplication of heating necessarily adds to the cost of maintenance. Mechanical systems which combine heating and ventilation, while they may be adapted for some special cases, do not appear to be generally suitable for Poor-law institutions.

Calorifiers.—Calorifiers should be centralised as much as possible. They should be such as admit of being easily cleaned, especially those used for heating domestic hot water, since the deposit of scale rapidly reduces their efficiency. The necessity of facilities for cleaning is often overlooked at present. At one institution visited by the committee the calorifiers had just been cleaned for the first time in eight years and thick scale of adamantine hardness had to be removed. Calorifiers are sometimes so inconveniently placed that cleaning becomes a formidable process. It is also important that the use of steam in calorifiers should be carefully regulated. If this is not done, there may be considerable waste of steam and consequent increase in the consumption of coal.

Water Supply.—Many Poor-law institutions have their own artesian wells. Where potable water has been obtained at reasonable capital expenditure the cost of the supply from the well should ordinarily be less than the cost of a public supply, but at present records of cost are generally wanting. Rain water is very valuable for use in boilers and in the laundry, yet is frequently allowed to run to waste. It should always be collected when a clean supply can be obtained at small cost, and even when it is too dirty for use in the boilers or laundry it may be worth while to collect it for other purposes. Condensed water is even more

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valuable than rain water, for it is not only soft, but also retains a high temperature, which can be given to cold water only at the expense of fuel and plant. Nevertheless, it is often allowed to pour into the drains, though a little thought would show that it would be as wise to pour away money. Any designing of building and plant which, unless there are very exceptional circumstances, does not provide for the return of condensed water is self-condemned. When the water contains oil or grease these must be separated before the water can be used again. When this is impracticable endeavour should be made to utilise the heat in the contaminated water before it is allowed to pass into the drains.

Exhaust Steam.—In connection with the use of condensed water may be mentioned that of exhaust steam. At many institutions visited by the committee a strong head of steam was blowing unharnessed to atmosphere, and frequently live steam was being raised for purposes for which the exhaust steam could have been used. With properly designed plant it should be possible to utilise practically all exhaust steam. In an institution where electricity is generated the exhaust from the engines may be sufficient to do all the heating required, including the heating of the domestic hot-water supply.

Water-softening.—Soft water is of great importance for boiler-feed and for use in the laundry. Rarely, however, should it be necessary to soften water if proper use is made of condensed and rain water. At one place visited by the committee, which had not long been built, extensive softening plant had been installed which would have been quite unnecessary had provision been made for the use of condensed and rain water. In the few cases where softening is advisable care should be taken that the apparatus is not larger than is necessary to deal with the water which it is essential to soften. It appears unnecessary as a rule to soften the water to be used for drinking and ordinary domestic purposes. The efficiency of water-softening plant requires more careful and regular testing than seems generally recognised at Poor-law institutions. Where the water used for boiler-feed is hard, chemical compounds are frequently used. The evidence received by the committee goes to show that the utility of such compounds varies unaccountably, and there is little doubt that at present much money is thrown away by want of proper discrimination in this matter. It is generally agreed that it is better to soften water before it is used as boiler-feed than to attempt to treat it inside the boilers. The committee were informed by one witness that he had found a special kind of graphite paint of remarkable efficiency in preventing the formation of scale even when the water was very hard, and that the use of boiler compounds and of water-softening plant was thus rendered unnecessary.

Lighting.—The number of institutions where gas is produced on the premises is small; those where electricity is generated are more numerous; but as a rule light is obtained from a public supply. Electric lighting is generally considered to have advantages over gas lighting for institutions, but a saving in cost for illuminating purposes alone is not usually counted among those advantages. Evidence was, however, submitted to the committee of economies effected in cost of lighting by the substitution of electricity for gas. It was not contended that light for light electricity was cheaper. The saving was attributed to the readier facilities for controlling the use of electricity. It appears to the committee, however, that much more care can be exercised in controlling the consumption of gas than is at present often the case, and that sufficient advantage has not been taken of the opportunities of economising by the use of incandescent mantles. On the whole, it does not seem to them that there is adequate evidence to justify the substitution of electricity for gas at institutions where gas is already in use. At new institutions the question is more open and depends largely on local conditions. Where electricity is installed consideration should be given to the use of metallic filament lamps, which consume much less current in proportion to the light given than carbon filament lamps.

Generation of Electricity.—The investigations of the committee have led them to the conclusion that when electricity can be obtained from an outside supply at a reasonable price the generation of electricity should not be undertaken. When the generation of electricity is undertaken more care is needed in determining what plant should be installed than has been exercised in the past. In many instances the plant is excessive. It is obvious that in these cases sufficient judgment was not exercised in installing the plant. The maximum load for an institution is not difficult to estimate. As already stated, excessive plant involves not only waste of capital, but also waste in cost of running, and the latter is even more serious than the former.

Battery.—The conditions at Poor-law institutions where there is generating plant frequently make the installation of a battery advisable, so as to avoid running the plant twenty-four hours a day. In determining whether a battery should be installed, it is important to consider (1) whether without a battery the generating plant would have to be run at a very low load-factor, thus materially increasing cost of generation; (2) whether the continuous running of the plant would necessitate increase in staff; and (3) whether with continuous running the exhaust steam could always be profitably used. Where a battery is installed care is needed that the size is in accordance with the requirements of the particular case. In some cases batteries have been discarded within a few years of installation. This suggests that in some of the instances at least they have not been properly handled. The management of a battery does not require very special skill. What is mainly needed is strict observance of the instructions of the makers. It is desirable that a contract, in terms free from ambiguity, should be entered into with the makers for the maintenance of any battery installed by them.

Laundry.—The investigations of the committee show that there is a tendency to instal excessive and too elaborate plant. The National Association of Workhouse Masters and Matrons gave evidence to the like effect. There also appears to be want of method in the use of machinery, two or more washing machines, for instance, being used at once where one would suffice, and much waste in the use of material. These defects are largely due to want of intelligent direction on the part of persons in control. Where sufficient inmate labour is available there should be little plant, and what there is should be as simple as possible. It seems probable that in this branch of work machinery has superseded hand labour to a greater extent than is necessary where inmate labour is available. As the National Association of Workhouse Masters and Matrons pointed out, with proper administration male inmates as well as female may be employed in the laundry. Separate infirmaries as a rule have their own laundries. The necessity for this practice is very doubtful, and it appears to the committee that the presumption should always be that the washing for the infirmary should be done, wholly or in part, at the workhouse. The committee were informed that difficulties arise when this plan is adopted, that complaints are made that articles are lost or not properly washed or not promptly returned. Such difficulties are not insurmountable and should not stand in the way of obvious economy. Separate laundries for officers are not infrequent. They are not necessary. Separate machines, if thought desirable, can be set aside for the officers' washing. A steam engine seems the most economical form of motive power for the laundry machinery, seeing that live steam has to be brought to the laundry for washing purposes. The exhaust steam from the engine can be utilised for heating water for the laundry and for drying clothes, and in some cases for other purposes as well. Care should be taken that not more machines are being driven at any time than are actually in use, a simple precaution which is not always taken. The laundry plant should be periodically inspected by the engineering staff, so that defects may be promptly remedied. With regard to the design of the laundry, one large room, with glazed partitions, where partitions are necessary, makes for economy, both in construction and administration.

Kitchen.—Apparatus of special design should not be necessary; the standard patterns and sizes should be sufficient. Too much use appears to be made of gas ranges and stoves and ovens, and not enough of ranges and ovens heated by coal or coke, which are generally more economical, especially ovens heated by coke. The officers responsible should be required to adopt the most economical means of cooking, and more systematic check is needed. For economy, ward kitchens should be restricted as much as possible. At present they undoubtedly add very materially to the cost of maintenance at many infirmaries. A small gas range or stove should usually be all that is required, provided that there is a supply of hot water.

Lifts.—There appears to be a tendency to put in too many electric or hydraulic lifts and to use them more than is necessary. It is not sufficiently recognised that every time a lift is used expense is incurred. The water used for hydraulic lifts is frequently allowed to run to waste.

Engineer's Workshop.—All ordinary engineering repairs at the larger Poor-law institutions should generally be done by the staff.

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THE ARCHITECTURAL ASSOCIATION.

A MEETING of the Association was held on Friday evening last at Tufton Street, Westminster, Mr. Walter Cave, president, in the chair.

The HON. SECRETARY said the fifth spring visit was fixed for March 13 to the Horseferry electricity generating station, Millbank, by permission of Mr. C. Stanley Peach.

It was also announced that an A.A. play, entitled "The Rise and Fall of Architecture," would be given on March 24 and 26 (smokers' night).

Messrs. D. A. Brodie and K. A. Cockrill were elected members.

On the motion of the PRESIDENT, a vote of condolence and sympathy was passed to the widow and family of the late Mr. Cole A. Adams. The deceased gentleman was president of the Association in 1883-5 and one of the trustees of the prize fund.

A cordial vote of thanks was passed to Mr. J. E. Franck for the gift of a drawing showing plans of English and foreign cathedrals on the comparative method.

Proposed House List, Session 1909-10.

President.—Mr. Henry Tanner, jun.

Vice-Presidents.—Messrs. F. Dare Clapham and C. Wontner Smith.

Ordinary Members of Council.—Messrs. G. C. Horsley, H. A. Hall, A. Keen, W. Cave, G. G. Scott, F. Winton Newman, Sir A. Brumwell Thomas, H. Field, P. W. Lovell, G. Drysdale, F. C. Eden, R. F. Atkinson, B. Greig, M. G. Pechell, H. Passmore, C. W. Ferrier, J. H. Squire (nine to be elected).

Hon. Treasurer.—Mr. Henry T. Hare.

Editor of "The Architectural Association Journal."—Mr. G. L. Elkington.

Hon. Librarian.—Mr. Percy May.

Hon. Secretaries.—Messrs. Maurice E. Webb and Edwin Gunn.

Hon. Assistant Librarians.—Messrs. A. J. Perrin and W. D. Cathcart.

Mr. JAMES WILLIAMS read a paper, illustrated by drawings and lantern slides, entitled—

George Devey and His Work.

He said:—At the outset I feel that some apology is due to you for the discursive nature of this paper, written as the various subjects occurred to one, but with a strong feeling



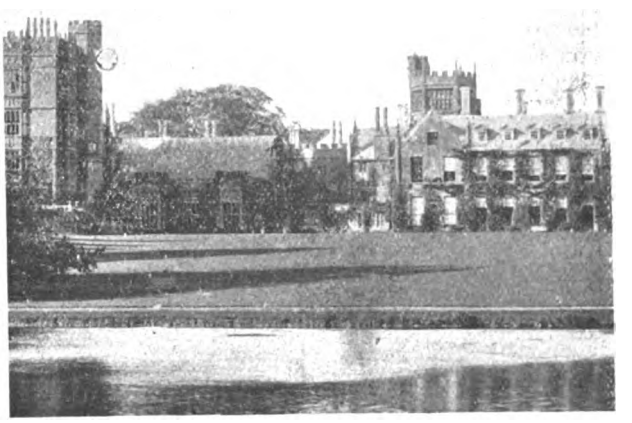
of inadequacy in doing anything like justice either to our good friend George Devey or to his beautiful work. At the same time it is a great pleasure to know that although he passed away many years ago, there remains a real appreciation of the man and his work, and if you only could have known him personally you would agree how natural and deserved that appreciation is.

George Devey was born in Dorset Place, Kentish Town, London, in the year 1820. His father was a solicitor practising in Ely Place, Holborn, where for some years he lived with his family. A man of the highest honour, he was greatly esteemed by his clients, both as friend and solicitor. Of sound judgment and marked ability in his profession, the son had a sincere regard for the memory of his father, and considered him an entirely unselfish, painstaking and devoted servant of his clients.

It was some extraordinary services, rendered to a needy client, that in the end secured for our friend an introduction to a distinguished man, resulting in the foundation of the young architect's practice.

One need hardly say that the early life and associations of such a man are always more or less interesting and important, having a good deal of influence on the formation of character. How much is involved in the fact that the father was a man of the highest honour. Let me mention as an illustration the case I have referred to as showing the atmosphere surrounding the early life of George Devey.

A gentleman, the reverse of rich, had been recommended to consult Mr. Frederick Devey, the solicitor (and father of our friend), with reference to the recovery of some property which had almost been given up as lost—partly on account of the lapse of time and the difficult tangle into which things had got, and partly because the client was poor. However, after endless investigation, with little chance of payment, the faithful solicitor succeeded in recovering a large estate, which put the needy client into very comfortable circumstances. His gratitude was great, and he took every opportunity of recommending and introducing George Devey wherever there was any chance for the young architect. As



a result Lord Hardinge became one of his first clients. This was the commencement of his professional work, and it was with natural pride that Mr. Devey would narrate the interesting and romantic story redounding so much to the honour and credit of his father.

In course of time the conscientious and painstaking work of the young architect over little things, together with his natural ability, refinement and attention to all the wishes of his client, so impressed the noble lord that he soon gave him more important commissions and went out of his way to find work for him. And he took a pride in showing his friends the drawings and sketches which he had asked the young architect to send him for that purpose. This circumstance, as well as the natural conviction which Mr.



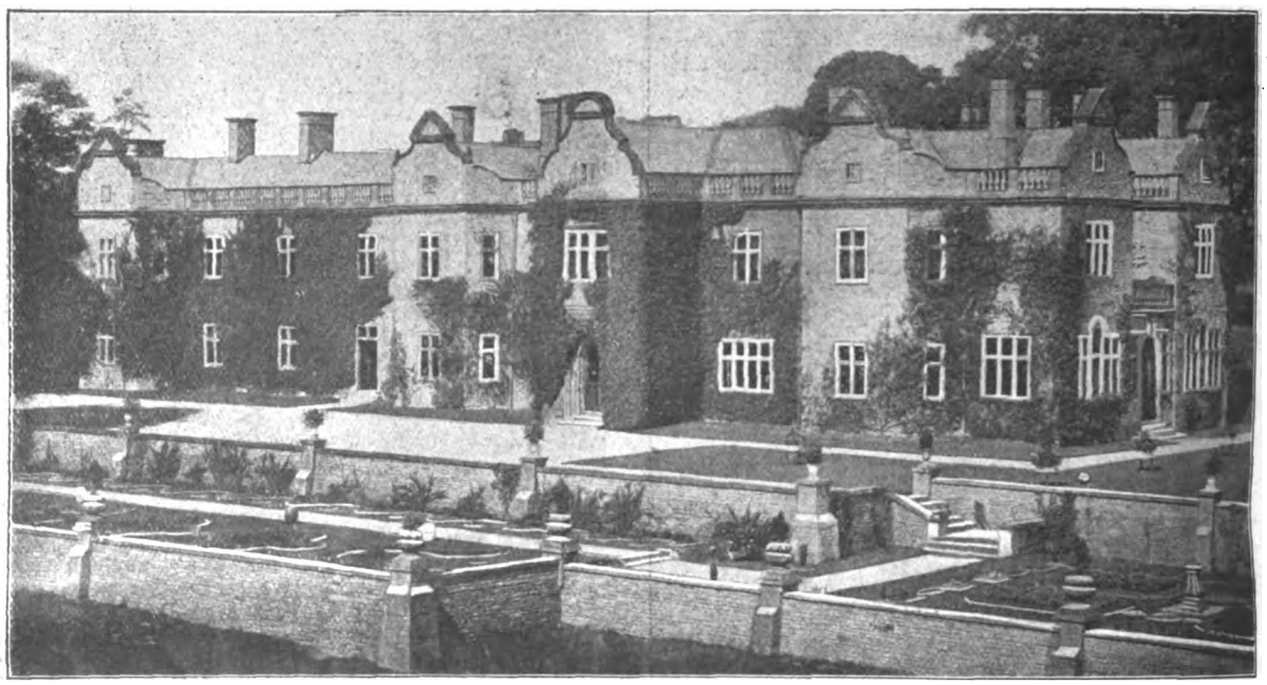
Devey always held, led him to impress upon young men the importance of doing justice to and taking pains over the smallest commissions.

We know nothing of the childhood of George Devey, and he used modestly to say that he was never considered to be a very capable youth. From Kentish Town, when the children grew up, the family removed to Ely Place, Holborn, in order that the boys might go to King's College School. Mr. Devey seldom spoke of his schooldays, but the impression left is that the time there must have been somewhat irksome to anyone of his temperament. He was well grounded in Latin and French, which he could speak with fluency. After he left school we hear of serious discussions

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as to whether he should follow the artist's or the architect's profession. He preferred the former, and from childhood had shown distinct ability in that direction. There is an impression that for a time he worked under J. S. Cotman and J. D. Harding, for whom he had a great regard, being influenced chiefly by Cotman. The earliest sketches about this period show great care in details, though they are somewhat formal according to the manner of that time. But his father and all his friends were against young Devey being an artist, for in the early part of the last century it was hardly thought of as respectable enough to be classed with the professions.

Eventually it was decided to article him to a Mr. Little, an architect and surveyor; at that time there were few men practising only as architects. Mr. Little appears to have had a small practice of a Classic character, and the young man must have had rather a dull time. We hear of surveyors' dilapidations and of the monotonous calculations involved in quantities. There are various detail drawings also showing conscientious work. Although all this sounds very uninteresting, especially to anyone of his taste and ability, we can at the same time quite believe that it was in some ways a valuable grounding. The most important thing he did in conjunction with his master was the designs for a new church—St. Mark's, Primrose Hill. Of these there were a number of drawings showing marked ability, especially when we think to what a low level architecture had sunk at that time, and it is the more remarkable when we remember that this work of his was almost before the Gothic revival had made any headway. In such an office and in such an age, how he acquired the true character, feeling and details of Gothic work is difficult to say, except by the unerring intuition of the artist and the revival then just starting, in which he must have been one of the first to participate.



Brantingham, Yorks.



After leaving Mr. Little he went on a Continental tour with his friend and fellow-pupil, Mr. Coutts Stone, going through France and Italy to Athens. In those days, when railways were few, it was a considerable undertaking, but it naturally allowed more time and convenience for observation and sketching. This our friends enjoyed to the full. There are not many drawings left of this tour, but what remain are exceptionally good, especially those made in Venice and Athens. They show, as do all his sketches, both in choice of subject, in composition and in refinement of execution, all the best characteristics of the true artist.

Although he would draw upon anything that came to hand, he was particular about paper and pencils.

There used to be in the Penshurst folio a beautiful little tinted drawing done on blotting paper, and there was an exquisite sketch of a hooded waggon, with six horses, done on a piece of the *Pall Mall Gazette* at six o'clock in the morning in Oxford Circus. Drawing and good music were things he never tired of, and the former was his chief resource in times of illness. He was never a strong man, though he enjoyed fairly good health, considering the active and arduous life involved with a large practice and works all over the country.

It was in the Penshurst country where his first business engagements commenced about 1850, and he continued going to and fro to the year of his death, as friend and architect. Lord De L'Isle was one of his first clients and remained all through to his decease. The restoration and repairs at Penshurst Castle were begun about 1850; the place had been very much neglected and the work was many years in hand, together with lodges and new cottages about the estate. Some of these have often been photographed as old buildings. The greater part of the work was done by an interesting and independent old character, an excellent type of the yeoman-farmer and builder combined, who used to talk to his lordship and Mr. Devey just as he talked to his men. He was well versed in the old methods and did good work. Here, too, were a house and various buildings done for James Nasmyth, of steam-hammer fame, who was a personal friend and always proud to show his visitors the boots he had kept when, as a workman, he tramped the country. Not far off is Hall Place, a large mansion and stables, built for the late Mr. Samuel Morley. Perhaps there are the most numerous examples of Mr. Devey's work in this county and the Aylesbury district, where a great variety of work was done on the Rothschilds' estates.

The journeys with Mr. Devey were always delightful. When the day's work was over he would saunter round an old town or village finding features, examining old buildings, making sketches or hunting up old furniture shops. He had a keen sense of humour, and the sparkling sallies of wit, cheery banter and quiet sarcasm often turned business into pleasure. He had a commanding and distinguished presence, with a generous and kindly manner, shown to workman and client alike, as befitted the gentleman he was.

In going over buildings, when things had gone wrong through carelessness, he would try gentle, or sometimes severe, sarcasm, as the case required; but when deception was met with, although he never lost his temper, his indigna-

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tion made itself felt with all the more force. To a foreman making the lame excuse for indifferent work that it could never be seen, he said:—"What, not seen? I should be ashamed for the birds to see it." He never would hurry over inspections and instructions to foremen, and many were the hairbreadth escapes in catching the last train, and there were times when clerks of works and foremen wished that he had not been so devoted to his work. He always liked to call himself a working man, and often regretted that there was no badge for us to wear in common with all workmen, showing the sympathy he had with all honest labour. One reason he gave was that when out driving on business workpeople along the road might see that we were not out merely for pleasure. He had a wholesome contempt for all idle people of whatever station in life. He was fastidious and particular, but only in the way that all right-minded men are. He hated the dress-coat and Sabbatarian black, and liked homespuns and quiet-coloured shirts, not white linen. He delighted to draw carriages and spanking horses coming up to an entrance. He hated all shams and complications and loved simplicity. He was full of resources, ingenuity and invention. An old foreman, who for years followed him about on works, used to say with pride that you could never get him into a corner; he always fought his way out, and many were the difficult problems that he would save for solution. Mr. Devey had a great liking for the simple and natural modes of honest country work away from town influences—those sound, traditional ways of doing things that had descended from good men and old times. In the office everyone felt it a pleasure to work under him; his kindness was unfailing, and it was delightful to see the interest all had in looking at the revised plans and the dainty sketches for work done by him overnight.

(To be concluded.)

WESTMINSTER ABBEY AND FIRE PROTECTION.

THE architectural profession will always be the first to welcome any manifestation of a lively and intelligent public interest in our national monuments. It is perhaps inevitable that this awakening should sometimes display itself in ways of solicitude as well as in those of pride. One of the anxieties that must ever be present is the normal risk from fire; and it is on this danger that the imagination most easily fastens, even more readily than on any possible instability. Londoners may well have an instinctive terror of it, for their ancestors in the seventeenth century were struck down by the Great Fire, and since then the thought of its recurrence can never have entirely faded from their apprehension. The only too frequent conflagrations that are constantly bringing heavy loss to London must keep alive that dread.

In a recent article in *The Architect*, attention was drawn to the fact that some of the most important public buildings in the metropolis were not protected as fully as they might be if advantage was taken of the resources available, and in particular of the hydraulic mains which with their pressure of some 700 lb. per square inch lie at their very doors. Special stress was laid on the unprepared condition of St. Paul's, which is hemmed in by warehouses, filled for the most part with highly combustible materials, and whose dome from its great height needs more protection than can be ensured by the ordinary water supply.

This article aroused some interest. In our own issue for February 26 we published a letter from Mr. Killingworth Hedges, M.I.C.E., the hon. secretary of the Lightning Research Committee, in which comment was made in this connection about Westminster Abbey. The arrangements were condemned as "antiquated and deficient." Mr. Hedges described them as follows:—"The water supply for the hydrants in the triforium comes from a tank in the south-west tower, which has to be kept filled by a manual pump, worked by, say, a dozen men, and with relief, eighteen would be required. Suppose a fire was to take place in the night, there is probably not more than an hour's supply in the tank, and how the men are to be quickly assembled at a short notice is problematical."

In view of the gravity of the situation thus suggested the Dean and Chapter made an exception to their usual rule, and courteously invited us to send a representative to the Abbey, who could make a thorough inspection of the measures taken for coping with any outbreak of fire, and so be able to remove any wrong impression that might have been created by our correspondent's letter if his facts proved inaccurate. The offer was at once accepted, and our representative was met by Mr. Arthur G. Wallace, the assistant architect, who has been connected with the Abbey works for several years, and who had been deputed to give all possible information. Our cicerone spared no pains to demonstrate how seriously the Dean, Chapter, and everyone concerned regard their responsibility for protecting the historic building.

The letter we published is so far correct in its statement that there is a tank in the south-west tower which is filled by a hand-pump, and also that this tank does not contain more than an hour's supply. The tank, which is always kept filled, is actually 16 feet by 16 feet by 4 feet, and holds 6,000 gallons. But in the first place it is not necessary in order to refill it to achieve the difficult task of collecting a dozen or eighteen men to work at the manual pump. The tank certainly can be, and is, filled by means of that pump; but it is also directly connected with the water mains under the grass by the north-west tower, and can be filled directly from them. In the event of an outbreak a summons would be sent to the fire station, which is in close proximity to the Abbey, and the first action of the brigade officers would be to pump water from these mains into the tank, if the supply had become exhausted. Or water may be pumped from another hydrant direct into the pipes under the roof. Consequently there are, as a matter of fact, two unlimited supplies of water, either or both of which would be brought into use a quarter of an hour at the outside after the alarm was raised, and more probably within five minutes. It may here be mentioned that it is possible to throw a stream of water from the ground level on to the roof.

Obviously there would be little use in having all this water unless it was properly distributed throughout the Abbey. That this has been done as thoroughly as could be desired by the most exacting "protectionist" was forcibly brought home to us in a highly interesting perambulation in little-known parts of the Abbey, reached through unexpected doorways. It commenced by an ascent up a steep winding staircase to the triforium. Here there are twelve hydrants at regular intervals, with hose attached, and everything ready for instant use. In the north-west corner of the triforium is the manual pump to which reference has already been made, and which could be disconnected in case of an emergency. There is direct communication with the fire station by means of three telephones, one in the nave, another in the triforium, and the third in the roof. The greatest possibility of an outbreak, perhaps, lurks in the roof, with its timber framing. Here there are no less than sixteen hydrants, accessible either from inside the roof or from the gutters behind the parapet by means of movable covers. To afford greater facilities for immediate use the hose is not coiled, but is folded in lengths. These would produce a deluge of water directly they were brought into play.

Descending to the ground level we passed a double hydrant on the aisle roof looking down on Henry VII.'s Chapel. There are two hydrants in the nave, not including one especially provided to protect the organ, and a double hydrant in the centre of the ambulatory. There are hydrants in each tower, and also in the cloisters outside the chapter-house commanding the library, the deanery, and in fact, in every place where there would be any likelihood of their being of use. To make assurance doubly sure, there has recently been introduced into the main building a number of hand extinguishers. At night the Abbey is patrolled inside by a professional fireman, whose alertness is checked every fifteen minutes by a "tell-tale" clock, and outside by a watchman.

Cases are not unknown where the efficacy of elaborate protective measures have been nullified by carelessness arising from over-confidence. This can scarcely occur at Westminster Abbey. Every six months there is an inspection and report by officers from the London County Council Fire Brigade, and it would be difficult to imagine more trustworthy examiners. That this inspection and report is no empty routine is proved by the fact that the electric light fittings have been brought still more up to date in consequence of the recommendations made in a recent report, as to the best way to minimise their possible danger.

It will thus be seen from what we have said that the Dean and Chapter are fully alive to their onerous responsibility as custodians of this glorious national heirloom. Lovers of Westminster Abbey (and who is not one in a greater or less degree?) can rest assured that no precaution that may be considered necessary will be omitted. Gratitude is due to those who have done all this for the safe keeping of London's richest jewel.

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ARCHITECTS' BENEVOLENT SOCIETY.

THE annual general meeting of this Society was held in the rooms of the Royal Institute of British Architects on Tuesday last, March 9, Mr. Ernest George (president) in the chair.

The Hon. Secretary (Mr. Percivall Currey) read the annual report of the Council, of which the following is an abstract:—

"The Council in submitting the fifty-ninth annual report have to record a year in which the demands made upon the Society have been exceptionally great. Ninety-nine applications for assistance were received, and in addition to the annuities allowed to eleven pensioners relief was afforded in eighty-eight cases. The income would not have been equal to dealing adequately with so many claims had not the Royal Institute of British Architects increased its annual contribution to 100*l.*, a sum further augmented at the end of the year by 25*l.* The total amount thus distributed in grants and pensions was 1,166*l.* 15*s.* 7*d.*

"Notwithstanding that the year has not been generally prosperous for architects, and that in consequence many subscriptions have been withdrawn or deferred, the Council have the satisfaction to report that there has been no diminution in this source of income, which amounted to 733*l.* 10*s.* Owing, however, to the urgency of the applications, the statement of accounts shows an excess of expenditure of 74*l.* 18*s.* 10*d.*, which will be reduced by the 25*l.* granted by the Institute, but not received at the close of the financial year.

"With regard to the capital account, the amount invested has been increased by the purchase of 150*l.* New Zealand 3 per cent. Inscribed stock. The total amount received in donations was 141*l.* 11*s.* 3*d.* Among the chief contributors were Mrs. Arthur Cates 50*l.*, Mr. John T. Christopher 22*l.* 15*s.*, Mr. Ernest George 21*l.*, and Mr. Arnold Mitchell 10*l.* 10*s.*

"The thanks of the Society are due to the T-Square Club, which contributed 6*l.* 3*s.* 9*d.*, being the proceeds of a concert, organised by Mr. W. J. H. Leverton, in aid of the Society.

"In view of the small number of subscribers—520—as compared with the number of practising architects, the Council would urge on all those interested in the welfare of their poorer brethren, or those dependent on them, the importance of exercising their personal influence in obtaining additional subscriptions.

"The thanks of the Society are due to the proprietors of *The Builder* and *The Architect* for granting space for free advertisements in their valuable journals."

The report and statement of accounts having been received and adopted, a vote of thanks, on the motion of Mr. Scamell, seconded by Mr. Brodie, was accorded to the retiring members of the Council, viz. Messrs. Walter Emden, Reginald St. A. Roumieu, H. Chatfeild Clarke, A. Saxon Snell, and Sir Henry Tanner.

The next business was the election of Council for the ensuing year. Mr. Macvicar Anderson moved, Mr. E. T. Hall seconded, and it was unanimously agreed that the following should be elected:—President, the President of the R.I.B.A.; Vice-Presidents, Messrs. Leonard Stokes, Thomas M. Rickman, and William Glover; Council, Messrs. Lacy W. Ridge, John T. Christopher, J. Douglass Mathews, Wm. Dunn, Henry T. Hare, Benjamin Ingelow, Henry Lovegrove, Rowland Plumbe, William Woodward (President of the Society of Architects), G. E. Bond, Arthur Ashbridge, Charles J. Blomfield, John Borrowman, C. R. Baker King, and Sir Charles A. Nicholson, Bart.

Votes of thanks were heartily accorded to Mr. Hilton Nash, the hon. treasurer, and Mr. Percivall Currey, the hon. secretary, who were both re-elected.

A discussion took place as to the advisability of having a dinner with the view of increasing the subscriptions, but no decision was come to, and the matter was allowed to stand over for further consideration.

The remainder of the formal business of the meeting comprised unanimous votes of thanks to the retiring auditors, Messrs. Greenop and Burke-Downing; also to the R.I.B.A. for use of rooms, and to the chairman, Mr. Ernest George.

The General Purposes Committee of the Marylebone Borough Council recommend, with a view to the provision of a suitable town hall, that an architect be engaged, at a cost not exceeding 100 guineas, to prepare a report and sketch plans relating to the suitability of various sites and the probable cost of erecting a new town hall.

GENERAL.

The Royal Institute of British Architects have now under consideration the conditions in the competition promoted by the London and South-Western Railway for a concert hall at Eastleigh, near Southampton, and the committee request the members to communicate with Mr. Ian MacAlister, secretary, before completing their design.

Mr. James Neale, F.R.I.B.A., F.S.A., of 10 Bloomsbury Square, W.C., architect and surveyor, left estate valued at 63,456*l.* gross, with net personalty 31,075*l.* He gave his drawings relating to the Cathedral or Abbey of St. Albans to the Dean and Chapter of St. Albans. His drawings relating to Canterbury or Canterbury Cathedral to the Dean and Chapter of Canterbury, and failing the acceptance of these bequests by either of these bodies, these drawings are left to the library of the Royal Institute of British Architects. And he bequeathed 1,000*l.* to the Royal Institute of British Architects for a travelling studentship in architecture, for the study and measuring of old buildings, or such other purposes as the Institution may decide.

Mr. William Milner Fawcett, F.R.I.B.A., F.S.A., of Cambridge, architect, formerly county surveyor for Cambridgeshire and surveyor for the diocese of Ely, left estate valued at 23,704*l.* gross, with net personalty 21,144*l.* He gave 100*l.* to his clerk, Arthur William Addison.

At a Public Meeting held at Burton-on-Trent last week it was agreed "that a personal memorial to Lord Burton should be erected to commemorate his long life of public service and open-handed generosity to the inhabitants of the town, and that the most suitable form of memorial is a full-sized statue, to be erected in King Edward Place." King Edward Place is the open space in front of the town hall, and in this immediate neighbourhood it is estimated that Lord Burton and his father expended between them 200,000*l.* on public buildings.

The St. James's Hall, Manchester, is shortly to be demolished. Plans are being prepared for an immense building which is to be erected on its site for the Calico Printers' Association, Ltd. The area of the site exceeds 6,000 square yards, and it is said that the new structure will be the second largest self-contained building in Manchester.

Mr. Jesse Horsfall, architect, Chapel Walks, Manchester, has prepared plans, which have been accepted by the Todmorden Town Council, for the erection of a secondary school on what is known as the Stile Estate. The estimated cost is 9,068*l.* The school is to accommodate 240 students.

A Memorial is to be erected in the Forbury Gardens Reading, on the site of the Abbey Church, as a memorial to King Henry I., who founded it in 1121 and who was buried there in 1136. The memorial has been designed by Mr. W. Ravenscroft, F.S.A., and consists of an Early English cross, in silver granite, 20 feet high, with mouldings appropriate to the Plantagenet period, and an inscription recording the burial of the king in the Abbey Church at Reading.

Mr. Joseph Holt, A.R.I.B.A., 9 Albert Square, Manchester has been appointed architect of the secondary school to be erected at Coalbrookdale by the Shropshire Education Authority on the usual terms.

The Members of the Edinburgh Architectural Association under the leadership of Mr. Ramsay Traquair, paid a visit to the Royal Scottish Museum in Chambers Street, Edinburgh, on Saturday. Important rearrangements have recently been carried out in the art collections of the museum. The great central hall is now devoted to architecture and the allied arts. The collection of Greek sculpture has been very much enriched, and now includes fine examples showing the growth of the style. The most important architectural examples are the interesting "Treasury of the Cnidians," from Delphi, and the great Ionic order from the Mausoleum. The progress of Mediæval art is represented by a series of casts from Celtic, Norman and Mediæval examples, including the fine figure of Christ from Amiens Cathedral. Examples of the Early Italian Renaissance are shown at the western end of the hall, and include a number of fine original examples, and some large models, including the "Paradise" of Isabella and Este. The furniture has now been rearranged in the north-western hall, and includes a large collection of wrought-iron work.

The Walsall Town Council on Monday agreed, by a majority of one vote, that in order to meet the increasing demand for current certain additions be made to the generating station, a new sub-station be provided in the centre of the town, and the system extended to Bloxwich, at an estimated total cost of 35,000*l.* Mechanical stokers are to be purchased at the electricity works at a cost of 2,143*l.*

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The Architect.

THE WEEK.

MEMBERS who attended the meeting of the Royal Institute of British Architects on Monday last to hear the paper on "American Architecture," by Mr. FRANCIS S. SWALES, naturally derived their chief pleasure from the contemplation of the illustrations of the modern work of our American colleagues, and could not fail to be impressed with the marvellous improvement that has taken place since RICHARD MORRIS HUNT and HENRY HOBSON RICHARDSON demonstrated by their work the advantages of a Parisian training, and so set the fashion for the present generation of American architects. The excellence of modern American architecture is overwhelming evidence of the value of the French system of architectural education as carried on in the ateliers and Ecole des Beaux-Arts of Paris. It has been alleged that the academic character of French instruction would be prejudicial to the peculiar merits of our native architecture and inimical to the idiosyncrasy of the British artist, but our American cousins are sufficiently closely related for us to feel sure that what suits them will suit us, and that on both sides of the Atlantic there is sufficient verve and originality in our characters to ensure good results from training on Parisian lines, and to allay any fear that academic methods would depress rather than elevate the standard of our achievements. Modern American architecture, or at any rate the best of it, is excellent, because it is built upon the sure foundation of sound training. The American architectural student learns in Paris to design architecture, and it does not matter thereafter on what particular phase of style he proceeds to build his own work—Greek, Roman, Renaissance, or even Art Nouveau, he produces something that is architecture, that is art. So valuable has been felt the influence of the French system that the universities and other architectural training schools in the United States have remodelled to a large extent their own curricula to accord with it, and ateliers on the Parisian pattern have been established in several of the American cities. Some years ago Mr. F. T. BAGGALLAY and Mr. W. MILLARD started in London an atelier for architectural students, but the support they received from the young men of that day was not sufficiently encouraging to induce them to continue it. This, however, was scarcely on the Parisian model, although the instruction was excellent and highly beneficial to those who received it.

NORWEGIAN versus British granite is still a topic of the day, and Mr. MCKENNA is still being bombarded with questions in the House of Commons. On Monday last the First Lord's attention was called by Mr. WATT to a reported statement that a Scotch company had offered to supply the contractors for the Rosyth docks with Scotch granite at 13,000*l.* less than the contract price for the Scandinavian granite. We have been making some private inquiries, and have come to the conclusion that the state of the case is this:—The Norwegian quarry owners are more happily situated than British in that the granite quarries of Norway are close to deep water, and stone can be loaded practically from the quarry to the boat that is to convey the granite to Great Britain. Hence the Norwegians are primarily in a position to supply at less cost than the British. On the other hand, for various reasons that often operate in business matters, British quarry owners are sometimes prepared to supply granite at a lower price than the Norwegians. The quality of granite varies in Norway as it does in Britain; there is good and, comparatively, bad granite in both countries. The proper course therefore for architects, in their clients' interests, is to invite tenders from both British and Norwegian firms for any granite they may require before making up their mind which they will use. Price alone, however, must not be the only determinant factor. Samples must be obtained to ensure that all tenderers are on the same basis, and when the decision is made and the order given, care must be taken to see that the stone supplied is in accordance with the sample. To do this requires expert knowledge, and we are not all experts in granite. But there are at least two or three architects of good repute who have made a special study of building-stones and their examination, and who would, no doubt, be prepared to assist their less experienced colleagues with their advice.

THE church at Rome of San Crisogono in Trastevere is of some interest to Englishmen, connected as it is with the names of STEPHEN LANGTON, Archbishop of Canterbury, and Cardinal DA CREMA, Papal Legate in England. It has recently been discovered that beneath the present building is a lower church or crypt, as at San Clemente, but this older work is in this instance mainly outside the limits of the present church, by which it is only partly covered. There has therefore been a change of plan when the present church was built.

IT is an interesting psychological speculation that there may be something in common between wireless telegraphy and telepathy: that as invisible electric waves are transmitted through space by the medium of what, for want of better definition, is called ether, and may be arrested and recorded by suitable receivers, so thought, which is generally now considered to be connected with brain action—that is, activity of matter—may also be capable of initiating wave motion through the ether and of being arrested and recorded by suitable receivers. If this speculation could be reduced to a scientific fact we should then have an explanation of apparent plagiarism in art, often vehemently asserted on one side and as vehemently denied on the other, and could comprehend the phenomena of otherwise apparently inexplicable tendencies and waves of thought in art production. The very expression "waves of thought" which comes to one's mind quite naturally seems to uphold the speculation.

ARCHITECTS with clerical clients frequently find that vicars are oblivious to any necessity for a faculty when contemplating alterations to their churches, and pooh-pooh the idea if their architect suggests such a thing. It it well therefore to bear in mind the judgment given by Dr. TRISTRAM in the Consistory Court held at St. Paul's Cathedral on Friday last, when the Vicar of St. Andrew's, Haverstock Hill, was condemned in costs because he was held to be wrong in making certain alterations in the chancel of the church without a faculty, even if he had the consent of the parishioners. As it is extremely difficult to make alterations, even though they be obvious improvements, to existing arrangements without treading on somebody's corns, architects should always strongly advise an application for a faculty. Nine times out of ten one may never have any trouble resulting from making alterations without a faculty, but the tenth time some cantankerous parishioner—he need not be even an attendant at the church—may bring down the heavy hand of the law, to the vexation and annoyance of the architect and his client, to say nothing of pecuniary loss. It is but fair to note that the vicar in this particular instance feels himself aggrieved, and has expressed his intention of appealing against the Chancellor's decision. But ecclesiastical law is strict and not easy of comprehension by the non-legal mind.

WE are not singular in England in adopting the latest phase of the Renaissance for the motif of twentieth-century architectural design. The "Barock" period in Germany produced some very remarkable works, and it is not therefore astonishing to find modern German architects occasionally utilising their own eighteenth-century work for the basis of their designs. The current number of *Berliner Architekturwelt* illustrates a good example of this treatment in the Viktoria club-house in Berlin by Herr WILHELM WALTHER. Exception might perhaps be taken to some parts of the design; it is always easy to find fault, but there is far more that is admirable and pregnant with valuable suggestion.

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ETHICS OF PROFESSIONAL PRACTICE.

MOST architectural practitioners are we doubt not desirous of carrying on their business in a manner that shall be fair to their colleagues at the same time that it is advantageous to themselves, and also that they themselves may be treated as fairly as they would wish to treat others. There are many practices that arise in carrying on the business of an architect as to which there can be no question of their rightness or wrongness, but there are others as to which there may be legitimate doubt, and still others which though they cannot be stigmatised as wrong may yet possibly be objectionable as transgressions of good form or etiquette in professional conduct.

It would seem therefore to be desirable that a code of professional etiquette should be prepared and promulgated by the Royal Institute to form the standard of conduct to be observed by all decently minded practising architects. Illicit commissions or bribes are unmistakably branded by the statute law, as well as by the declaration that every Fellow and Associate of the Royal Institute has to sign on his election, but beyond this there is very little guidance for the young practitioner. The Council of the Royal Institute has indeed started a code, but at present this only contains two items, and these quite minor points of one question, professional advertising. It is authoritatively laid down that it is bad form for an Institute member to display his name on a board announcing that he is the architect of a building in course of erection, but quite right for him to leave his name permanently on the completed structure as a signature. It is also not etiquette for a member of the Royal Institute to style himself other than "architect" or "architect and surveyor." We presume that this does not bar the use of the letters "F.R.I.B.A." and "A.R.I.B.A." which are empowered by the Charter, but is directed against the coupling of the profession of an architect with that of an auctioneer, estate agent, or undertaker. It is quite true that some prominent members of the Royal Institute have made a considerable part of their income by acting as estate agents, but it is clearly undesirable that this should be publicly thought to be an ordinary or usual function of an architect.

But there are many other varieties of professional advertising that require to be distinguished as good or bad form. Professor Donaldson, than whom probably no more high-minded architect ever existed, laid it down that it is perfectly legitimate and consistent with good taste for an architect to make the fullest use of the professional journals to make himself and his work known; in plain words, to advertise. How far is it consistent with professional etiquette for an architect to illustrate his executed works or his purely speculative designs in the non-professional Press? If the practice is allowable at all it is capable of indefinite extension, and this is, it seems to us, a question that the Council of the Royal Institute ought to consider and determine.

The authority of eminent examples appears to justify the publication of books by architects illustrating buildings erected from their designs, whether monographs or polygraphs. To what extent is the presentation of copies allowable? It would be unreasonable to debar a man from presenting copies to his personal friends and relations. Then surely he might do so to his acquaintances, and why not to his friends' acquaintances until the circle expanded so far that there would be little distinction from the manufacturer's issue of a catalogue? Where is the line to be drawn? Another question for the Council to determine. Again if executed designs may be thus illustrated, should non-executed designs be debarred? For many architects the designs they are capable of making for any particular building are far superior to those they have the opportunity of carrying into execution. Painters and sculptors are not prevented from showing the best that is in them because they have not received a commission to produce it. Why should an architect be fettered? The Royal Academy hangs in its architectural room designs that are never intended to be translated into bricks and mortar. When an architect has received a commission to design a building to cost say 5,000*l.*, is there any objection to his making a design for the same building that would cost 20,000*l.* and showing it at the Royal Academy or in the pages of the professional Press? There is very good precedent for the practice.

The production of literature dealing with technical subjects is recognised as a legitimate method of advertising in such strictly regulated professions as medicine and law, and there cannot be any reasonable objection to the same practice in architecture. Now it is a custom frequently followed by book publishers to include advertisements, sometimes cognate to the subject of the book and sometimes not. How far is such procedure admissible in books written by professional men?

One form of professional advertising that is now almost if not quite obsolete is the publication of business cards in the advertisement columns of the Press. At one time this was quite common in American papers, and it has been seen in some of our own provincial Press, but nowadays it is, as far as our observation goes, limited to naval architects. It is a form of advertising that is of very little real value and distinctly unworthy of a dignified profession.

Advertising is not the only department of professional practice that requires a code of etiquette or ethics. The solicitation of work or touting surely needs regulation or restriction. The exalted ideal of a profession excludes touting in any shape or form; the professional man must wait till he is consulted, and the profession of architecture can hardly expect to be publicly recognised as on the same plane with medicine and law, unless the professional ideal is maintained in the former at least as strictly as in the latter professions. The contention that architecture is an art and not a profession is not improbably weighted with this consideration. A painter or a sculptor produces his goods and offers them in *marché overt*, and if architecture is an art and not a profession the architect can do likewise. If this is to be our position let it be openly recognised all round. If the architect R.A. may follow the example of his compeers who are painters and sculptors it is unreasonable that the country practitioner or the youthful A.R.I.B.A. should be bound in this respect by notions of professional etiquette. But we must accept the consequences. The painter R.A. who offers his picture for sale on the walls of the Academy is as much a tradesman as Liberty or Elkington, and the low esteem in which we learn from Plutarch, Lucian, and other writers the ancients held the social position of artists as renowned as Pheidias and Polycleitos must be accepted by us also. Tradesmen employ travellers and canvassers. May architects do the same? If so to what extent? Excellent architectural businesses have been established by the help of the tactful commercial push of a wife, a cousin, or an aunt. If such assistance from a relation is legitimate, why not that of a friend or that of an employée? Is any line to be drawn, and if so where?

Mr. Ernest George, in one of his presidential addresses this session, hinted that the young architect might build up his business by tactful suggestions to possible clients. Touting, therefore—for such suggestions must be admitted to be a form of touting—has high sanction as legitimate in the business of architecture. Is there to be any limitation and if so what? It might be said that an architect should not tout a total stranger, but acquaintances are easily made and some sort of an introduction is readily obtained. One thing certainly ought to be decreed, that no architect should tout another man's client. And this brings us to another point. It is not an unknown thing for an architect to take advantage of his position, official or otherwise, to oust a brother practitioner from his job. This behaviour should certainly find reprobation in any code of professional ethics.

Another question that requires regulation by code is the position of an honorary architect. Is an architect who poses as "honorary" justified in demanding or accepting payment for expenses, either directly from the

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committee—there is usually a committee when an honorary architect's services are accepted—or indirectly through the contractor? There have been cases where an honorary architect's expenses have amounted to a large proportion of the customary full charges, and it would have been possibly more honourable for the architect to have charged the usual commission and made a donation to the funds, representing the amount by which he really did benefit the undertaking. And this brings us to the question of 5 per cent. Is it unprofessional to accept less or to charge more? We think not, but the position should be clearly defined by the Royal Institute. Trades unionism does not prevail in architecture, and no one can say that every man's services and abilities are of equal value; there cannot rightly, therefore, be one universal scale of pay.

The participation of architects in trading concerns is a somewhat difficult question. How far may an architect be financially interested in the business of those who work for or supply goods to his client under his supervision? An able young craftsman is setting up in business. Would it be wrong for an architect to advance him capital and give him work? It would very likely be necessary for the safety of the capital that the architect should retain a controlling interest in the business—should be, in fact, a partner of the craftsman. How far would this be right or wrong?

Such are some of the points that occur to us as not only worthy of consideration but desirable of elucidation in a code of professional practice, for the provision of which the Council of the Royal Institute of British Architects is the only authority that could be recognised.

STEELWORK.—VII.

By C. V. CHILDS, A.M.I.C.E.

THE plate girder is the girder par excellence for heavy loads and long spans. It can be built up to carry anything that is ever likely to be required in the way of steelwork for buildings. The limit of size is more a question of delivery to and erection at, the site than anything else. Probably the largest that have been erected in London are the curved girders carrying the galleries at the Coliseum, weighing as much as 60 tons each, with a span of 100 feet. The form of these girders is exceptional, as they are not only curved in plan to follow the curve of the balcony, but in elevation as well. In fact, they partake of the arch probably almost as much as of the girder, and are prevented from turning over sideways, as they are naturally inclined to do owing to their shape, by the strength of the connections of the floor girders, which mutually support, and are supported by the plate girder. The girders exceeded the limit mentioned above, and were constructed and rivetted together at the site, supported on falsework.

There is one fault to be found with these girders, and not with these alone, but in other cases also, and that is the excessive thickness of the flange plates; the total thickness of all the plates being as much as 8 inches. Half this amount should be the maximum in total thickness. Flange plates are useless unless their compressive and tensile stresses can be linked together by means of the rivets that transmit these stresses one to the other through the medium of the web plates. Apart from the difficulty of upsetting the shanks of the rivets, while they are being driven, so that they fully fill the holes, there is the fact that the rivets themselves would fail by bending on account of their length, instead of shearing across their section; a slight amount of bending would relieve the outer flange plates of all their stress. Even in the design of the pin, for the typical American pin-connected bridge, the bending moment is of far greater importance than the shear on its cross-sectional area. How much more is this the case, where the rivets are practically cantilevers, anchored only by the bearing of their heads on the surface of the flange angles. It may be mentioned, by the way, that the writer once heard in America, that the reason why pin-connected bridges did not come into favour in English practice was on account of the above-mentioned reason. One of the few examples of the pin-connected bridge in England is the Charing Cross bridge; and it was said that the pins had been designed for shear only, the bending moment not having been taken into consideration; consequently trouble had arisen, and brought disfavour on this type of bridge. Whether this is true or not, it certainly seems a pity that the pin-connected type has practically disappeared in English design, if only for the sake of its being more graceful in appearance than that of the rivetted connection bridge.

Returning to the consideration of the plate girder, especially the question of the rivetting, as it is in this respect the workmanship is more generally at fault; it may often be noticed that the size of the flange plates seems to be out of all proportion to that of the flange angles, these latter being so small as to allow of only one row of rivets to connect them to the web plate; even though the area of the flange plates may be considerable and their width such that it is necessary to forge the ends of the stiffeners to form knee braces, so that these not only stiffen the web, but also the flange plates against buckling. It would be better construction to increase the sizes of the flange angles, to allow of a double row of rivets and dispense with the forged end of the stiffeners; even if, by so doing, it means an additional web plate, where wide flange plates are required.

The shearing value of the rivets connecting the flange angles to the web, for a length of the girder equal to its depth, should, of course, be the same as the shear in such a panel; but it is questionable whether this rule is as strictly adhered to as it should be; in plate girders, carrying heavy loads on short spans, it is often rather a troublesome matter to arrange for the requisite number of rivets.

For girders of similar cross sections, with loads similarly disposed, the pitch of the rivets required for short spans is smaller than that for the longer spans. The safe load on a girder is inversely proportional to the span; the safe load regulates the amount of the shear, which in turn regulates the pitch of the rivets; consequently, for one girder, that is half the span of another of like section, the rivets should be spaced one-half the distance apart. This practically amounts to the total number of rivets being alike in either case.

It is seldom that any difference is made in the flange areas between that of the compression or tension flanges; the area of the rivet holes that are deducted from the tension flange provides a slight additional strength for the compression flange, which even then is probably the weaker member of the two, owing to its being in the nature of a stanchion, of a length equal to the span. In large plate girders, such as for through bridges, it becomes necessary to take this into account, by providing lateral braces to prevent any danger of the compression flange buckling. If the designer desires to be especially economical, it is a usual practice to allow one-sixth of the area of the web plate, as a portion of the required flange area; one-sixth the area multiplied by the depth being equivalent to the moment of resistance of the plate; the web plate has, however, usually quite enough to do without calling upon it to perform other duties.

The size of the web plate, if designed solely to resist the shear, is, especially for short spans, more in danger of buckling under its compressive stresses than in failing in any other way; hence the necessity for the stiffeners—tees, angles or channels, as the case may be. For excessively heavy loading, and where two or more web plates are used, it is well to connect the webs together with diaphragms, such as channels or joists; these make very efficient stiffeners for the web plates.

To determine whether stiffeners are required, the following table, which may save the designer the trouble of calculating the strength of the web plates as against buckling, may be found convenient.

The amounts given in tons are the limiting values of the shear, within which stiffeners are unnecessary. With these are incorporated tables showing the areas, in square inches, of two rivet holes of different diameters in plates of various thicknesses.

Web Plate. Depth in Inches.	Thickness.			
	5/16"	3/8"	1/2"	5/8"
24"	11·3	16·9	30·3	45·0
30"	10·3	16·0	30·4	47·0
36"	9·3	14·8	29·2	47·9
42"	8·3	13·6	28·0	46·8
48"	7·5	12·4	26·3	45·3
54"	6·8	11·4	24·7	43·3
60"	6·3	10·5	23·1	41·3

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Thickness of Plates.	Diameter of Rivet.			
	5/8"	3/4"	7/8"	Areas given are in square inches for a pair of rivet holes.
5/16"	0·34	0·51	0·59	
3/8"	0·43	0·61	0·70	
7/16"	0·52	0·71	0·82	
½"	0·60	0·81	0·94	
9/16"	0·69	0·91	1·05	
5/8"	0·77	1·02	1·17	
11/16"	0·86	1·12	1·29	
3/4"	0·95	1·22	1·41	

The chief trouble with regard to plate girders is in the matter of delivery; unfortunately they are apt to be very slow in appearing at the site. The reason for this is not so much the fault of the constructional workshops as of the rolling mills, the difficulty being to obtain the plates from the mills. What is needed is that some enterprising manufacturer should lay down a universal plate mill, which would obviate the delay now caused by waiting for the rolls to be put in for the flats required, or for the larger plates to be first sheared, and afterwards planed, to the required dimensions. For girders used in buildings planing the edges of the plates is an unnecessary luxury, if rolled flats or universal mill plates could be obtained. The universal mill is one in which four vertical rolls are employed for rolling the edges of the plates, whilst it is also passing through the horizontal rolls that reduce it down to the required thickness.

There is a very fine example of this type of mill at the Homestead works of the Carnegie Steel Company; this mill can roll plates of any desired width or thickness usual in constructional work, and saves all the waste of time that is necessitated by changing the rolls for rolling flats of different widths.

The compound is the most useful of all built-up forms of girders in building work. Strangely enough it is but seldom used in American practice; this being due to the reason already stated in regard to built-up stanchions, viz. the existence of the "Beam pool," when structural work was first being developed in America; the joist section was avoided as much as possible owing to its being more expensive than plates or angles. The reverse of this is the case in England; hence it is more economical to use compounds in place of plate girders, wherever practicable. Perhaps another reason why compounds are not more used in America is that it is the usual practice there for the holes in this class of work to be punched, and punching holes in the flanges of a joist, especially if on only one side of the joist, causes the joist to become curved, and necessitates its being straightened before the cover plates can be rivetted on, whereas in English shops it is customary to drill the holes in all compounds, in order to save this trouble, the works being equipped with batteries of radial drills to deal specially with this class of work. Moreover, English structural work is on the whole of a heavier class than American, and the need for compounds is far greater.

Compound girders can be made very strong in comparison with their depth, which is a desirable quality where they are used as floor girders and the maximum amount of headroom is required; one thing must not be forgotten, and that is that the rivet heads have to be taken into account in their over-all depth; an 18 inch by 7 inch joist and a 16 inch by 8 inch compound may be equal in strength; the compound appears to save two inches in depth, whereas with the rivet heads its over-all depth will be but half an inch less than that of the joist. This is one of those little pitfalls that so often occur and that may cause a client to pay the extra cost of the compound, thinking thereby to save 2 inches in the depth of the casing of the girder. On paper, the compound certainly looks less in depth than the joist, but in reality this is almost fictitious.

This question of the depth of the girders breaking down beneath the level of the ceiling is one of the chief bugbears of the steelwork designer; he is continually having to decide nice points of difference between economy on the one hand and appearances on the other hand. Naturally architects, or their clients, do not like to see their ceilings spoilt by ill-placed cornices encasing the girders; and yet sometimes architects set the designer some severe problems in this respect, on the assumption that steelwork can accomplish anything nowadays. In ordinary office buildings or hotels where the rooms are moderate in size the main girders can usually be hidden in the cornices of the ceilings, adjoining the partition walls; the breaks in the ceilings can be more or less confined to the passages. In large rooms, however, care has to be taken to make the cornices fit in with some feature of the room, such as a pier in the external wall. On the other hand, amongst some features to be avoided are cornices running into chimney breasts or over window heads, as these are very unsightly.

All this goes to show that the steelwork designer's influence may affect the general appearance of a building, even in its internal decorations.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

A MEETING of the Institute of Architects was held on Monday evening last, at Conduit Street, W., Mr. Ernest George, president, in the chair.

Mr. ALEXANDER GRAHAM, hon. secretary, announced the decease of M. Alfred Nicolas Normand, a distinguished French honorary corresponding member of the Institute, who held the Prix de Rome about 1850.

Mr. FRANCIS S. SWALES read a paper illustrated by lantern views entitled –

American Architecture.

The Lecturer referred almost exclusively to work at Washington, and dealt at great length with the location and foundation of that city on the river Potomac. Philadelphia, New York, Baltimore and other large towns had urged their claims to be made the seat of the national Government, but rivalry was so keen between those cities, and political partisanship so bitter, that a ballot even gave no results. Finally an Act was passed conferring upon President Washington the sole power to select a Federal territory "*not* exceeding ten miles square on the river Potomac . . . for the permanent seat of the Government of the United States." This Act authorised him to have the site surveyed and planned, and to proceed with the construction of certain works and buildings. The President therefore appointed three commissioners to supervise the development of the adopted site, Major Ellicott to survey the territory, Major L'Enfant to plan the city, and Thomas Jefferson, then Secretary of State, to confer with them. That the latter was qualified to act as one of the Commissioners cannot be doubted, for later in life and after he had retired from office at the expiration of his term as President of the United States, he designed among other works the fine group of buildings for the University of Virginia, and his own house, Monticello. L'Enfant's plan approved by Washington and Jefferson, and adopted by Congress in 1791, was during the author's lifetime carried out only so far as securing sites for the principal Government buildings, cutting down trees and making a few of the principal roads. The site once chosen, all available land had been bought up by speculators, who held it at high prices, and thus retarded the growth of the city. In 1792 a competition was held to procure a design for the Capitol, which was L'Enfant's designation of the Federal house. Sixteen designs were submitted, but none were regarded as worthy of serious consideration. Shortly afterwards a French architect, Stephen Hallett, of New York, submitted a design to the Commissioners, which met with general approval, and he was asked to journey to Washington. About the same time Dr. Wm. Thornton, a Philadelphia physician and amateur architect, who had studied in Paris, presented an elaborate coloured design to President Washington, who was so impressed that he asked the Commissioners to adopt it in place of that submitted by Hallett. The latter declared that Thornton had stolen some of his rough sketches, and merely elaborated upon them. This charge Thornton vigorously denied, and the premium originally offered for a design was awarded to him. Thornton, however, was not considered to be competent to carry out the work, and Hallett was made supervising architect. He was ultimately dismissed, being succeeded by George Hadfield, an Englishman. A competition was next held for the President's house, and this was won, and the work carried through by James Hoban, an Irishman, who had been clerk of works under Hallett, and who afterwards succeeded Hadfield. He also completed the north wing of the Hallett-

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Thornton design for the Capitol. Three years later Benjamin Latrobe was appointed to construct the south wing. In 1814 the British troops having taken the city of Washington, burned the Capitol, the President's house, and other public buildings. Latrobe afterwards restored the Capitol, and to him is due the credit of designing the former House of Representatives, now known as Statuary Hall, and the old Senate Chamber. Charles Bulfinch, of Boston, succeeded him. He designed the hall of the old Library of Congress, which formed the projecting central feature of the west front, modified Latrobe's design for the dome, and in 1827 reported the Capitol was finished, and for twenty years nothing further was done to it.

In 1833 the old building of the Treasury was destroyed by fire and Mills was appointed to design a new one. He took so long deciding upon the site that President Jackson, a soldier by profession, lost patience, and meeting the architect just outside the President's house one morning, he planted his cane at the spot where he was standing, and said, "Here, right here, is where I want the corner-stone laid." The selection of this site was a serious blunder, and a blot on L'Enfant's plan. To President Jackson the lecturer attributed the beginning of the appointment of army engineers to construct Government buildings. As Washington and Jefferson had appointed engineers and architects, men of their own professions, Jackson felt that he should follow their precedent by appointing others from his. On the other hand his action was partially justified by the dearth of good architects. The commercial undertakings everywhere called loudly for the help of all the brains in the country; there were doubtless plenty of opportunities for architects who could have shown themselves competent to grapple with the problems of the times, but if a design for a church was required, a Greek-Ionic temple was submitted, if a railway station a Greek-Doric temple was considered suitable by the so denominated architects. In 1850 important extensions to the Capitol became necessary, and Thomas U. Walter, of Philadelphia, was entrusted with the task, who carried it through to completion. He treated the scheme boldly and simply, leaving the plan of the centre block as he found it, and adding two great wings, making a three-part composition. His work, it was suggested, represented the last phase in American architecture of the past.

The architecture of the present in the United States, continued the lecturer, might be said to begin with R. Morris Hunt, who returned from Paris in 1855. Hunt had been for ten years a student in the Ecole des Beaux-Arts, and he had worked under Lefuel and Visconti upon the construction of the extensions of the Louvre, carried out during the Second Empire. In America he saw the endeavour to resuscitate Gothic architecture by attempting to follow the so-called Gothic revival. He set to work vigorously to change things, and started an atelier in which he had as pupils Mr. George B. Post and Charles Gambrill, Professor Ware and Henry Van Brunt. In 1870 H. H. Richardson returned from Paris, and in his work he attracted the attention of the public to the difference between the work of an architect and that of engineers and builders, and his influence extended all over the country.

Hunt, who found his taste for Classic work opposed by the wave of Gothic and "Picturesque" popularity, had meantime compromised with the public by taking into association with himself Henry O. Avery, and together they produced the design for the William K. Vanderbilt house. Marquand house, and others in the French Transitional styles of Francis I. and Louis XII. Henry P. Kirby, of New York, produced some fine imaginative studies in this style, which he published in his book of "Compositions." A number of strong men were won over to the style of the early French Renaissance, including Ellis, who produced some interesting work in St. Louis, among other things the City Hall; Bruce Price, of New York, who designed the Château Frontenac, an hotel for the Canadian Pacific Railway at Quebec; and Clarence Luce, of New York; Louis Hickman, of Philadelphia; Julius Schweinfurth and George Newton, of Boston, made studies of conspicuous merit, nearly all of which were produced between the years 1888 and 1892. In 1889 several works by Messrs. Carrère & Hastings were published, which had been built at St. Augustine, Florida, in the style of the Spanish Renaissance, but highly original and beautifully adapted to American needs, composed on lines of pure design and ornamented with paintings, mosaics, and decorative sculpture. Messrs. McKim, Meade & White produced several works in the Italian Renaissance style—the Villard houses and the Century Club; the Madison Square Garden, with the tower similar to the Giralda of Seville, and the New York *Herald* Building, by Stanford White. The publication of the early studies by Mr. McKim for the Boston Public Library, which clearly showed that it owed its inspiration to the Library of St. Geneviève, in Paris, had a very beneficent influence, and for several years was regarded by architects and the public generally as the finest example of architecture in the United States. Its extent and costliness indicated something of the demands for education of the citizens of Boston, and its conservative architecture is unquestionably only a reflection of the character of the representative people of that city.

The Columbian Exhibition, said Mr. Swales, afforded an opportunity, for the first time, of bringing together the combined artistic abilities of several of the then leading architects of the country. Again, the best work owed its inspiration to French designs. From the time of the Exhibition down to the present day the history of the development of American architecture disclosed a rapid march of progress. The Classic influence, re-established in the public favour by the Exhibition, had been maintained, and accepted in one or another of its manifestations throughout the country. Numerous architectural schools have been founded; and the old ones at the Cornell, the University of Illinois, and the Massachusetts Institute of Technology, improved their courses of instruction, modelled in principle upon that of the great school of Paris. The atelier system, first attempted by Richard Hunt, was successfully inaugurated about fifteen years ago (by Mr. E. L. Masqueray, since chief architect of the St. Louis Exposition, who was at the time Hunt's chief assistant) and has been fostered by the Society of Beaux-Arts Architects, which has made its principal objective the education of the younger men. The Architectural League of America—a society composed of societies—whose members are the various architectural clubs, which, in several of the large cities do auxiliary work to that of the Society of Beaux-Arts Architects, especially as regards the education of those office-trained men whose circumstances prevent them from taking a regular course in one of the universities. These have given birth to and rock the cradle of the architecture of the future.

In the third part of his paper Mr. Swales explained the schemes which were afoot for the future development of Washington on the lines of L'Enfant's plan. A Senate Commission had appointed an advisory committee (Messrs. Burnham, McKim, Olmstead and St. Gaudens), and they were instrumental in inducing both the Pennsylvania and the Baltimore and Ohio Railroad Companies to remove their tracks from the Mall so that the original scheme could be advanced. The whole improvement is to be made on a grandiose scale, and such is the admirable spirit of public enterprise now prevailing that it is likely to be an accomplished fact within a few years. Mr. Swales also attributed some of the success of the movement and the possibility of its ultimate completion to the unity of the different American architectural societies. He accounted for this hopeful condition of art in America, first, to the system of education which enabled Americans to know who their strong men were while they were still young—a system that was competitive and the results of the competitions made public. It was the French system—that of the Ecole des Beaux-Arts—where each student knew exactly the standing and record of every other student as well as his own in every subject. The entrance examinations were to the schools—not to the Institute. Before a student had spent much time or money he knew whether it was likely to be worth his while to do so. Secondly, to fellowship which arose out of friendly association with one another in the architectural clubs, the universities and the ateliers in Paris. To the influence upon a large personal following of young men by such strong leaders as Messrs. Charles McKim, John M. Carrère, George B. Post, Walter Cook, Cass Gilbert and E. L. Masqueray; and of the college professors, Wm. R. Ware, A. D. F. Hamlin, D. Despradelles, Warren Powers Laird, Frederick M. Mann, Emil Lorch, Paul Cret and others; but more particularly to the generous impulse of one of the present leaders, who had a great opportunity to show his mettle and proved equal to the occasion. This was the man who might have designed in his own offices all of the buildings at the Columbian Exposition, but chose rather to recommend to the Exhibition Company to give out five of the largest buildings to his ablest contemporaries in his own town of Chicago and five others to men practising in different parts of the country, whose loyalty to these co-workers was never found wanting, and whose integrity and ability—artistic, organising and executive—proved him to be the fittest to lead, though he con-

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ceded himself that leadership to Richard Morris Hunt during his lifetime—Mr. Daniel Hudson Burnham, of Chicago, chairman of the Senate Commission, which recommended to the Senate that the plan of the great L'Enfant should be adhered to.

Mr. F. M. SIMPSON proposed a vote of thanks to the lecturer, and said Mr. Swales was peculiarly qualified to read such a paper, as he was one of the brilliant staff of designers who were responsible for the lay-out of the St. Louis Exposition and a pupil of the Ecole des Beaux-Arts. They had heard an admirable description of the work going on in America at the present time, and they all appreciated the excellence of the designs which had been put before them. The moral they could draw from the paper was the wonderful influence that the French education of the American artist had had upon their designs. The jump that had been made since the time when Hunt returned from Paris was marvellous. In the Americans they saw a nation pre-eminently practical dealing with vast commercial interests, grafting on to their own gigantic needs the traditions, training and the exact knowledge and delicate feeling for Classic beauty which they obtained from France. He wished also to draw attention to the point in the paper where the authorities in charge of the improvements at Washington found that the tremendous railway stations of the Pennsylvania and Baltimore and Ohio Companies prevented them realising their scheme, they sent their architects to the railway companies asking them to help, and the latter most generously did so. He wondered whether London authorities would be as successful in a request to remove Charing Cross railway station and the bridge across Ludgate Hill.

Mr. JOHN SLATER seconded the motion.

The PRESIDENT said it was delightful to think of a city in which the people as well as the architects were willing to make sacrifices for beauty.

The vote of thanks was passed by acclamation.

THE BUDDHIST AND HINDU ARCHITECTURE OF INDIA.*

(Concluded from last week.)

THE whole surface of India is covered with Hindu temples, the vast majority quite modern or comparatively modern. The number of ancient shrines is small, chiefly in consequence of the destructive religious fury of the Mohammedans, who invaded India from 1000 A.D. onwards. The oldest specimens date from about 600 A.D., and the best examples are to be found between that date and 1300 A.D. In surveying these ancient monuments we can clearly distinguish two styles, each of which shows a definite type from the beginning. The geographical distribution of these two types is, to begin with, rather interesting. For the Southern or Dravidian style of Hindu architecture is found only within the tropics, or south of the the twenty-third degree of northern latitude. The Northern or Indo-Aryan style, on the other hand, is found only north of the tropic of Cancer, excepting only the eastern and western extremities of its territory, which come down to the twentieth degree. A historical study of these two, moreover, shows that the Hindu temples of both styles are developments of Buddhist prototypes. But the remarkable thing is that they are respectively the descendants of two entirely distinct classes of Buddhist building; for it can be shown that the Dravidian Hindu temple has been evolved from the Buddhist monastery, while the Indo-Aryan Hindu temple has been developed from one of the other two classes of Buddhist building.

The earliest representative of the Dravidian temple is at Mahabalipur, thirty five miles south of Madras. It is a monolith, being hewn out of a single block of granite, and dates from about 600 A.D. It is clearly Brahmanic in origin, as is shown by the sculpture as well as the inscriptions. But it is evidently also a model of a Buddhist monastery of four storeys. The plan is square, the pyramidal tower representing the upper storeys containing the cells of the monks. The design of the regular structural Dravidian temple is a square base ornamented externally with pilasters, and containing the cell in which the image is kept. Over the shrine rises the sikhara, a pyramidal tower, which is always divided into storeys. This division never disappears in Dravidian temples. The tower is crowned with a small dome, either circular or polygonal in shape.

* Abstract of a paper read before the Society of Arts by Professor A. Anthony Macdonell, M.A., Ph.D., F.B.A.

An early example of the Dravidian style of Hindu temple on a grand scale is at Ellora, which dates from the seventh century A.D. This also is a monolith, but on an enormous scale. It is, really, one of the wonders of the world, for it is a temple carved elaborately inside and outside, out of a single huge rock left standing after a wide passage had been cut away in the hill side around it. Out of this living rock were cut shrines, porches, columns, halls, steps, galleries, roofs, and the most detailed sculptures 1,300 years ago. Much of the sculpture is still as clear as when it was first carved. It would take a large volume to illustrate fully the details of this marvellous structure. It is the culmination of the art of rock-cutting in India.

In front of the Dravidian temple a porch, or even two porches, may be added, but these are not an essential feature of the building. The later Dravidian temples from about 1000 A.D. stand in a large court surrounded by an enclosing wall. A special feature here is the great gateway, erected in front of the shrine in the wall which encloses the court around the temple. It has a storeyed tower, resembling that of the shrine itself. But it is oblong, not square, in shape, being twice as wide as it is deep. The best specimen of the structural temple in the style is that at Tanjore, which was erected in 1025 A.D. The body of this temple is of two storeys, about 80 feet high, while the pyramidal tower rises in eleven storeys to a total height of 190 feet.

Many of the famous later temples of Southern India are architecturally a good deal spoilt by two main defects. In the first place, successive independent additions obscure the design of the original shrine, producing a sense of bewilderment in the observer. The second defect is that the gateways in the walls of the successive courts, which have subsequently been added, increase in size and height as you proceed outwards, thus entirely obscuring the tower of the central shrine. Both defects are specially striking in the Srirangam temple, near Trichinopoly, which is the largest in India. Here there is a fifth court which was added, but left unfinished, in the middle of the eighteenth century. The shrine itself is quite insignificant, being distinguishable only by the gilding of its dome, while the gateways of every court are each larger and more decorative than the preceding.

About sixty miles from Gadag is situated a place which is virtually a vast open-air museum of Hindu monuments in the Dravidian style. This is Vijayanagar, the ruined capital of a Hindu kingdom, which was founded in 1118, and remained a bulwark against Mohammedan invasion for two centuries and a half. The city was at last captured in 1565, and has remained deserted ever since. The ruins of palaces and temples cover an area of several miles. The finest temple here is that of Vittoba Svami, erected soon after 1500 A.D. This, together with two other shrines, is surrounded by an enclosure with four Gopurams or great gateways. The finest part of the main shrine is the porch, which is notable for its elaborate composite pillars and columns with richly carved figures of conventionalised animals attached to them in front. Close to this temple is to be seen in the court the stone car of the god, 26 feet high, carved out of a single block of granite. The stone used in all the buildings at Vijayanagar is granite, and the enormous size of the slabs used is very remarkable. A walk of rather over a mile brings one to the great temple of Siva. This temple is in use, as there is a small village close to it. It has a great Gopuram at the north entrance. Taken in all its dimensions (being over 165 feet high) this gateway is, perhaps, the largest in India.

To each of the great temples of Southern India is attached a large tank for the religious ablutions of the worshippers. Sacred tanks not within the precincts of a temple are also frequent in Southern India. These are called Teppa kulam, or raft tanks, with a small shrine in the centre, to which at certain festivals the image of the god is taken across on a raft. One of the features of the Madura and other great South Indian temples is the colonnades which surround the tanks. Other South Indian temples have colonnades around their court. This is the case in the great Siva temple at Vellore, not far from Madras. It is one of the most remarkable shrines in South India. It has a Gopuram, seven-storeyed, and 100 feet high. The colonnade which runs round the enclosure is supported by nearly 100 carved pillars.

Here may be added a few words about the columns of the South Indian style. The early Dravidian temples had conventional lions and elephants of normal shape as supports of their pillars. These were gradually enlarged and affixed to the pillars, as at Madura; the animal forms being

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conventionalised with riders. Human and other figures were then introduced as supporters.

One of the most sacred shrines of India is the great temple of Ramesvara, sacred to Rama, situated on an island close to the mainland, in the channel between South India and Ceylon. It has a magnificent Gopuram. Its most striking feature, however, is the wonderful corridors which adorn it. The south corridor is 700 feet in length, that is to say, it is the longest in the world excepting that in the Vatican.

A variety of the Dravidian style is that which has been called the Chalukyan by Fergusson, after the dynasty which ruled from about 400 A.D. onwards in the territory where this variety prevails. It embraces the northern and the north-western part of the region covered by the southern style of architecture. The peculiarities of this style are these. The ground plan is star-shaped, and the tower is stepped rather than storeyed, forming a square pyramid with breaks corresponding to the angles in the walls. The temples generally stand on a terrace from 10 feet to 15 feet wide, and 3 feet to 6 feet high, a feature which adds very greatly to their architectural effect. The best examples belong to the period between 1120 and 1270 A.D. The most perfectly preserved example is the temple of Somnathpur, about twenty miles from Mysore city. The buildings were erected without mortar, the joints being carefully fitted. The details of this style are very elaborate, most of the finer temples being overlaid with sculptural ornament, consisting of floral patterns intermixed with mythological figures. But the most attractive of all the Chalukyan shrines is the great temple of Siva at Halebid, delightfully situated on a terrace near the shores of a lake. It was left unfinished in the year 1270 A.D., the towers never having been added. It is one of the most remarkable monuments in India. One of the pavilions in front contains a huge image of the Bull of Siva. In the interior are some remarkable black stone pillars, which look as if they had been turned in a lathe. This temple is unmatched in the variety of its details and the exuberance of fancy shown in its ornamentation. There is, perhaps, no other temple in the world on the outside carving of which such a marvellous amount of labour has been spent. It will give some idea of the enormous amount of sculpture with which this temple is covered when it is mentioned that the lowest band of the frieze alone contains a procession of about 2,000 elephants, no two of which exactly resemble each other.

Now turn to the Indo-Aryan style of Hindu architecture. By great good fortune there are extant side by side two of the earliest examples of the Dravidian and Indo-Aryan styles near Badami, in the Chalukyan territory. They date from the end of the sixth century A.D., and already show fully developed the characteristic features which the two styles clearly retain down to the present day. Both have a square base containing the cell, but while the Dravidian temple has a pyramidal tower, always divided horizontally into storeys, the northern tower is a curvilinear spire, not divided into horizontal storeys, but, on the contrary, having a vertical band running up each face. While the Dravidian tower is surmounted by a small round or polygonal dome, the Indo-Aryan tower is surmounted by a circular fluted ornament, somewhat flattened at the top. The Indo-Aryan, like the Dravidian shrine, has a porch nearly always added in front of the entrance to the cell, but it was evidently not essential, not being an integral part of the edifice. The shrine itself consists of two parts. The lower part containing the cell is square. It rises from a moulded plinth and ends in a cornice. There are never any pillars or pilasters. Above this rises the spire, which is square in section, and the curve of which in the early specimens begins near the top. The central vertical band was carved, usually with a reticulated ornament composed of minute arches. The Mandapam, or porch, is added in front of the doorway of the cell, and is square, being of the same height as the top of the shrine where the spire begins. In the earliest specimens there were no pillars, and the roofs consisted of long sloping slabs. Later, columns were introduced in groups of four, and courses of masonry were made outside to correspond to the carved conical roof inside.

The earliest representatives of the Indo-Aryan style are found in the group of deserted Hindu temples at Bhuvanesvar in Orissa, about 250 miles south of Calcutta. The older and finer specimens begin from about 600 A.D., the series coming down to about 1100 A.D. They show this style in its greatest purity, and probably furnish better material for the history of this form of Hindu art than any other temples in India. To the ninth century belongs the celebrated Black Pagoda, a temple of the Sun, at Konarak, in Orissa, about twenty miles from Puri, and within sight of the sea. It represents the car of the Sun drawn by seven horses, with twelve gigantic, elaborately carved wheels of stone on each side.

The famous shrine of Jagannath, the lord of the world, a name of Vishnu, was erected about the year 1200 A.D. Within its enclosing wall, which is about 20 feet high, are crowded together something like 130 shrines. Puri is a great place of pilgrimage from all parts of India, but the great crowd of pilgrims assembles at the car festival in June and July. The great car, which is 45 feet high and 35 feet square, is then, with the image of the god placed on it, dragged from the temple to the garden house of the god, situated at a distance of about a mile. In pulling the great car and two lesser cars along, a throng of more than 4,000 professionals are employed. After the festival, these wooden cars are broken up and the fragments distributed to the pilgrims. Thus when pilgrims eat the sacred food within the precincts of the temple, all caste distinctions disappear. The highest Brahman would then take food from the hands of a man of the very lowest caste: a thing otherwise impossible in India.

The origin of the Indo-Aryan spire has always been a puzzle to Eastern archæologists. Thus Fergusson says:—"Neither the pyramid nor the tumulus affords any suggestion as to the origin of the form, nor the tower, either square or circular; nor does any form of civil or domestic architecture. It does not seem to be derived from any of these." Here, then, we are faced with a fascinating problem. The Indo-Aryan Hindu spire appears fully developed in its earliest occurrence about 600 A.D., beside the Dravidian Hindu pyramidal tower. It has clearly no connection with that tower. But it can still less be a development of the Buddhist Chaitya or church, with its waggon-headed roof and semicircular apse at the end, which shows no suggestion of anything like a spire about it. Where then are we to look for its source? I believe the answer can be given with certainty, or at least a high degree of probability. The Buddhist Stupa in the cave temples gradually developed from a plain solid dome into an elongated hollow cell containing an image of Buddha. The transition from the solid to the hollow Stupa is further illustrated by model Stupas at Bodh Gaya. Then we find near Badami an old structural Hindu temple of Vishnu dating from the seventh century A.D., containing a similar hollow cell for the image, the back of the cell being still semicircular. In that neighbourhood we find another old Hindu temple, the same in other respects, the only difference being that the cell has become square. Now, there are to be found in Northern India a number of simple Indo-Aryan shrines erected without porches. These evidently bear a strong resemblance to the transformed hollow Stupa. In place of the original round drum is the square base, as more suitable in form for a cell. Above this rises the spire in place of the elongated dome, and still retaining the vertical curve of the latter, but modifying its circular shape by carrying the corners of the square base to the top. Thus the horizontal section of the spire becomes square also.

Finally comes the explanation of the ornament at the top of the spire. We may dismiss the theory that the fluting is an imitation of a certain small Indian fruit. In the earliest examples of Indo-Aryan temples there is a neck between the top of the spire and the ornament. One of the rock-cut Stupas at Ellora indicates that the neck represents the lowest part of the tee, and the ornament above represents the upper part, the fluting being a rounded modification of the vertical divisions in the tee. The curved flattened top probably represents a single umbrella. In one of the rock-cut Stupas at Ajanta, the three umbrellas carved in stone above the tee are themselves fluted. These in turn are surmounted by the vase-shaped finial which regularly appears at the top of the Indo-Aryan spire.

Thus we arrive at the remarkable conclusion that, while the Southern Hindu temple has been evolved from the Buddhist monastery, not only Buddhist temple architecture outside India, but also Hindu temple architecture throughout Northern India, is a development of the Buddhist Stupa. In the Northern Hindu temple the dome of the Stupa was elongated, while the umbrella ornament became attenuated. Outside India the dome was gradually attenuated till it finally disappeared, while the umbrella ornament grew to such an extent that it finally became a tower 200 feet in height. With the red thread of historical study to guide us, we are thus enabled to understand clearly what otherwise presents itself as an inexplicable mass of disconnected phenomena in the domain of early Indian architecture.

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NOTES AND COMMENTS.

THE perfect handbook on building construction has not yet been produced, but there are some that approach more nearly to the ideal than Mr. ALLEN'S "Practical Building Construction." The fact that the fifth edition * is now before us is evidence that this book has won popularity, and at the price of three half-crowns is considered good value for the money. But it might be made better. We think it is not possible to produce at the price a book adequately treating of building construction and also including as much knowledge of materials, sanitation and history of architecture as is necessary for those students for whom the volume is intended. These subjects would be better omitted rather than insufficiently treated. That done there would be space for fuller treatment of matters more properly within the domain of construction. Hollow walls need further elucidation, particularly with regard to drainage, ventilation, and the finish at the base of the wall of the hollow space. The reason why bituminous internal vertical damp-courses sometimes fail should be explained, with the precautions necessary to avoid failure. Sections of rolled joists should always be properly drawn, not as on p. 119. Fig. 404 should also be correctly drawn. Fig. 457 shows a device which, it should be explained, is only sometimes permissible, and even then has its drawbacks. The details of Portland cement (unless omitted altogether) should be made to agree with the British standard specification. Obsolete forms of fire-resisting (not fire-proof) floors should be ignored, and more of the good modern ones, now omitted, put in their place. The diagrams of both flying and raking shores should be corrected, for as now shown they are impossible. It is dangerous to tell a young student that "the collar beam acts as a tie and prevents outward thrust." He should receive an explanation of the conditions under which collar beam roofs can be safely used, or he will find later by sad experience that they cannot always be so. Mistakes in spelling should be rectified, as, for example, "lear" board is a phonetic rendering of our modern corruption of the old name "layer board," which did express the function of the item.

THE oxyhydrogen blowpipe is a wonderful and powerful tool, but the Americans have found one still more remarkable by substituting acetylene for hydrogen, obtaining a much higher temperature than the 4,000° Fahr. of the older implement, and rendering easily possible the autogenous welding of cast iron, wrought iron, steel, brass, copper, and even aluminium. There is no need, therefore, to discard a kitchen boiler because it is cracked. The crack can be mended. By means of the oxy-acetylene blowpipe metals can be cut easily and truly, with smooth sides to the severed portions, and without perceptible injury by oxidation to the adjacent metal. A detailed account of this new tool is given in the *Scientific American*.

THE British Fire Prevention Committee has just issued a "red book" giving an account of tests with two steel rolling shutter doors known as the "Wilson" rolling shutter door, made and supplied by the Wilson Manufacturing Co., and fixed by Messrs. MOUNTAIN & GIBSON, Ltd. The test was very successful the classification of "Full Protection (Class B)" being obtained. The standard required for this classification is very high, four hours' exposure to a temperature gradually increasing to 1,800° Fahr., with subsequent applications of water for five minutes, being the principal conditions of the test.

A SUGGESTION for a British decimal system of measurement is made in *Indian Engineering*. The proposition is that our present land-surveying "link," or 7.92 inches, shall form the starting-point, and 5 links be our meter, then 20 meters equals 1 chain, 200 equals 1 furlong, 1,600 equals 1 mile. It follows that 2½ square meters equals 1 perch, 100 square meters equals 1 rood, 4,000 square meters equals 1 acre. The suggestion is ingenious, but the confusion between our meter and the widely adopted French system would be worse than ever. If we should in the future adopt a metrical system, it must be the French one, for the chief value of a change from our present system would be the greater facility it would give for international commerce and exchange.

* *Practical Building Construction.* By John Parnell Allen. Fifth edition. (London: Crosby Lockwood & Son. 7*s.* 6*d.* net.)

ILLUSTRATIONS.

THE CHARTERED BANK OF INDIA, AUSTRALIA AND CHINA, CALCUTTA—INTERIOR.

THIS building has been erected in Calcutta for the Chartered Bank of India, the contractors being Messrs. MARTIN & Co., engineers and contractors, and the architect Mr. EDWARD THORNTON, F.R.I.B.A., both of Calcutta. The building is situated in Clive Street, in the centre of the business quarter of Calcutta, and is one of which the city may be proud. In fact, it may truly be said that Calcutta is really becoming a city of palaces. Mr. THORNTON'S work is now very well known in India, as he has designed not only several of the largest business premises in Calcutta (including Royal Insurance building and MARTIN & Co.'s new offices), but also several palaces for rulers of Native States.

ST. MICHAEL AND ALL ANGELS CHURCH, BECKTON, LONDON, E.—EAST ELEVATION—THE CHOIR.

THIS church has been erected to serve that portion of East Ham wherein is situate the Gas Light and Coke Co.'s works, &c. The architect has had to contend against a water-logged site, resulting in having to build on piers and arches carried down some 18 to 20 feet below the ground level. This necessitated a lower superstructure than is usual, in consequence of which the architect chose the Devon type, with barrel vaulted roof. The work was carried out for a sum of 10*l.* per sitting, inclusive of architect's fees, and has cost so far as built some 4,300*l.* The reredos and stalls are temporary, the former coming from the Mission Church adjoining, the latter being to special design. The work was carried out by Messrs. JOHN BARKER & Co., the heating by Messrs. JEFFREYS & Co., the lighting by the Gas Light and Coke Co., and the architect is Mr. A. H. RYAN-TENISON, F.R.I.B.A., of 21 Great Peter Street, Westminster, S.W.

CAMDEN CHURCH, PECKHAM—THE CHOIR, AS RESTORED AFTER FIRE.

THIS church was partially destroyed by fire in 1907. The restoration was entrusted to Mr. A. H. RYAN-TENISON, F.R.I.B.A., of 21 Great Peter Street, Westminster, S.W.

The instructions given him were to reinstate in every case, so far as possible, the original work designed by the late Sir GEORGE GILBERT SCOTT, R.A., and Mr. JOHN RUSKIN. This has been done to the satisfaction of all. The architect has provided new choir stalls in oak of late design, a new mosaic flooring, a new organ chamber, and other works, comprising a partial rebuilding of the west façade, nave walling, and an entirely new roof of open timber construction for the nave. The church is now lit by electricity, with a gas installation for cases of emergency. The interior has been colour decorated.

Mr. VOGEL GOAD, of Camberwell, was the contractor. The stalls and other works were executed by Messrs. WAKE & DEAN at their Yatton works. The stained-glass work in renewing the window destroyed is the work of Mr. PERCY E. DEMAIN HAMMOND. The works in renewing the original organ are by Messrs. GREY & DAVISON, and the electric lighting by Messrs. WELLS, RAYNER & Co. The total cost amounted to nearly 6,000*l.*

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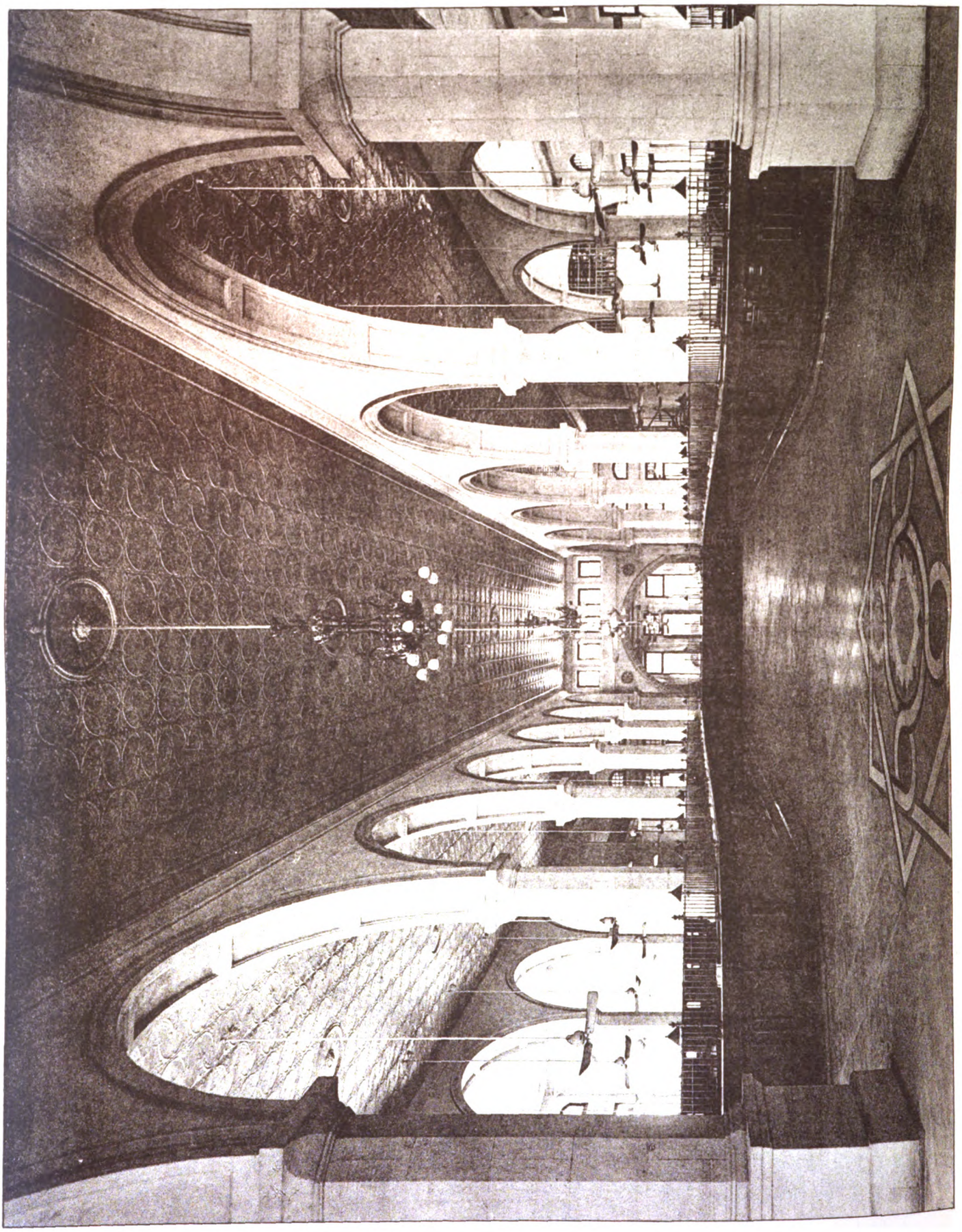
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ST. MICHAEL AND ALL ANGELS' CHURCH, BECKTON, LONDON, E.: EAST ELEVATION.

ARTHUR H. RYAN, TENNYSON & ELLIS, ARCHITECTS.

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THE CHARTERED BANK OF INDIA, AUSTRALIA, AND CHINA, CALCUTTA: INTERIOR.

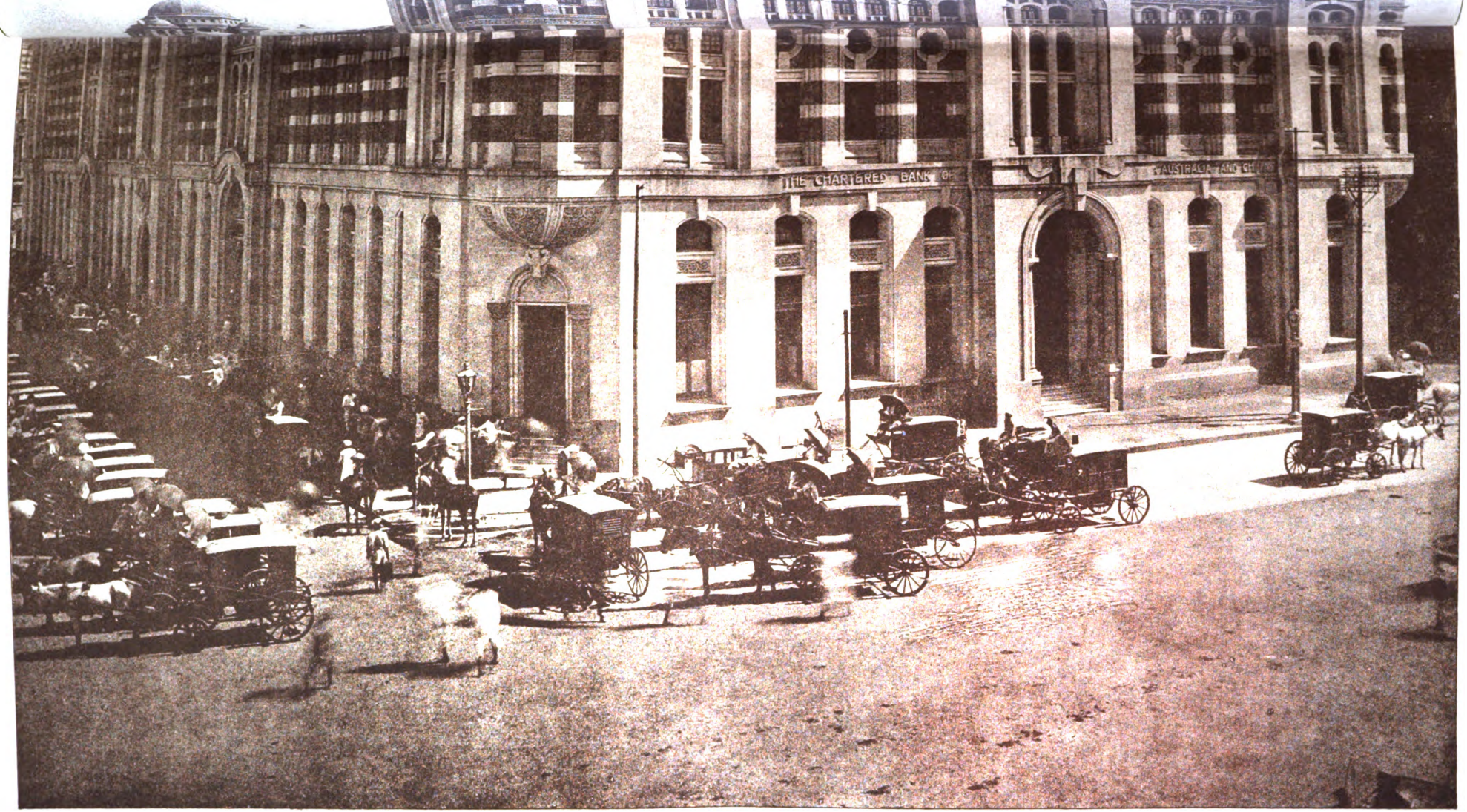
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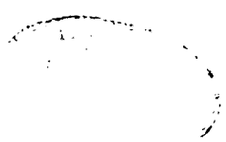
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THE CHARTERED BANK OF INDIA, AUSTRALIA, AND CHINA, CALCUTTA.

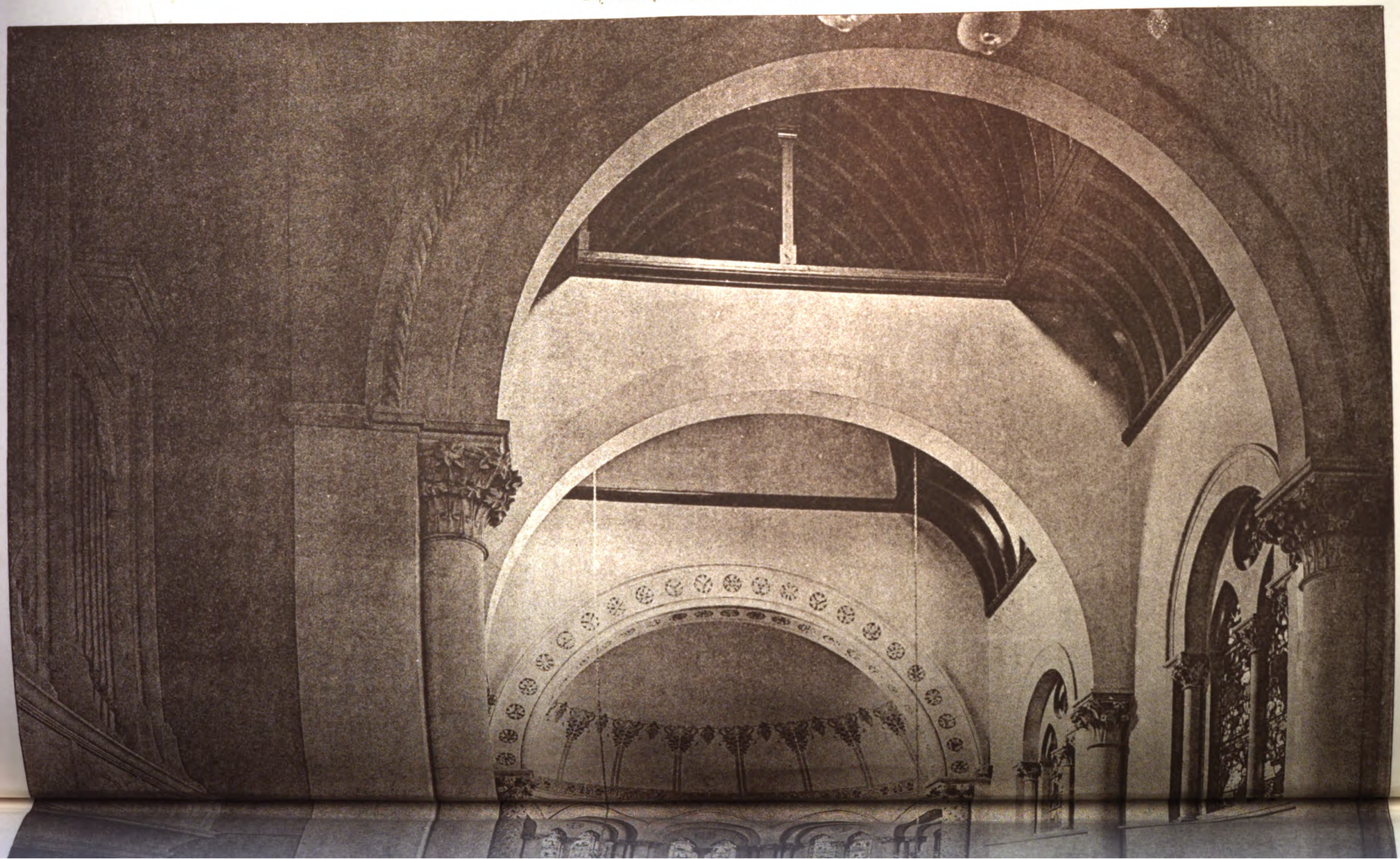
EDWARD THORNTON, F.R.I.B.A. (Messrs. Martin & Co.), Architect.

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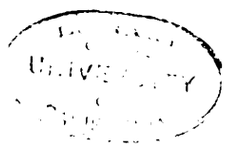
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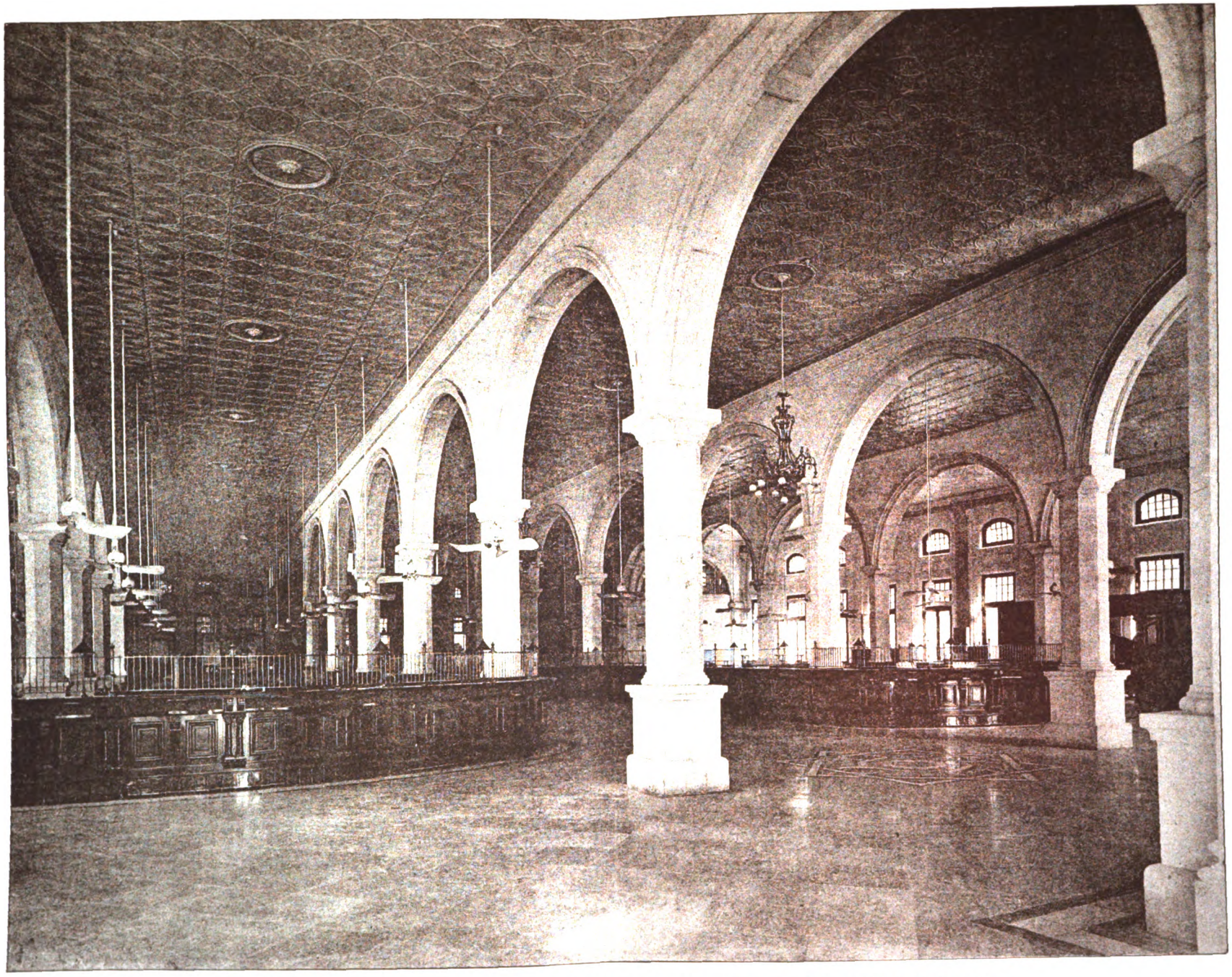
CAMDEN CHURCH, PECKHAM: THE CHOIR, AS RESTORED AFTER FIRE.

A. H. RYAN TENISON, F.R.I.B.A., Architect.

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THE CHARTERED BANK OF INDIA, AUSTRALIA, AND CHINA, CALCUTTA: INTERIOR

EDWARD THORNTON, F.R.I.B.A. (Messrs. Martin & Co.), Architect.

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ST. MICHAEL AND ALL ANGELS' CHURCH, BECKTON, LONDON, E.: THE CHOIR.

ARTHUR H. RYAN TENISON, F.R.I.B.A., Architect.

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GEORGE DEVEY AND HIS WORK.*

(Concluded from last week.)

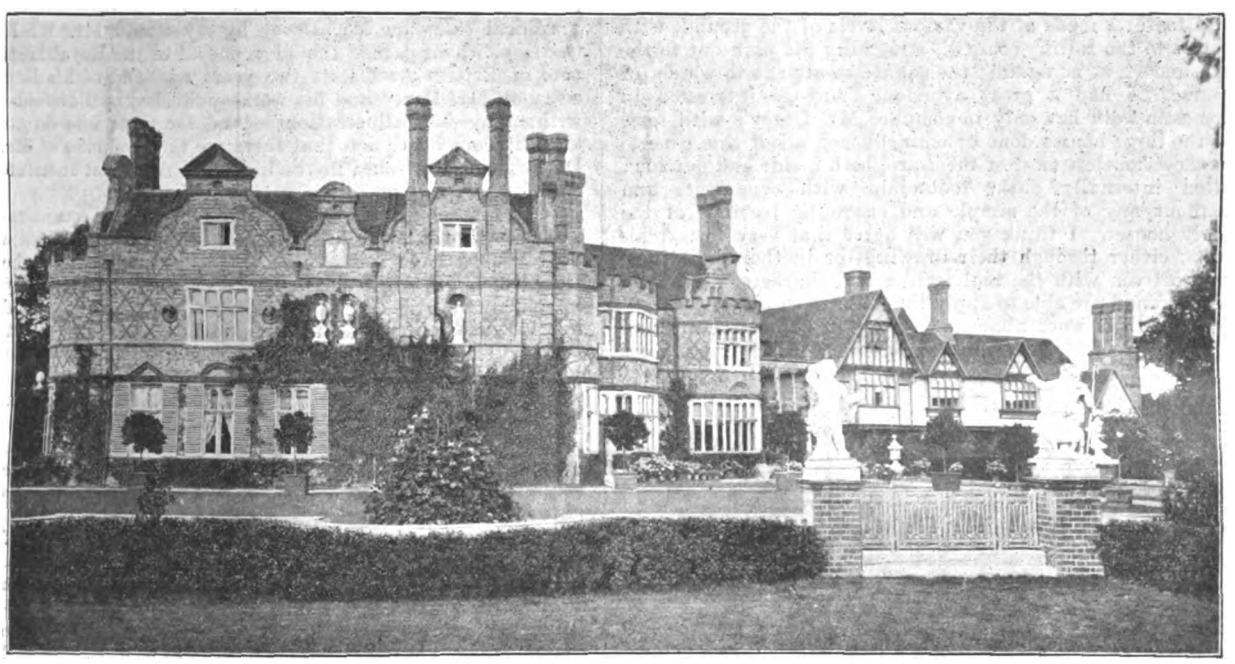
IT is interesting to note, now that garden craft has become such an important adjunct to the complete design for a country house, that Mr. Devey was certainly one of the first in our time to take any practical part in its development. The immediate approaches and surroundings, the entrance courtyard, the enclosing walls and archways, the terraces, the disposition of steps and the arrangement of gardens connected with every well-appointed house, he always held came properly within the province and should be the work of every competent architect. And he attached great importance to the comprehensive treatment of all this as a vital and necessary part of the whole design. The sympathetic consideration of these things was always a joy to him, and he was singularly happy in the variety of charming features which he invariably produced, all admirably adapted to the different needs and local circumstances. An excellent example may be found in Coombe Warren, where the best characteristics are all brought out, making that attractive collection of accessories mostly to be met with in old houses and their surroundings. A house standing alone, with the winds of heaven sweeping round it and without the friendly shelter of walls, was to him a horror. He loved a brick or stone wall attached to every house, going round the entrance court with gateways and doors according to requirements. This you will find with most of his houses when he had his own way, together with that feeling of welcome mystery where, as you approach, the wall prevents your seeing everything at once, leaving play for romance to picture Elysian fields on the other side.

The commissions chiefly consisted in country houses, although there were a number of new schools and churches he repaired. At the busiest time there were about ten men in the office, one modeller in constant work and six clerks of works. For some years George Myers, the builder, carried out the largest works, and in this there was the great advantage of dealing with one set of men who knew your ways. (He was the same Myers who in former years had done so much of the great Pugin's work.) But, satisfactory as this was, Mr. Devey hated the contract system, with all the endless bickering and compromises so often involved, and with the difficulty there always was in carrying out a new idea or a second thought. So, having had experience of how successfully some things had been done by estate works (I think it was at Lord Vernon's, Sudbury Hall), arrangements were made and a system adopted whereby the client built on his own account. This worked well for years and was carried out concurrently with contract works, in other cases and in the usual way, where the client wished it. Of course, this new departure entailed more work, for which an additional 2 per cent. was charged. In large and important works it was a great relief not to feel bound within the limits of a contract, although in all cases a careful approximate estimate was given, but the chief advantage was to the client, where the work was better done and at less cost than by contract. Of course, some builders may question this; everything, however, depends upon the efficiency of the system and the superintendence. Given this and there can be no doubt as to the time and cost being less and the quality of the work better. Remember in this case that the architect is in no sense the builder. He arranges the system which the client's foreman carries out. The workmen are engaged by the foreman, who also orders all materials—under supervision. A monthly statement was always rendered, which put the client in possession of all information and removed the possibility of misunderstanding.

Such a system required the confidence of the employer, and that Mr. Devey always commanded. It is needless to say that Mr. Devey personally had little to do with the practical work involved in all this, although he would do anything that he considered the duty to his client required, but he was essentially an artist.

Although Mr. Devey was not a well-known man, it is interesting to remember what a number of distinguished people he had as clients. Here are some of them:—Her Majesty the late Queen Victoria, the late Duke and Duchess of Sutherland, the late and the present Duke of Argyll, Lords Granville, Spencer, Lytton, Kenmare, Lucan, Revelstoke, De L'Isle, Dunraven, Strathnairn, Northbourne, Vernon, Cranbourne, Stratford, Tankerville, Cranbrook, Carlingford, Rothschild, the Countess of Waldegrave and a number of others.

The late Earl Granville, a most genial and charming man, who, as ambassador, had been to all the great courts of Europe, was a very good friend and client. He would call at the office and walk off arm-in-arm with Mr. Devey, consulting him frequently on various matters of taste. He had great faith in Mr. Devey's judgment and advice. When the earl was Foreign Minister, Devey would often dine with him at Carlton House Terrace (where he had made considerable alterations and improvements), and afterward attend the receptions at the Foreign Office. It was at one of these banquets, sitting between Sir William Harcourt and the Bishop of Oxford, that Sir William began talking to Devey of a wonderful house being built for a friend of his in Oxfordshire, where the architect, an ingenious and clever man, by using old stonework and tiles, had managed to make a most charming and old-looking mansion. Sir William was afterwards very much amused to find that he had been talking to the architect.



COOMBE WARREN.

* A paper by Mr. James Williams, read at the last meeting of the Architectural Association.

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No account of Mr. Devey's work would be complete without some notice of the excellent staff of men who were in the office, many now occupying important positions in life, especially the invaluable services rendered for many years by Mr. Arthur Castings, an accomplished architect, who, but for a retiring nature, might have been better known and whose ability may well rank with that of the best living men. There was also the late Mr. Henry Smith, his surveyor; you all know what an important part a good surveyor plays in every office, and he was indeed a trusty friend and adviser for whom we all had a great regard.

In talking of the duties of an architect one is reminded of an answer given to an unreasonable complaint where a clerk of works was employed, and which at the time struck one as very much to the point—that you never expect a doctor to act as doctor and nurse. Mr. Devey rarely criticised the work of contemporary architects and never unkindly, but there was not much about this time that he was in sympathy with.

In the arrangement of a house, whether large or small, few appeared to realise, as he did, the requirements and conveniences of a comfortable home. Things are different now. The advice given by a client about servants' accommodation, that unless they were given some luxuries there was little chance of his living in common comfort, was hardly necessary in Mr. Devey's case. He was considerate for all alike. The plan was carefully thought out and specially adapted to the site chosen, advantage being taken and features made of the various levels of the ground, with gables to the falling country, stretching the plan out to the sun and view, as against the square treatment to which, of course, he had a great aversion. Anyone interested in domestic work has only to compare Mr. Devey's with some of the large houses done by eminent men about this time to see how hopeless most of them are, both inside and outside; often internally dark, redundant with ornament, and without any of the simple and charming features of the early houses. I think you will agree that very few architects, either through their drawings or in their buildings, impress you with the real feeling and character of the old masters and are able to apply this to modern requirements—making their work alive and strong in expression, full of life and vigour. Simplicity and honesty of construction are



its chief characteristics, and these Mr. Devey always aimed at. It almost seemed that everything he drew was full of this subtle spirit, and you will readily understand how depressing it sometimes was to see the painful contrast between the master's sketch and the actual working drawing.

He was very much against the use of iron construction when it could be avoided; and it was amusing to hear him discussing the thickness of web and flange with his surveyor, who always allowed a very ample margin, but Mr. Devey invariably added something, saying that we seemed precious afraid of the girder "going up." He prophesied a great day of reckoning, when, one by one, they would all collapse about our ears.

Mr. Devey held that it was the duty of the architect to carry out the wishes and ideas of his client—after submitting his own—and he would never try to force his ideas on anyone.

In making additions to a house he would generally carry them out in harmony with existing work, however simple that might be. He altogether objected to the display of new architectural patches of an entirely different character so often seen, and so much like the self-assertion of the superior person.

Few men have ever been gifted with such a wealth and variety of alternative good ideas and suggestions as he could produce, both for plans and elevations. This was a great accomplishment, but at times, as you may suppose, it was



an unwelcome cause of delay when working drawings were sorely needed on a building to keep things going.

Most of you are no doubt aware of the excellent biographical essay on Mr. Devey by my friend Mr. W. H. Godfrey, which gained the silver medal of the Royal Institute of British Architects two years ago, and of his later essay on Mr. Devey and his work—published by Batsford—with many good illustrations. And for those who do not know it I may mention that there are three volumes of Mr. Devey's small sketches in the library of the Royal Institute of British Architects.

One of the last things Mr. Devey had under consideration was that all who had worked in the office more than a year should have some share in the profits, and had he lived this would have been carried out. The last journey he made was to the Earl of Kenmare's, at Killarney, one of his largest works, and then on to Lord Dunraven's, at Adare, about some proposed additions, during which time he contracted a serious cold, resulting in pneumonia, from which he died at Hastings in 1886, in his sixty-seventh year.

It is now more than twenty years since Mr. Devey died, but anyone who knew him intimately could never forget the impression he made on them. No words can express his natural charm of manner and refinement. Quiet, modest, somewhat reserved at first, at times vivacious, alert, full of humour, of deep feeling and genuine sympathy, considerate, thoughtful, kind and generous, showing great indignation against all injustice and the warmest approval of everything noble and good. With large and expressive eyes he saw much more than most people. He was passionately fond of music, with a fine taste and appreciation for the best in everything, a man of the highest honour and of entirely unselfish disposition, of a reflective and independent mind, not accepting the ordinary and general view without being fully persuaded in his own mind, true to himself, maintaining high principles and noble sentiments, with modesty and the firmness of real conviction.

No one was ever in his company without being the better for it. He had the deepest reverence for and delight in all life, in the flowers and the trees, which he could draw with such feeling and delicacy; with all animal life, from the smallest insect, which it was never beneath him to protect, to his horses, always his friends. While to all about him, in whatever position, he was ever the true gentleman, and in every sense a worthy member of your noble profession.

Mr. ARTHUR KEEN, who proposed a vote of thanks to the author of the paper, said there was always such an intimate association between the work of an artist and his personal qualities, that anyone who made them known rendered a great service to those who were interested in the life work of the artist. The lecture they had heard would therefore be appreciated, and similar papers dealing with Mr. Butterfield and Mr. Burges would be welcomed and interesting. All the work done by Mr. Devey must be judged primarily by contemporary examples. Possibly some of the photographs of the buildings they had seen would seem to lack distinctive qualities, but they must remember that architecture then was at a very low ebb, and domestic work often very bad, although there was a certain amount of creditable church architecture. The quality therefore of Mr. Devey's work

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must have been a revelation, and especially so when they remembered that Penshurst was undertaken in 1850, some twenty years before Mr. Norman Shaw began to influence the style of building. Mr. Devey's plans were remarkable as showing very fine feeling for the external effect, and though the leading characteristic of his work was its domesticity, yet there was extraordinary excellence in all the arrangement of it. He realised that a house should be a home, and the illustrations they had seen were evidence of how well he succeeded. They had not, however, been shown much of the garden work, which was justly praised for its greater freedom in the customary formal arrangement.

Mr. NEEDHAM WILSON seconded the vote of thanks, and said one of his first earliest architectural experiences was connected with a visit to some work of George Devey's, near Bolton, in Lancashire, and which he found full of charm. He would have liked to have heard what influence the work of George Devey had in the development of English domestic architecture, because, extensive and delightful as the work was, the retiring disposition of the man checked its educational influence among the other members of his profession. His designs were scarcely ever or never published in the architectural journals, and so it was in his lifetime almost wholly unknown except to a very few architects.

Mr. W. H. LEVERTON said the paper was a pleasant reminder of summer visits to delightful houses, and he suggested that excursions in the future might be again made to them.

Mr. ALAN POTTER wished to emphasise the interest of the non-architectural part of the paper. Such lectures were unfortunately rare in the Association, and he hoped papers of a similar character, dealing with modern architects and architecture, would become more frequent.

ROYAL SCOTTISH ACADEMY.

THE annual meeting of the Royal Scottish Academicians was held last week in the library of the Academy, Mound, Edinburgh, Sir James Guthrie (president) in the chair.

The resolution passed on March 3 to elect three painter Associates was confirmed.

The eighty-first annual report, which was submitted by the Council and adopted, stated that the year ending December 31, 1908, was the first in which the changed date of the Academy's business year has come fully into operation. There had been less immediate inconvenience than might have been expected from the change, and the Council hoped that it would ultimately conduce to the smoother working of the Academy's affairs. The year had been an arduous one in many ways, and both Academicians and Associates had been called on to render services implying much time and anxious thought in various directions other than the routine duties of membership. As it was thought advisable, in the interests of his health, that Sir James Guthrie should spend the spring months abroad, Mr. Blanc again acted as his deputy, with much acceptance to the various meetings over which he had to preside, till, towards the beginning of May, the Academy had the pleasure of welcoming their President home in restored health.

The eighty-second annual exhibition was opened to the public on Saturday, February 1, and closed on Saturday, May 30. Five hundred and thirty-nine works were shown, 421 of these being paintings in oil and water-colour, thirty-seven works in sculpture, forty-one architectural drawings (including photographs of buildings exhibited by their architects) and forty miniatures and works in black and white. Following a custom of recent years, several representative pictures by two members lately deceased—Thomas F. Graham and David Farquharson—were borrowed for exhibition. Till the beginning of May the attendance was well maintained, but during the closing weeks it was adversely affected by the opening of the National Exhibition at Saughton.

At the statutory general assembly held on February 12 Mr. A. K. Brown was elected to fill the vacancy in the list of Academicians caused by the transference of Mr. John Hutchison's name to the honorary retired list. At the same meeting Mr. P. Hume Brown, LL.D., Professor of Ancient History and Palæography in the University of Edinburgh, was appointed the Academy's Professor of Ancient Literature, in room of the late Professor David Masson. During the month of February Mr. George Henry, whose headquarters have for some years been in London, was, at his own request, placed on the non-resident list. At the statutory general assembly held on March 18 Mr. R. Duddingstone Herdman, Mr. George Smith (painters), and Mr. Harry S. Gamley (sculptor) were elected to the rank of Associate.

The curators of the library reported as follows:—"As the library continues to be used for the general purposes of the Academy from the beginning of the year till the end of the first week in June, it has been found impossible to revert to the arrangement of having it open for one evening of the week; but the books are available for consultation or loan on application to the secretary or assistant secretary. The books, drawings and prints are, generally speaking, in good order and catalogued up to date." It was intimated that a number of works had been added.

During the year the Academy's collection of works of art was augmented by the following additions:—"Bronze Venetian Door-knocker;" "Two Stone Axe-heads," found near Greenlaw, Berwickshire; "Land's End, Cornwall," by William Miller, H.R.S.A.; "Fast Castle," by Thomas B. Blacklock; "Plaster Bust of the late William Forrest, H.R.S.A.;" "A Grey Day," by A. K. Brown, R.S.A., diploma work; "Head of the Venus de Medicis," monochrome study by Thomas B. Blacklock. The thanks of the President and Council were recorded to the donors.

The report of the visitors to the life class was as follows:—"The session of 1907-8 commenced on November 18, 1907, and finished on June 30, 1908. There were 122 meetings of the class, viz. sixty-six evening and fifty-six morning meetings, and the aggregate attendance was 1,318. The visitors have gratification in reporting on its efficacy and usefulness, as shown in the work of the students during the past year in drawing and colour, while the President's monthly prize has had a beneficial effect in original composition. The number of students on the roll is twenty-two and the average attendance is eleven. The Council, after inspecting the drawings and paintings done by the students during the course of the year, had pleasure in expressing their agreement with the visitors concerning the efficiency and usefulness of the school generally, and also in regard to the various studies produced during the session. The Council awarded the prizes as follows:—The Carnegie Scholarship, Hugh A. Cameron; the Chalmers Bursary, J. Howard Lyon and William A. Cuthbertson—equal; the Chalmers-Jervise prize for the best drawing from the life, Hugh A. Cameron; Maclaine-Watters medal, William A. Cuthbertson; the Stuart prize, George H. Paulin; the Keith prize, D. M. Sutherland and J. Howard Lyon—equal.

The Council had much satisfaction in recording the appointment recently made to the office of King's Limnership for Scotland, and they had the more pleasure in congratulating Mr. Robert Gibb on the honour conferred on him and on the Academy as there seemed some danger of that ancient and honourable office falling into abeyance. The Council took the opportunity of thanking those public bodies and individuals who so successfully used their influence in this matter.

The year has seen considerable development in those changes, in which the Academy were so deeply interested, involved in the passing of the National Galleries (Scotland) Bill two years ago. In particular the New Edinburgh Art College was pushed on so rapidly that at the close of the year the larger part of it was ready for occupation, and the classes which had been carried on with some difficulty at the Royal Institution were shortly afterwards transferred to the new premises. At an assembly of Academicians held early in the year five members of the Academy—three Academicians and two Associates—were chosen to act on the board of management; during the summer a director was appointed, and a teaching staff, which included several members of the Academy, was organised. The Council, in noting this new departure in Scottish art training and the greater and much-needed facilities it provides for the application of art to our various crafts and industries, would hope that it might also prove a stimulus to those higher branches of the fine arts in which the Academy were more directly interested.

The Council felt that some reference was due to the great art collections brought together during the summer and autumn months in Edinburgh and London respectively. The Edinburgh collection formed part of the Scottish National Exhibition, the leading intention of which was to show the progress and development of Scotland during the two centuries which had elapsed since the union of Parliaments in 1707. This idea was eagerly taken up by the committee in charge of the fine art section, and in no part was it so steadfastly kept in view or so thoroughly carried out

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in any other section. Scottish art during that long period was admirably represented in the galleries at Saughton. To this result the Academy contributed materially, both by loans of works and through the labours of many of its members associated with the committees of collection and arrangement. It was matter of satisfaction to know that the collection was fully appreciated by the crowds who thronged the galleries from May till October. With the Franco-British collection the Academy was less intimately concerned, but the Council might draw attention to the initiative taken in the formation of a committee, on which several Scottish art societies were represented, the purpose of which was to obtain fair treatment for Scottish art in such exhibitions. And though the effort was not attended with direct success, the Council believed that the action of the committee had much to do with the more considerate treatment ultimately conceded in regard to the composition of the committee of arrangement; nor were they without hope that it might have furnished a basis for a still fuller recognition of the claims of Scottish art in future international collections. The Council also desired in this connection to express their sense of the excellent services rendered by Mr. Robert Noble as the representative from Scotland on the committee.

The Council regretted having to record the death of an Associate member, Mr. Archibald D. Reid.

It was interesting to record that during the year there occurred the hundred and fiftieth anniversary of the birth of Alexander Nasmyth, H.R.S.A., and the hundredth anniversary of that of his son, James Nasmyth. The former, who has been called "The Father of Scottish Landscape-painting," was born on September 9, 1758; the latter, the inventor of the steam hammer, on August 19, 1808. These names, so well known in connection with Scottish art and science, were now indelibly associated with the Academy through the munificent bequest made some years ago by the son in memory of his father, under the name of "The Alexander Nasmyth Fund."

The office-bearers were elected and the Council declared for the ensuing year as follows:—Council, Sir James Guthrie (president), Messrs. P. W. Adam, G. Ogilvy Reid, J. Campbell Noble, A. K. Brown, J. Lawton Wingate, J. H. Lorimer; W. D. M'Kay, secretary; Hippolyte J. Blanc, treasurer; G. Ogilvy Reid, G. Washington Browne, auditors; P. W. Adam, G. Ogilvy Reid, curators of library; J. Campbell Noble, E. A. Walton, Robert M'Gregor, Edwin Alexander, visitors of the Life School.

ASYLUM CONSTRUCTION.

AT a meeting of the Architectural Section of the Royal Philosophical Society of Glasgow held last week in the Society's rooms, Mr. Alexander Cullen presiding, Dr. Hamilton C. Marr, Woodilee Asylum, read a paper on "Asylum Construction." Dr. Marr said that St. Vincent de Paul in the seventeenth century was the first to proclaim "that the darkened mind was as much the visitation of God as the darkened vision; that Christianity demanded of the humane and virtuous and powerful to protect and the skilful to relieve the one as well as the other." Many years passed before this teaching was put into practice. In 1792 Pinel, in France, and three years later Tuke, of York, introduced what was known as the humane treatment of the insane. In practice the old association of insanity and demoniac possession was difficult to be got rid of. Thus in 1819, in connection with the lunatic asylum formerly in Parliamentary Road, the rotating motion by means of whirling chairs had been tried in a great number of cases and in some of these with wonderfully good results. Asylums originally consisted of cells, in which lunatics were bound down by chains and locked up. Shameful conditions of treatment of the insane in workhouses resulted in the Lunacy Laws of 1857 and the establishment of boards of lunacy and grants in aid of pauper lunacy. From one extreme it was only human to pass to the other, and many of their palatial asylums were the results of this rebound. Woodilee Asylum (opened in 1875, and then the Barony Parochial Asylum) was the first asylum to be built with sitting-rooms or day-rooms for the use of patients, open grounds instead of airing courts, and a maximum of freedom allowed by what was known as the "open-door system." The evolution of asylums all the world over had proceeded since 1875 towards the conception that as insanity was a bodily disease, the buildings for the insane should primarily be of a hospital nature. This was illustrated in modern Continental asylums in France, Germany, Holland, and Great Britain. When the details of asylums in these countries were considered the majority were found to be built on what was known as the block and corridor system, with, as at Gartloch and other asylums, a detached hospital, or with the hospital attached as at Woodilee. Chiefly through the writings and influence of the late Sir John Sibbald, His Majesty's Commissioner in Lunacy for Scotland, two asylums of the village type had been built in Scotland—Kingseat, Aberdeen, and Bangour, Edinburgh. These village asylums had their prototypes in Germany, and at Alt Scherbitz and Uchtspringe in Saxony. It was contended that the village asylum conduced to the greater welfare of individual patients by segregating them into small groups; that it was as economical in construction as the block and corridor type (this had actually been proved in the case of the Aberdeen, Kingseat, asylum, costing 230*l.* per bed); and that the village asylum could also be efficiently and economically administrated. Six years' experience of the Reception House at Woodilee showed that all insane patients could be treated in buildings of an ordinary hospital type, devoid of means for putting into use any system of restraint or deprivation of freedom by seclusion in single or padded rooms. The ideal mental hospital should consist of two portions—(1) a hospital section, (2) a colony. The hospital section would be divided into three parts—(*a*) a hospital, into which newly admitted patients and those requiring medical treatment on account of their bodily and mental condition would be placed; (*b*) villas grouped round a central kitchen and laundry for women requiring continuous medical supervision; (*c*) villas grouped round workshops for men requiring continuous medical supervision. The colony would consist of villas placed round farms for patients who did not require continuous medical supervision, but who required to be under sufficient observation in order to fit them, should they not recover, to be boarded out with strangers in the country. Such an asylum built in the country, accessible to the friends of patients at all hours, and with a sufficient allowance of ground for the employment and treatment of patients, should not exceed in cost 200*l.* per bed.

THE SOCIETY OF ARCHITECTS.*

THE object of this paper is the elucidation of some facts, which are not so widely known as they might be, concerning the changes which the last quarter of a century has effected in the importation and use of building timber.

The question is, What forms of timber can the architect specify for use in a given building which will on the one hand give his client the best value for his money, and will on the other permit the contractor and timber merchant to supply what is wanted without undue inconvenience?

It is incumbent upon all merchants and manufacturers to bring before the profession the fullest information as to changes in origin, form and manufacture. This is particularly true in the case of timber. Many of the ports which once sent us large quantities of the fir, pine or deal so largely used in building construction, both for joiners' and carpenters' work, have ceased to exist as sources of supply, and conversely other ports, till recently unknown, are now exporting to England some of the best and most suitable shipments.

It may be urged that the architect need not interest himself in areas of origin, ports of shipment or brands, it being his duty to see that good sound timber is supplied, irrespective of any other consideration. This might hold good if the standard of quality were always the same, and if builders and contractors were philanthropists eager only to please their clients and to achieve the highest possible level of artistic excellence in their work.

It has been the custom of the profession to lay down in its specifications certain definitions of what it requires in the way of timber for constructional and decorative work. The timber merchant and contractor are entirely within their rights in asking that these definitions shall be clear and definite, and as far as possible in accordance with the reasonable convenience of the trade. So far from deprecating any close and detailed limitations in the timber clauses, the sensible contractor asks for them. Nothing would please him better than to know that the terms used in describing the wood are meant and will be strictly enforced. Estimators now frequently complain that the formulæ tell them little or nothing. If they read them literally, they would never secure a contract under open

* Abstract of a paper entitled "The Specification and Inspection of Timber," by Mr. J. Davies, of *The Timber News*.

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competition. They have to consider the class of erection in question and the idiosyncrasies and prejudices of the architect, so far as they are known to exist, plus the possibility of trouble from clerk of works.

So far from securing the desired level of quality, the clauses in question frequently open the door to the substitution of inferior materials. If the contractor demonstrates the inability of the timber merchants to supply satisfactory material of the exact description specified and obtains permission to supply something equal thereto, a great deal is at once left to his own discretion.

Many of the well-known builders and contractors may be associated with a certain set standard so far as their purchases are concerned. It varies with every firm, the experience of no two establishments being exactly alike. There are many who permanently exhibit an intense anxiety to carry out their woodwork in a manner creditable to themselves and just to the architects for whom they work. Even these are sometimes involved in serious difficulties through varying interpretations of timber specifications, and grave injustice has been inflicted upon them by the inability of architects to realise the difficulties of the situation. On the other hand, there are a few who prefer the existing state of things, and see in it opportunities for using indifferent wood under the excuse that what was specified is unobtainable and that "this is just as good."

Of course there are countless instances in which the good faith of the builders and the sound common-sense of the architect (best exhibited, when he has a conscientious firm working for him, in leaving as much to them as he can) have surmounted all difficulties without friction.

The wide differences between sundry clauses taken from recently issued bills of quantities will show clearly that all cannot be right and some must be wrong.

The first reads thus:—"The joiners' work to be executed with the best yellow Christiania or best red Petersburg deal"; and the second as follows:—"The joiners' work to be the best Christiania or equal quality deals."

These clauses are issued by eminent architects in active practice, associated with good work.

Christiania has not sent out, directly or indirectly, a good piece of joiners' timber for the last twenty years. The smaller wood that we receive from that place, in the form of planed boards, floorings and matchings, is of the class used in the most ordinary kind of speculating building.

One of these clauses permits the use of Petersburg stuff. This is more reasonable, but is open to the objection that it rules out by implication other ports which now send better and milder wood. Petersburg wood has shared the deterioration which has characterised the whole of our imports, and even the finest parcels show a considerable proportion of centres, knots and sap.

Another firm specifies the best Gefle yellow deal for joinery. This is nearer the mark, but similarly rules out other equally good Swedish shipments and the even more useful material which comes from the White Sea, except by the indulgence of the architect.

The next gives Onega, Petersburg or Archangel, leaving no room for even the best of the Swedish stuff.

Altogether it is clear that the information upon which these clauses have been based is very fragmentary and is greatly in need of revision. The same applies to the phrases governing the carcassing or carpentry. One says:—"The timber for carpenters' work to be the best Memel, Danzig or Riga fir, and no American, Swedish or Scotch fir is to be used in any part of the building."

Memel has ceased to send us fir. Riga still sends us fir, but of a spongy texture and poor quality. Danzig still sends fir in diminished quantities, of smaller sizes and lower quality than in the past. American red pine, which when obtainable is considered equal to any European stuff, is barred. Swedish fir is excluded. This rules out the firm, tough and elastic wood which comes in abundance from the best Swedish ports and which is largely used for high-class timbering. What is meant by the exclusion of Scotch fir is not clear. If the writer used the term commercially, indicating place or origin, it is unnecessary, as the quantity of Scotch fir or pine used in England or Scotland is negligible and would not enter into a builder's calculations. If he used the word botanically, to cover a species, he stultifies himself, as the Danzig fir, which he admits, and the Scotch fir, which he bars, are one and the same thing. No mention is made of Petersburg wood, which includes some very strong carcassing stuff.

Summarising the carcassing clauses, none of them specify the wood mostly used for constructional work where dimensions that are over 12 inches by 4 inches are required, viz. pitch pine, or in some cases Oregon or British Columbian pine. Most of our schools and municipal buildings are timbered in pitch pine or Oregon pine so far as the bigger sizes go, and in Russian or Swedish deals and battens where the smaller dimensions are concerned. Yet these items are not specified. Here we have a complete divorce between precept and practice, fraught with possibilities of endless disputes between the profession and the contractors.

It must be admitted that the task of compiling clauses which will govern the use of timber with fairness to all parties is not an easy one.

First, it may be appropriate to make a rapid survey of the important features of the timber trade to-day, with special reference to the soft woods, which form by far the largest proportion of imports. It will be necessary to examine the nomenclature of the staple building-wood in some detail, the terms which are variously applied to it being very puzzling to the uninitiated.

Although we speak of Memel or Danzig fir, the tree which yields it is a pine, botanically known as Pinus Sylvestris, a coniferous, needle-leaved tree growing very widely in Russia, Germany, Sweden and Norway and in some parts of Scotland and the North of England.

Whether in the form of squared-hewn logs from Danzig, or planks, deals and boards from Russia, Sweden and Norway, the wood is essentially the same, variations in its texture and quality being brought about by differences of climate and soil. That is why it is so difficult to draw distinctions between the shipments from various ports, any one shipment containing both fine, slowly grown and clean wood from the highlands, and coarse, wide-ringed and spongy stuff from the lower and moister ground. A joiner may get hold of a nice clean mild-working deal of a particular brand and swear by it ever after, giving precedence to a shipment the average quality of which may be very ordinary. Or he may come across a piece which is harsh and inclined to warp, or so resinous as to make it impossible for him to get a smooth surface upon it. He is then likely to condemn that mark for good, although its average quality may be very high. Possibly this is one reason why the men who actually work the wood differ so widely in their opinions about it and make such unreliable guides upon the subject.

It is known to the shippers as red and is so called in the Midlands and North; but most merchants and consumers in the South know it as yellow. It is thus variously called redwood, red deal, yellow deal, Baltic, Memel or Danzig fir, and has even two more names, Northern pine and Scotch fir, although these two are fortunately not often met with in the South.

It may be noticed here that the word "deal" is also used to denote a size, as 9 by 3, and in this connection has no relation to the name of the wood itself.

It is the wood about which nearly all the disputes occur, and is the one which is usually specified for most forms of building construction.

From thirty to fifty years ago it mainly came from Memel and Danzig, Stettin and Riga, in the form of logs, both round and squared. These were converted into carcassing and joiners' stuff in England, and undoubtedly yielded a large proportion of the finest and most durable wood. But as time went on Russia and Sweden developed an export trade in what is, as already explained, botanically the same tree. It came in a more easily merchantable form, viz. sawn square-edged planks, deals, battens and boards. Naturally the saving effected in buying the converted sizes had an effect upon the trade in Danzig and Memel stuff, and the imports of the latter fell away, until now we get very little indeed.

Still, as it was then correct to specify the latter variety, the terms became very firmly embodied in architects' specifications and have been copied and recopied until to-day. The situation is complicated by this fact, that although Riga fir is no longer of desirable quality and Memel fir is a thing of the past, we still get these hewn-squared logs from Danzig, and if an architect absolutely insists upon it, they can be had, although only in limited quantities and of very ordinary quality. Consequently, the builder who meets the recopied clause in a specification is faced by the probability that the architect is only using a figure of speech, but also the possibility that he has some reason for using the words and actually wants Memel or Danzig fir.

The question arises, "Where large sizes are required for main structural work, what is the best alternative, seeing that we do not receive imported planks larger than 12 inches by 4 inches from Russia or Sweden?" The answer to this

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is pitch pine, and some would include the Douglas fir or Oregon and British Columbian pine.

The quality of nearly all timber imported into England has steadily deteriorated during the last twenty years, the leading exception—viz. Kauri pine—being unfortunately a joinery and not a carpenters' wood.

No doubt there are thousands of mature and well-grown trees in the forests of Europe and America which would yield just as good timber as that which we used to receive. But the trouble is that they are, so far, inaccessible. When the cost of carriage becomes prohibitive the shipper falls back upon those forests which lie sufficiently near to the railways and rivers to permit of his getting the wood to the port of shipment at a certain price. These have already been worked and the finest trees removed. Natural regeneration and State regulated replanting together fail to keep pace with the world's demand. European countries which once dipped very little into the available Russian and Swedish supplies now compete with the United Kingdom as bidders for yellow and white deal. At this moment Italy is buying it very largely for the erection of temporary buildings in Sicily and the mainland in consequence of the recent disastrous earthquake. The standard of comfort in the poorer countries is rising, which means that the demand for wood per head per annum is increasing. Our own Colonies import Baltic stuff for house building, finding it cheaper to do that than use their own woods, which are either too hard to work for the purpose or too valuable as exports.

Afforestation will not help us in our own generation. Although yellow deal now grows in the United Kingdom, it does not exist in really merchantable quantities or dimensions. The Royal Commission which has recently reported upon afforestation is of opinion that it can be grown here in bulk, and that scientifically planted forests will eventually produce good, clean, usable timber. But we shall have to wait about ninety years before the trees will yield cut stuff sufficiently wide and long.

Meanwhile the destructive process is going on, and the cutting of young wood in Norway and Sweden for wood pulp is further retarding the work of replenishment. While anxious not to appear as an apologist for poor or shoddy work, we must take these facts into account in the specification and inspection of timber.

Importers appeal to agents and shippers in vain for deals and planks which shall be free from sap, shakes, large, loose and dead knots and other defects. Money will not buy them. Timber is not a manufactured article, which a sufficiently tempting price will bring forth in perfection. The picturesque shapes which make a well-wooded landscape so attractive spell defects in the wood from an architectural point of view. If you take a walk through Kew Gardens, or through such a well-preserved section of the Sussex Weald as the Duke of Norfolk's natural park at Arundel, you will see some noble trees, but surprisingly few which are sufficiently straight in the stem and free from branches to produce a 20-foot plank free from pith, sap and knots.

To sum up, the wood of to-day is admittedly imperfect, and the question arises, "What measure of imperfection, if any, is permissible in timber used for contract work?"

The answer to that question will determine the wording of timber specifications. What shall we say about sap? It is safe to say the area of a transverse section of a typical Pinus Sylvestris will show about two-thirds heart and one-third sap. That two-thirds heart is roughly circular in shape. Cut a parallelogram from it. You have about half the area of the original section in that parallelogram, with a centre or pith in it. Can we afford to lose half the tree? Of course, everything depends upon the class of work in hand, and for some exceptional contracts no doubt every particle of sap must be eliminated.

If trees are felled in the winter, when the live sap is not filling the cells, and properly seasoned, the sapwood is visible, but bright and light coloured. If trees are felled during spring and summer when the juices are circulating, the cells contain chemical combinations which are liable to decomposition or to the attacks of fungi. The sapwood of such trees becomes discoloured, turning green or blue, and is unfit for use. At best the sapwood is less durable than the heart. But if perfectly bright and not exposed to variations of humidity in the atmosphere it will last and take a share of the load. That is to say, a 9 inch by 3 inch, showing 1 inch of bright sapwood at the edge, will be stronger than the 8 inch by 3 inch which would remain were the inch of sapwood removed.

So far as internal joinery is concerned, in panels, mouldings, &c, where the element of strength is not important, the problem becomes largely one of appearance or interference with decorative effect. The general practice of to-day tolerates the use of a limited proportion of bright sap for all but the very highest class of work. But very few specifying clauses contain any hint of permission for the inclusion of the smallest modicum.

Then what about knots? The large dead knot is a source of weakness, but the live knot, firmly attached to the rings of living wood, may be regarded as playing its part in bearing stress. The small dead knot, if its dimensions do not break into many of the annular rings, is a negligible quantity so far as strength is concerned. Here again the question of disfigurement comes in.

As to centres, a sound centre is rarely objected to if completely boxed in by the surrounding wood, and is of course inevitably passed in the case of very large carcassing stuff.

Putting all these considerations together, the following were suggested as workable clauses for the regulation of joiners' and carpenters' timber:—

Wood for carcassing or carpentry shall be sawn out of sound, bright, square-edged Baltic or White Sea planks, deals and battens, or Danzig fir, pitch, Oregon or British Columbian pine of similar quality.

The wood for joinery to be Baltic or White Sea yellow, equal in quality to the best Russian or Swedish shipments.

All to be free from injurious open shakes, large, loose or dead knots, or more than a small proportion of perfectly bright sap and thoroughly seasoned.

GOTHIC STYLES IN MODERN ARCHITECTURE.*

IN speaking of the use of the Gothic styles in modern work one must necessarily confine oneself chiefly to dealing with ecclesiastical buildings, because for buildings of the civil class fashion now favours almost exclusively the modern Palladian manner, and this fashion also to a great extent influences domestic work.

That Palladian Classic is alone suitable for modern methods and requirements seems indeed to be generally accepted without question, but the truth of such a view is open to much argument, and certainly its blind acceptance does not tend to the advancement of architectural art.

The late Mr. James Fergusson, in the introduction to his "History of Architecture," gives an illustration of the front of a supposed building. The first section is absolutely plain, like the front of any tenement house in a back street, and he shows it repeated five times, with various degrees of increasing enrichment, in the shape of cornices, pilasters, architraves, arches, balustrades, rustications, &c. The front might be that of a cotton mill, a bank, mansion, or a hotel; and though the first section is nothing but the commonest building, the last or fifth has some considerable pretensions. This fifth section I consider very fairly represents the generally accepted type of the modern method of civil and domestic architectural design. It is not, however, architecture at all, but merely the application of architectural ornaments of a more or less satisfactory character to the front of a building, which building, so far as practical requirements are concerned, would be quite as satisfactory in section 1 of Mr. Fergusson's illustration as in section 5.

Such a method of design, though no doubt recognised in the later Renaissance and modern Classic work, was not the method of the builders of either the Antique or Mediæval schools, where, apart from the ornamental features, the methods of construction, though widely different in the various stages of development, expressed the use, and so governed the form of the building.

Separated from this leading principle of utility (which is not apparently usually accepted in modern work), I do not believe good design can be produced in any style, and certainly not in Gothic, which, as was well said by Pugin, is the art of ornamental construction as opposed to constructed ornament.

This great principle guided the masters of the Gothic revival, such as Sir Gilbert Scott, Street, Bodley, Pearson, Butterfield, and others, in the most successful of their works; and these works will, I feel sure, come to be more justly appreciated when the present fashion for ponderous and clumsy revived Classic Renaissance has had a little time to cool down.

In criticising the civil buildings of the Gothic revival,

* A paper read before the Sheffield Society of Architects and Surveyors by Mr. Temple Moore, F.R.I.B.A.

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such as, for instance, in London, the Houses of Parliament, the Law Courts, and St. Pancras Hotel, &c., great allowance must be made for the difficulties the architects had to contend with in the carrying out of work at this time. For instance, among other things, the fashion of the day prescribed as an absolute necessity large sheets of plate glass in all windows, which alone is sufficient to spoil the appearance of any building, besides the desire for a machine-like accuracy in all architectural details, mouldings and carving, which gives to many buildings of this period a harshness which, had the methods of Gothic workmanship been better understood, would have been avoided.

In spite, however, of minor defects, the best of the Gothic revival buildings of this period are full of character and interest, and if the style had been persevered in its various characteristics would have become gradually better understood, and I believe a higher level of architectural art would have been reached than we are at present likely to see in what may be called public buildings.

The departure from the true principles of architectural design seems to have begun in this country with the works of Vanbrugh, whose pompous and heavy version of the Palladian manner has, I think, largely influenced from time to time the popular conception of architecture with us. Its influence is very evident in our more recent public buildings, with few exceptions, and it seems likely with men of the Classic school to cause the gradual obliteration of the much finer traditions of the earlier English Renaissance.

This English Renaissance may be said to have commenced in the reign of Charles I., and to have reached its highest point in the works of Sir Christopher Wren. The best examples of this period are unsurpassed in their particular way in the dignified simplicity of their proportions and details. The influence of this time gave us much charming domestic work of the simpler character, and its traditions remained to a large extent in our less pretentious buildings to quite the end of the eighteenth century. The influence of these traditions was, however, finally extinguished by the window tax and the earlier Building Acts.

The reaction against the utterly commonplace and unworthy buildings of the earlier part of the nineteenth century brought about the first serious attempt to revive the use of the mediæval styles; and I suppose that no one had greater influence in this than the elder Pugin, who certainly had an extraordinary insight into the true principles of Gothic design, based as it was in his case on a thorough study of old work.

Pugin is best known by his ecclesiastical work, and, to name a few examples only, his Roman Catholic cathedrals at Birmingham, Nottingham, and Derby, and the church at Ramsgate, are works of great excellence. The Birmingham church is one that has always attracted me in spite of its two very wretched western spires, but despite its spires this church is a very instructive one, showing as it does what may be done with quite simple materials and design. Externally it is of brick, and is fitted with great skill on to a falling and awkward site at the east end. It is, however, the interior which is the striking part of the building. The scale is, of course, small when compared with many ancient works, but is quite sufficient to give great dignity, and it is certainly one of the best works of its time.

Pugin's connection with Barry in the carrying out of the Houses of Parliament is, I think, now generally admitted, and the detail of much of this fine building certainly suggests Pugin's handiwork. The great fault, however, of this particular work is the over-elaboration of detail, every bit of the exterior being covered with niches and panelling, &c., which, though in themselves often of excellent design, become wearisome by endless repetition. This fault, indeed, is not confined to the Houses of Parliament, but is largely shared by most of our great buildings of late years, quite apart from the particular style in which they may have been designed.

Now I have come to think that this over-elaboration is largely due to people attempting to judge of buildings purely from the mechanical drawings showing them. As you perfectly well know, no building can ever be seen as it is shown on an architectural elevation or section, but the public (and I fear many architects) appear to think only of what the drawings look like. To make an architectural elevation look attractive it has to be loaded with a quantity of details and features which, when translated into the actual building, produces the fussy, restless feeling which is unfortunately the distinguishing feature of most of the architectural work of the last sixty years.

For example, if you will compare the drawings of nearly any old building of recognised architectural merit with a drawing of a modern design, you will at once be struck by the extraordinary difference of the two things on paper. Probably to most people the drawing of the modern building would be the most attractive, the old one would look bare and uninteresting, and the other would look ornamental.

Or again, I believe that if either the Ducal Palace at Venice (I speak of the front or Gothic portion facing the Grand Canal), or, say, Durham Cathedral, both of them in their different ways perhaps the finest buildings of their kind in the world, would, if drawn out to ⅛-inch scale elevations, stand a very poor chance in a modern competition. The assessor and his committee would almost certainly pass them both by as being bald and uninteresting, monotonous, lacking in originality, and so forth.

I feel sure that the great development in the skill of the architectural draughtsman within the last fifty years has hindered rather than tended to improve architectural design, the very natural tendency in these competitive days being to think more about the appearance of the drawing than the design and consequent appearance of the building it is intended to illustrate.

Please do not misunderstand me. I by no means wish to depreciate in any way good, accurate and sound architectural draughtsmanship; it is a real necessity under modern conditions, but it must never be lost sight of that it is merely a means to an end, and not the end itself.

Nor is this overloading the design of which I have been speaking confined to work of the Gothic school; it is quite as noticeable in modern Palladian; for if the draughtsman on the Gothic design runs riot with panelling and pinnacles, his brother on the Palladian design gives you a surfeit of rustications, which I think is possibly even a more wearisome form of—shall I call it?—decoration.

Not, however, content with rustication on the wall surfaces, which would enable you to count every stone in the building if you wanted to, a further development of the same idea has been reintroduced, and finds apparently much favour with the Palladian men—namely, the cutting up of engaged columns into short lengths by square blocks of stone.

It is hard to understand what beauty there can be in such a treatment of a Classic column, except it be with the object of making the drawings look more dotty. The columns of any of the antique orders are among the most beautiful architectural things ever designed, and with their perfect proportions, beautiful mouldings, and the enrichment of their caps, &c., are never likely to be surpassed in their own way. Whether used on a colossal scale in a portico, or in a Sheffield plate candlestick of the best Adams' period, a Classic column is a thing of beauty; but it is utterly unreasonable to cut its shaft into chunks by square blocks, which absolutely contradict and nullify the whole motive of the design.

In a large block of buildings lately erected in London the order (in this case, I think, Roman Ionic) has its shafts cut up for a considerable portion of their height in the abovementioned manner, and the effect is most unsightly, especially when the columns are seen in sharp prospective from below, which must so often be the case in buildings erected in a street.

The general tendency of the modern English Palladian school of design does not appear to me to promise well for the future. An increase in extravagance of design and material, together with in many cases an altogether uncalled-for increase in the scale, of the newer town buildings (notably in London) seem to be its leading characteristics. In scale the newer buildings frequently quite dwarf their surroundings, and the wildness of the design of many of them rivals the stick and rag architectural vagaries of the White City.

There are, of course, honourable exceptions, and one not infrequently sees in works of the domestic class buildings of refined and artistic design which show a careful study and appreciation of some of the best traditions of English domestic work.

(To be concluded.)

A Scheme is being promoted for a Scottish Exhibition of National History, Art and Industry to be held in Glasgow next year. Primarily the aim of the scheme is to raise funds for the endowment of a Chair of Scottish History and Literature in Glasgow University, but buildings, it is estimated, could be constructed at a cost of 30,000*l.* to 50,000*l.*, and defrayed by the sale of season tickets.

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Correspondence

[The Editor will not be responsible for the opinions expressed by Correspondents.]

Fire Risks in Buildings.

SIR,—As you were good enough to refer to my letter in *The Architect* of February 26, in your article on "Westminster Abbey and Fire Protection," I should like to say that the fact that there are hydrants to which the fire-engine hose pipes can be attached does not afford a satisfactory answer to the question you originally raised. Attention was drawn in *The Architect* "that some of the important buildings in the metropolis were not protected as fully as they might be if advantage was taken of the hydraulic mains of 700 lb. per square inch at their doors." A fire might break out at the Abbey when the engines were occupied at other conflagrations in distant parts of London, and we have to consider this fact, that New York has in parts of the city where there are high buildings abandoned the method of connecting the hydrants on the face of the buildings to the fire engines, and a special system of high-pressure mains has been laid for the sole purpose of fire extinction. After Mr. Wallace's explanation I will withdraw the expression "antiquated," but still think the appliances described are not up to date.

KILLINGWORTH HEDGES, M.I.C.E.,
Consulting Electrical Engineer.

10 Cranley Place, S.W.: March 16, 1909.

[Mr. Robinson, the late chairman of the L.C.C., stated a short time back that the New York fire mains are supplied with 350 lb. pressure per square inch.—ED.]

A. A. Play.

SIR,—Can you spare me a few lines in your correspondence columns to call attention to the fact that the A.A. play is taking place this year on March 24 and 26? My reason for writing is that last year so many people remarked that they did not know anything about it and would most certainly have gone if they had known. We are anxious, therefore, to bring it before the notice of your readers.

Tickets can be obtained from the undersigned or at 18 Tufton Street, S.W.

Thanking you in anticipation for inserting this short letter, I am, yours faithfully, THOMAS W. WATKINS.

11 Old Queen Street, Westminster, S.W.:
March 17, 1909.

[See announcement on front page.—ED.]

GENERAL.

The Royal Commission on Ancient Monuments in Wales, of which Professor Rhys is chairman, will resume its inquiry at Cardiff on March 23. After Cardiff other parts of the Principality will be visited.

Mr. Thomas Brock, R.A., in accordance with his intention announced some time since, has retired from the presidential chair of the Society of British Sculptors, and Sir Charles Lawes-Wittewronge has been elected president, with Mr. Brock as treasurer.

A Select Committee of the House of Lords, presided over by the Earl of Kintore, met on Tuesday to consider the Malvern Hills Bill, which proposes to give the Malvern Hills Conservators definite powers to preserve the hills from defacement by quarrying operations.

M. Bigot, former resident at the Villa Medicis, and winner of the Grand Prix de Rome in architecture, has been commissioned to produce a plan in relief of ancient Rome. M. Clemenceau has made a grant of 25,000 francs for the purpose.

The Dean of Canterbury has issued an appeal to incumbents within the Southern Province asking that each church should make a contribution—"perhaps a single offertory"—towards the 20,000*l.* now required to place the cathedral in a state of satisfactory repair.

The Meeting of the Edinburgh Architectural Association arranged for March 24 has been postponed till an early date next session, in consequence of Mr. Morley Fletcher's absence from town to attend the International Archæological Congress meeting at Cairo.

Mr. Ibrahim Shaik Ahmadi, Fellow of Bombay University and the first Indian F.R.I.B.A., died last month. He was for some years executive engineer of Bombay city, and was subsequently appointed special engineer of the Bombay Improvement Trust.

The Prizes were distributed on the 10th inst. to the successful competitors in the Manchester Society of Architects competitions. They were as follows:—Design for a church tower: Senior prize, F. Cowper; junior prize, E. B. Norris. Design for a timber-framed ventilating turret: Senior prize, W. J. Roberts. Design for a dressing shelter: Senior prize, W. J. Roberts. Design for lych gate: Senior prize, W. J. Roberts; junior prize, E. B. Norris. Prize winner for best work done in School of Architecture classes: Second and third year student, F. Cowper; first year student, H. O. Hill. Session 1908-9—Mr. Ogden's prize, design of a country house: Senior, first prize, Hubert Worthington; special senior prize of 2½ guineas, J. F. Cowper; special senior prize of 1½ guineas, W. J. Roberts; junior prize, E. B. Norris. Design for an entrance doorway: Senior prize, Leo H. Cross. Design for a college of arts: Junior prize, G. Hemm. Design for a country bungalow: Senior prize, L. M. Angus; junior prize, G. Hemm.

The Margaret Stokes Memorial Lectures will be delivered at Alexandra College, Dublin, on Wednesday, March 24, and the two following days at 4 P.M. The lecturer will be Professor W. Ridgeway, D.Litt., LL.D., Professor of Archæology in the University of Cambridge. The subject of Professor Ridgeway's first lecture will be "Ireland in the Bronze Age." In the second he will deal with "Ireland in the Early Iron Age," with special reference to the "Oldest Irish Epic," on which Epic he published a book in 1907. In the last lecture he will treat of "Ireland in the Early Middle Age."

The Cambridge Syndicate appointed to obtain plans and estimates for a museum of general and local archæology and of ethnology on the Downing College site are of opinion that, as the fund amounts to over 10,000*l.*, leave should be asked from the Senate to begin at once the first portion. Some of the rooms will be available for the Cambridge Antiquarian Society. The building, designed by Mr. T. G. Jackson, R.A., will abut on the Squire Law Library, and occupy the vacant ground at the corner of Downing Street and Tenniscourt Road

The Council of the Surveyors' Institution have accepted an invitation from the South Wales and Monmouthshire committee of the Institution to hold the next country meeting at Cardiff on May 20 and 21.

It is Stated that the Very Rev. Dr. Cameron Lees, minister of St. Giles's Cathedral, Edinburgh, and Dean of the Order of the Thistle, has received a letter from Lord Knollys on behalf of His Majesty the King as head of the Order of the Knights of the Thistle, stating that the Knights of the Thistle desired to have a chapel or stalls of their own in the capital of Scotland, that they had given up the idea of having such in Holyrood, and now wished to know if the authorities of St. Giles's would favour the idea of accommodating the Knights in the Cathedral. Lord Leven and Melville has placed at the disposal of His Majesty for this purpose his share of the 40,000*l.* his father left for the restoration of Holyrood Chapel, which sum went back to the family estate on account of the project not begin proceeded with. The sum in question amounts to 20,000*l.* or 25,000*l.*

The Leighton House Committee are raising a sum of 250*l.* for the purpose of acquiring for the public Lord Leighton's first large and important picture, "The Death of Brunelleschi," painted when he was twenty years of age at Frankfurt, where it has remained till now. The work belongs to Dr. von Steinle, son of Professor Eduard von Steinle, Lord Leighton's master [illegible] friend, who has lent it for exhibition in the studio [illegible].

The Northants Education Committee have agreed to the following appointments of architects for new work:—Badby new school, Mr. J. T. Blackwell, Kettering; Burton Latimer new school and special centre, Messrs. Gotch & Saunders, Kettering; Corby new school and special centre, Messrs. Sharman & Archer, Wellingborough; Rothwell special centre, Mr. J. T. Blackwell, Kettering; Silverstone new school, Messrs. Brown & Fisher, Wellingborough; Towcester new school, Messrs. Law & Harris, Northampton.

The Royal Academy of Arts will, on the 23rd inst., elect one Cousins annuitant. Applicants for the annuity, which is of the value of not more than 80*l.*, must be deserving artists, painters in oil and water-colours, sculptors, architects, or engravers, in need of aid through unavoidable failure of professional employment or other causes.

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The Architect.

THE WEEK.

ON Wednesday last the Lord Chief Justice, Mr. Justice DARLING and Mr. Justice JELF, sitting as a Divisional Court of the King's Bench Division, gave judgment in the appeal case of the London County Council *v.* the District Surveyors' Association. As our readers may remember, the London County Council, although succeeding to the duties and responsibilities of the School Board, considered that they were not bound to give notice to the District Surveyors or to be subject to their supervision under the provisions of the London Building Act. A test case was tried before Mr. GARRETT, the stipendiary magistrate at the South-Western Police Court, and he decided against the County Council, but stated a special case for the High Court. Their lordships held that although the London County Council did not come within the purview of Parts VI. and VII. of the Act, they did come within the provisions of Section 145. The appeal of the Council was therefore dismissed and the decision of the magistrate affirmed.

AN important decision was given on Friday last in the Consistory Court of London, at St. Paul's Cathedral, by Dr. TRISTRAM, the Chancellor of the Diocese of London. An application was made by the Vicar (the Rev. WALTER FORSTER, M.A.) and both the churchwardens for a faculty to authorise the erection of a rood-screen, the essential feature of which, as proposed, was a rood-beam with a central cross containing the figure of Our LORD, crowned and reigning on the Tree, with the accompanying figures of the VIRGIN and ST. JOHN. That is, in short, the screen was to be a veritable rood-screen. The main point of the learned Chancellor's judgment was to determine whether the rood-screen was an architectural ornament or a church ornament as referred to in the rubric in our present Prayer-book. "And here it is to be noted that such ornaments of the Church and of the ministers thereof at all times of their ministration shall be retained, and be in use, as were in this Church of England by authority of Parliament in the second year of the reign of King EDWARD THE SIXTH." The Chancellor decided that a rood is an ornament of the Church within the meaning of the rubrics, that it is not prescribed by the rubrics, and not necessary or subsidiary to the performances of the Church, and therefore he declined to grant the faculty, notwithstanding that it was urged on behalf of the application that the erection of the screen would materially assist in strengthening the piers of the chancel arch, which had been affected by recent drainage works.

ALTHOUGH half a million sterling is a large sum to raise for any one object in these days, there is good reason to hope, after the meeting held at the Mansion House last Tuesday, that the Shakespeare National Theatre in honour of the tercentenary of the poet's death, which took place in 1616, may become a reality. Enthusiasm was imparted to the committee by the announcement of an anonymous donation of 70,000*l.*, and starting from this encouraging commencement there appears to be a strong probability that we may have in London a repertory theatre which shall do for dramatic art in England what the Comédie Française has done in France.

IN the Newcastle section of the Society of Chemical Industry a paper was recently read by Mr. CHARLES J. POTTER on "Chemical Changes in Portland Cement Concrete and the Action of Sea-water thereon." Some concrete has been found to be injuriously affected by the action of sea-water, and as a result of various experiments it has been discovered that the addition of six parts of red calcined clay to ten parts of the cement clinker before grinding gave the best results and obviated the damaging effect of the sea-water. It has also been found that the action of carbonic dioxide on cement concrete brings about a high degree of induration. Some years ago we analysed some specimens of American hydraulic lime which had been successfully used with sea-sand, and found that this lime contained a high percentage of magnesia and a very small amount of alumina silicate, from which we deduced that whilst ordinary hydraulic lime cannot well be used with sea-sand, a dolomitic lime is not open to the same objection. With regard to the use of red calcined clay in concrete, we have found that burnt clay ballast with Portland cement for matrix produced a concrete which, when examined some twenty years after it had been laid in foundations, was of remarkable hardness and strength. It is scarcely necessary to say that the clay had been thoroughly well burnt.

THE British School at Rome is desirous of undertaking excavations at Malta on the lines of the successful and valuable explorations of Dr. EVANS, this year's Royal Institute gold medallist, and Dr. MACKENZIE at Cnossos, and hopes to obtain thereby results of equal importance. Funds are wanted, and the Secretary of the School has made an appeal for contributions.

SCOTS law is not on all fours, as they say in the Courts, with that of England, but nevertheless the result of the appeal of the executrix of the late WILLIAM MACKISON, borough engineer of Dundee, against the decision of Lord GUTHRIE in the action of Mr. MACKISON *versus* the Corporation of Dundee, is not without interest. Mr. MACKISON, as our readers may remember, was borough engineer of Dundee for some thirty-eight years, during which time he performed many services beyond what he or anybody else, as far as we can make out, anticipated would be within the sphere of his duties when he was appointed. The value of these services he estimated, and no doubt rightly, at 45,000*l.*, but he claimed and sued for 15,000*l.* only. He died whilst the action was in progress, and although the Town Council offered to compromise for 4,000*l.*, this was refused by his trustee, the case was lost, and his estate condemned in costs. The appeal has been no more successful, and has been dismissed with costs. This case is illustrative of what is happening all over the country. Public authorities, in plain language, are robbing the engineering and architectural professions of enormous sums of money. They decide to employ a salaried official, as borough engineer, council surveyor, education architect, or in some such capacity. They appoint a young man, at the outset of his professional career, to whom a fixed salary of some 300*l.* a year or thereabouts, sometimes less, is more attractive for the moment than the uncertainties of private practice. At first he is, at the figure, well paid; the work is not excessive, but it grows. As an instance, when the late Mr. MACKISON was appointed his staff numbered three; when his employment was terminated in 1906 it was eighteen. The salary no doubt increases to some extent, but not to anything like what it should be if it were in accordance with the skill and experience gained by time and study or with the added responsibility, until the unfortunate paid official finds that he is carrying on a practice which, in the ordinary way, would probably bring him in ten times what he receives. He has no redress; like Mr. MACKISON, at his appointment he was bound to give his whole time to his masters, and no matter what the value of his services might be, he can claim no more than his salary, but must be humbly grateful for any little extra honorarium or Christmas-box his employers like to give him. The Dundee Town Council generously gave Mr. MACKISON during his thirty-eight years of admittedly conscientious and unsparing work the munificent additional sum of 205*l.* No wonder at their last meeting they congratulated themselves that they had good reason to be satisfied with the decision. Are the Councils of the Institution of Civil Engineers, the Surveyors' Institution, and the Royal Institute of British Architects also satisfied?

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MADRID.*

WHEN one is contemplating and planning a holiday abroad one is thankful to be furnished with a clear and concise account of what is to be seen in the localities to which one's thoughts are inclined as a possible object of pilgrimage, and such guidance is admirably furnished by the Spanish Series of Mr. ALBERT CALVERT. When an architect has left behind for ever his *Wanderjahre*, and can no longer spare time for the delights, the disappointments and the thrills of discovery that go to make up the charm of an exploring tour, he wants to know beforehand where to go without loss of time and with prescience of what he will find. The present volume opens out the possibilities of Madrid, "Imperial y Coronada, muy noble y muy leal y muy heróica."

Madrid is essentially a modern city and has little to show in the way of antiquities as compared with other towns of Spain—Segovia, Toledo, Avila, Burgos, Seville, Cordoba and Granada. It is emphatically not the place for a young architectural student, for a Soane medallist or a Tite prizeman, but for him whose faith is on a sure foundation and whose judgment is sound the opportunities that Madrid affords of studying the work of the seventeenth and later centuries of Spanish architecture are valuable and suggestive. For Moorish work and the *plateresco* period of Spanish Renaissance a twenty-mile journey must be made out of Madrid to the old university town of Alcala de Henares, but the Herreresco, the Baroco and Rococo can be found in the capital city of Spain to quite as great an extent as is wholesome.

The handbook before us is just what is wanted as a preparation for visiting a city like Madrid without the tedium of the ordinary guide-book. After a chatty chapter on the general aspect of Madrid, hygienic and social, we have a sketch of the history of the city from the tenth century to the latter part of the nineteenth, and of the manners and customs of the Court and society. Then a chapter on art in Madrid. This being a book for the Philistine, art, of course, means painting and painting only. VELASQUEZ, MURILLO and GOYA overshadow all other Spanish painters, and it is in Madrid, particularly in the Museo del Prado, that their masterpieces are to be found. Art in Madrid is not, however, confined to painting, but is prominent in remarkable works of the best armoursmiths of Europe, collected in the Royal Armoury, a collection unsurpassed by any other and approached only by that in the Imperial Armoury at Vienna. This collection owes its high position not to Spanish craftsmen, celebrated as were the sword-blades of Toledo, but to the superlative workmanship of famous Bavarians and Italians, notably the COLMANS of Augsburg and the NEGROLIS of Milan.

A sketchy account is given of the architecture and history of the churches and public buildings, as also of the little town of Alcala de Henares to which we have already alluded, and then a tolerably full description of bull-fights and bull-fighters makes up no inconsiderable proportion of the literary part of the handbook. Quite properly, for the bull-fight is the most assertive feature of the life of the Madrileños, and Madrid is the Mecca of every Spanish *torero*. Mr. CALVERT seems to think that a feeling is growing up even in Madrid against the worst feature of the Spanish bull-fight, the massacre by the horns of the bull of the miserable specimens of worn-out horses that are ridden to their death by the *picadors*. The Spaniards might very well learn in this respect from their neighbours in Portugal, where the gallant bull is not killed, and where any horseman who allowed his steed to be even scratched would be hissed out of the ring. Hence the finest horses and the finest horsemanship in the country are displayed in the Portuguese bull-ring, and both horse and bull probably enjoy the sport as much as the man and more than the spectators. There is, in fact, in the Portuguese bull-fight no more cruelty than in a Rugby football match, and the sport is in no way inferior, if indeed it be not superior, to the Spanish form. Even if, to preserve the exhibition of the high skill and courage of the *espada*, the death of the bull still remained the crowning feature of the fight, the introduction of the Portuguese equestrianism would add largely to the interest of the spectacle and deprive it of its most revolting episodes.

We now come to a remarkable feature of this charming handbook. There are 169 pages of letter-press, in large print with wide margins, and 453 pages of illustrations, almost all reproductions of photographs. Of these a large proportion are views of buildings and parts of buildings old and new, and although the scale is too small to admit of serious study of their architecture, they nevertheless gives us an excellent idea of what Madrid has to offer, the formality of HERRERA, the Late Gothic of the Hospital of the Conception or "la Latina" in the Calle de Toledo, the wildest extravagance of the Baroco, as in the façade of the hospital in the Calle Fuencarral, besides the modern work of the nineteenth century. Although HERRERA's work may be formal, it is not without dignity and power, and there is much that is admirable in his designs. The tabernacle in the Escorial Church, executed by TREZZO, although "restored" in 1827, is a very excellent piece of detail.

The Escorial, monastery, palace and tomb, is fully illustrated, so that the reader may form his own independent judgment of its merits or defects, and may or may not agree with the opinion of the author, whose impression can be gathered from these words:—"In its simplicity and hugeness it might easily be mistaken for the work of Nature, not of man. Artistically this is perhaps its sole merit, yet, as I have said, it never fails to awe." This impression is probably the result of the material of the building, grey granite, and the severity of its façade treatment, but what particularly strikes us is the maintenance of what seems to have been a dominant characteristic of composition in the work of the early Spanish Renaissance architects—restraint in the lower portions of their buildings with richness in the upper parts. The façade of the University at Alcala de Henares, included in the illustrations, is an instance of this mode, and is but one of many that may be found throughout Spain. The austerity of the wall treatment of the external façades of the Escorial is, to our mind, an admirable foil and support to the grouping and piquancy of the features that go to make up the skyline. To appreciate the general composition of so huge a building one must view it from a distance, such as the point from which is taken the general view. Mr. CALVERT tells us that the original plans were drawn by JUAN BAUTISTA DE TOLEDO, and the first stone laid in April 1562, and that on the death of the original architect in 1563 the work was carried on by his assistant, JUAN DE HERRERA, and completed in June 1582. But our author says, "The real architect was PHILIP himself." "TOLEDO and HERRERA can have had little else to do than commit the scheme to paper." We should rather say that the designer of the Escorial must have studied the work of BRAMANTE and PALLADIO, and then, influenced no doubt by his studies but without copyism, he has imbued his conception with his own personality, and that the personality of a Spanish architect. For example, the little octagonal temple in the centre of the Patio de los Evangelistas reminds us irresistibly of BRAMANTE's San Pietro in Montorio, and yet it is in no sense a copy, but, we agree with Mr. CALVERT, "one of HERRERA's best works" and thoroughly characteristic of that architect at his best. We are somewhat amused at Mr. CALVERT's stricture on the palace portion of the Escorial, the interior of which he says is "altogether in the style of the eighteenth century, a sufficient condemnation." This reminds us of the story of the missionary who warned the Esquimaux of the fires of Hades—they all wanted to go there. "The style of the eighteenth century" is an attraction for our readers nowadays. The truth is that in the Escorial we have eighteenth-century work devoid of the extravagances of the Rococo.

Numerous illustrations are given of the artistic work

* ***Madrid: an Historical Description and Handbook of the Spanish Capital.*** **By Albert F. Calvert. (London: John Lane, the Bodley Head. 3s. 6d. net.)**

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of the famous Italian and Bavarian armoursmiths of the sixteenth century, the period when in the last days of armour-clad warriors art in the most extraordinary degree was superimposed on utility. It is in this particular phase of the armourer's craft that the Madrid collection, thanks to the patronage of CHARLES V. and his immediate successors on the throne of Spain, excels all others. Of earlier work "it includes few pieces anterior to the last years of the fifteenth century, and none at all of the fourteenth."

The gateways of Madrid are admirable pieces of architectural design, and so too is the Toledo bridge, whilst the modern work is, as elsewhere, sometimes good and sometimes not, but is usually characteristic. In short, Mr. CALVERT'S handbook shows us that Madrid is well worthy of a holiday visit by English architects. Judging from their works, some of our leading architects have already been there.

ARCHITECTURE: ITS TRUE PRINCIPLES.—VI.

By R. OWEN ALLSOP.

BUILDING MASSES.

TO "mass" is to collect into a body, and the object in architectural composition is the attainment of unity. The ultimate effect of massing in building is to interest by the disposition of parts. All mere creation of *outline* for its own sake is bad. The skyline of a building can never be considered as a primary effect. Intentionally silhouetting reduces the art of architecture to that of fretwork.

Massing may be either general, subordinate, or of detail. Thus we may group a roof and tower, or the parts of a façade, or the foliation of a capital. The art of arrangement—fine grouping—is pre-eminently the art to strive for an architectural design. Good grouping means good outline as a natural result, whereas effective outlines may be cut out of cardboard and silhouetted against the sky. The latter effect belongs more to the scenic painter's art. The charge of mere fretting cannot be brought against such an object as the spire of Antwerp Cathedral, because the beautiful silhouette is derived from skilful arrangement of necessary features. Besides, no one ever *saw* a symmetrical outline in a building, whereas symmetry is the great aim of the fretworker, and from the smallness of the completed object a practically symmetrical view is given to the eye. A *pattern* against the sky is not required in architectural design. Perspective effect destroys any "symmetry" in large objects. The main plea for a well balanced effect of building outline must be based on the supposition that the building is to possess some beauty and interest at a distance. One general description of the nature and requirements of architectural design may be gained by advancing towards a building. Afar off we see interesting outline rising against the sky. On nearer approach the general grouping begins to affect the observer, and what might be called the middle-distance view has, for its base of effect, outline *plus* composition. The nearer we approach the less importance is attached to mere outline. The arrangement of masses becomes of the first importance; nearer still the subordinate grouping interests us, until when we stand beneath the portals outline and grouping, both major and minor, cease to have any value (because we cannot see them) and we become absorbed in the details. Providing that the practical needs —service—of the building are properly fulfilled, we have, if satisfied with our view, from distance to close proximity, been beholding a true work of architecture. If now we start away from a building and recede, we can equally show what is not architecture. Our examination of the detail work may be satisfactory, and the main grouping of parts may be passably interesting; but let it be supposed that as we move off we discover bad major grouping—uninteresting and tame—ugly to the stage of that is revolting, and that when we see the general outline only there is nothing but a monstrously ugly silhouette; then we may fairly say such is not architecture—being imperfect in its nobler qualities. And here we may see that detail of itself cannot be counted architecture, can indeed scarcely be termed architectural, if it has no harmony with the larger mass. Truly, of such a work all the beauty might have been shown in a museum.

Such a composition as last described may well have been produced by one who had no grasp of the whole problem, or by one who had never thought of architecture except of the elevational type or as a mere frame for exhibiting detail. All such detail might have been hung for exhibition on a screen. Assuming that of itself such detail were pleasing, take it away, and what remains? There is a building certainly, just as in the most utilitarian engineer's design there is a building. But there is no architecture. Architecture, then, is pre-eminently a compound. And if a compound, is composed; and, therefore, in the actual composition must reside effect for good or for evil.

In natural scenery and in natural things the universal tendency is towards grouping and the formation of masses. A view over a countryside does not reveal sheep and cattle, trees, clouds and sky mixed up heterogeneously. The clouds group in the heavens, sheep graze with sheep, kine keep to kine; there is a breadth of hill country and broad stretches of marshland, belts of trees of a kind, land here in mass and water there, flights of duck or starling—everywhere the old saw as to birds of a feather applying to all things animate and inanimate, in a wonderful manner when we reflect that we might reasonably expect some intermingling. Generally, this rule is correct; plantations, farmyards, and "happy families" being artificial. All painters in pictorial composition imitate this principle of nature. The essential of the picturesque would be lost by, as it were, putting a landscape into a mixing machine and producing a mass homogeneous in all its parts—that is, having the same amount of bird, beast, tree, water, land, and sky to the unit of surface. The climax of "patchiness" would result. It would seem at times as though a designer of buildings having, say, twenty or thirty fine columns at his disposal, considers that he will do best to eke out his stock, a little here and a little there. To make groups and to mass the groups seems the truer principle. So powerful for effect is massing that painters not only seek groups of like things, but bring together unlike groups, tier behind tier, mass upon mass, as best evidenced in many of TURNER'S great pictures. There are some who complain that they cannot see St. Paul's Cathedral, and would apparently be pleased to find the building standing isolated like a model on green cloth, and to deprive those who have eyes, and see, of numberless examples of magnificent massing, and of the necessity for viewing the building in many places, in sharp perspective, in the manner that WREN evidently intended. Bred on elevations and impossible geometrical representations, the taste for elevation and two-dimension effect persists.

If the architect should be judge as to what constitutes architecture, the artist should say what constitutes beautiful architectural effects. That which the latter abhors seems first of all a rigid, symmetrical, elevational effect and the uprising of isolated masses in bald nakedness. In consequence, in picture-making where the least chance and justification occurs he will group and mass; and this being so it seems necessary that the architect should group parts of a building in a manner that will attract his eye. In his reliance on the principle of placing mass against mass, the artist is strictly following nature. Only when we seriously ponder over this question does the principle of massing observable in nature impress us with some sense of its aspect of infinity. It might reasonably be imagined that the eye would soon weary of endless variety, and that, say, when we beheld a flower it should be placed against a monotonous background and clearly relieved in all its parts. The truth lies at the other pole. A moment's consideration of the exact point shows first that in nature one object is placed behind another in practically endless vista; and, secondly, as shown us by the artist, monotonous background never occurs in

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Fig. 15.—ST. PAUL'S, AND ST. MARTIN'S, LUDGATE.

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nature, but as a general rule an object breaks from obscurity into prominence, here emerging from the light and there lost in shadow. If any kind of a rule could be suggested in this matter as affecting the art of architecture, it might be that each relieved object must be *sui generis*—pure and not mixed up, in its form and nature, with parts in a different plane. Impurity seems the one great sin in architectural design. The thundering of one-half the biblical writings—against impurity—may suggest the wrongfulness of impurity in all things under the sun; for unless the abnormal had in itself the seeds of death—or impotency in continuing as a series—weird types would be evolved. And we must consider that, for example, Ionic volutes and pointed arches would be a very weird type indeed.

It might be urged that the matter of massing more affects the architectural artist than the architect. The truth is rather that it is impossible to too much consider the principles of orderly grouping and effective massing of groups. And to this is closely related the principle of concentration; for massing has plainly to do with what we finally call "proportion," since it leads to an interesting contrast of varied sizes and dimensions, linear and superficial. If we construct an arcade, we mass arches, and their ultimate grouping constitutes something that contrasts with a residue—hence brings about an effect in the nature of proportioning. The final outcome is that we have *created an effect* that would have been lost by frivolous patching of the arches all over the façade. The beautiful effects of condensation on a window pane result from grouping, as distinct from the diffusion of water as vapour. In the Gothic style pointed arches are massed; in the Classic, square-headed openings. The principle involved evidently conduces to more power and breadth—more character—in ultimate effect, than if an admixture were made of the two species of form.

(To be continued.)

NEW BOOKS.

THE latest addition to the books dealing with sanitary subjects published by CHARLES GRIFFIN & Co., LTD., is "Principles of Sewage Treatment," a translation by Dr. H. T. CALVERT from the German of Professor Dr. DUNBAR, who is Director of the Hamburg State Hygienic Institute. England has the dubious privilege of having rivers which are worse polluted than those of France, Germany, or any other European country. This misuse is traceable to the introduction of the water closet in 1810; although it was not until half a century later that underground sewers were constructed which emptied into the rivers at the nearest possible point. In 1865 the first Royal Commission was established in England to inquire into the pollution of rivers. Four years later a Commission was appointed to consider the disposal of London sewage, and out of it arose the Local Government Board—a body, we are told, which "has exercised a somewhat fatal influence on the development of the problems of sewage disposal and river pollution down to very recent times, not for want of good intentions, but rather as a result of its bureaucratic constitution." Indeed, Professor DUNBAR believes that the past has clearly proved that in this country legislation alone will not achieve the desired results, but that much more may be expected from the formation of a special authority free from bureaucratic influence, consisting of experts in the various branches of the subject, occupying such a position as to command the sympathy of all parties, able to follow any developments, and free to make its decisions. Part I. deals in thirty pages with the historical development of the sewage problem, while the two hundred odd pages of the second part treat of the present position of sewage treatment. Six methods are described for the removal of suspended matters, viz. (*a*) detritus tanks, (*b*) sieves, gratings and screens, (*c*) grease extraction, (*d*) settlement, (*e*) septic treatment, (*f*) precipitation. This long chapter, and the still longer one that follows it on "Methods for the Removal of Putrescibility" are generously illustrated. The author seems as much, or more, conversant with English experiences than with German. His studies have made him convinced that many towns will eventually abandon irrigation in favour of the cheaper artificial biological processes. The book is remarkable for the amount of information that is put into the space, and it is easy to believe the statement that Dr. DUNBAR has consulted, and doubtless thoroughly studied, over a thousand reports and publications dealing with his subject.

Mr. JOHN S. BRODIE, M.Inst.C.E., says in the introductory chapter to his book, "The Ventilation of Public Sewers" (The St. Bride's Press, Ltd., London), that "up to the present time little real progress has been made in the direction of uniform success in the solution of this difficult problem"; although as far back as 1835 a large number of gully traps were formed in the surface-water gullies of the Metropolis. The author takes early opportunity to emphasise his opinion that any scheme for ventilating a defective sewer (*i.e.* one with insufficient gradients or of unsound construction) will only end in disappointment, the only remedy possible being to take it up and relay it on proper principles. Mr. BRODIE is convinced that even perfectly designed and well-laid sewers require proper ventilating arrangements to make them work satisfactorily. Chapter III. is chiefly made up of reports from municipal surveyors and independent engineers on the forms of ventilation by natural air currents. It would appear that the surface gratings in centres of streets are now being replaced by, or used in conjunction with, upcast shafts. The two chapters entitled "Sewer Ventilation by Artificially Produced Air Currents" and "Deodorisation of Sewer Air and of Sewer Gas" give exhaustive accounts of various methods, though they are more descriptive than critical. The author says elsewhere that no reliable information is obtainable to enable a correct general conclusion to be arrived at; each system of sewers must therefore be considered and dealt with on its own basis. Very useful information is given in the chapter on "Comparative Costs of the Various Systems now in Use," including the first cost of installation as well as the charges for working and maintenance. It is estimated that the first cost per mile of sewer ventilated by open surface gratings with 6 inch by 4½ inch shafts against gables of buildings is 57*l.* 15*s.*, and the annual cost per mile is 11*l.*; if 6 inch diameter ventilating columns 30 feet in height placed on lines of kerbs are employed, the figures are given as 108*l.* and 16*l.* respectively. The appendix forming the second half of the book is made up of abstracts of reports, papers, &c., of which the majority were delivered during the last ten years. The great diversity which exists in both theory and practice is well exemplified in the replies to fourteen questions sent out by the Kensington Vestry to thirty-one towns.

"A Text-book of Theodolite Surveying and Levelling" for the use of students in land and mine surveying (London: CHARLES GRIFFIN & Co., LTD.) has been written by Mr. JAMES PARK, who is Director of Otago University School of Mines, New Zealand. It admirably fulfils its avowed purpose of dealing in a simple and elementary way with the course of instruction in theodolite surveying now laid down for engineering and mining students and for candidates for examination as licensed land surveyors in the United Kingdom and in the Colonies. The matter in the pages, when taken with the concurrent field work, is intended to cover a two years' course in surveying.

"Modern Methods of Sewage Disposal" (London: The Sanitary Publishing Co., Ltd.) is a small handbook of less than sixty pages which has been written for members of local authorities and their officials who may lack time and opportunity to study elaborate treatises when it is necessary for their boards to undertake the construction of such works. Mr. W. H. TRENTHAM and Mr. JAMES SAUNDERS, A.M.I.C.E., the authors, can scarcely expect, however, that their condensed account will enable an unaided choice to be made as to the most suitable system. Indeed it is evident that they regard as a *sine qua non* that the sanitary engineer, presumably a consulting engineer, who designs a sewerage scheme will possess a great amount

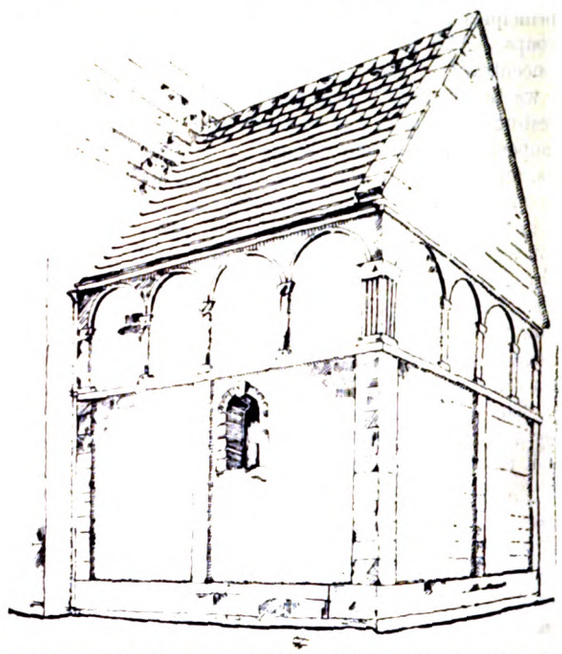
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of skill and experience, and be conversant with every part of the management. Consequently their small book is in the nature of a general introduction to more detailed studies, or a guide for earnest representatives on sanitary committees who wish to display an intelligent interest in the matters entrusted to their charge. Mr. Saunders should know the sort of information that is wanted, for he was late resident engineer at the Chichester Sewage Disposal Works. The phraseology adopted is as simple as possible considering the technical character of the subject.

Port Sunlight is one of England's show-places, and has been several times visited by deputations who come to study that economic experiment. There should be an ample sale for "Labour and Housing at Port Sunlight" (London: Alston Rivers, Ltd.). Mr. W. L. George obtained his information from eighty-seven people, only nine of whom were officials, while thirty-one were working men and women, and thirty-six were employés of institutions and others. The three first chapters give a detailed account of the admirable organisation of the scheme; the fourth is entitled "The Village: Topography and Architecture." The illustrations to it are distributed throughout the book and are made up of photographs and a fair number of plans of the different buildings together with a block plan of the entire village. Charming as the township is shown to be, we can readily agree that "the final conclusion as regards the general effect is that it depends to a great extent on circumstances other than architecture; Port Sunlight without its spirit would be only an ideal city, an antiseptic paradise." Unfortunately this leaven has not yet produced any visible effect on improving adjacent villages. Nevertheless it is comforting to look through the pages and to know that the picturesque buildings and far-sighted provision for the workers can be proved in material figures to be profitable to the shareholders themselves. The book is a valuable and interesting study.

The quickening interest in the topography of the Metropolis should receive a fillip from the latest contribution, called "Old London" (London: Alexander Moring, Ltd.), which consists, with one exception, of fifty reproductions of engravings made during the last half of the eighteenth and the first half of the nineteenth century. The handy size of the book (9 inches by 6½ inches) and its cheapness put it on a different footing to some other works dealing with the same subject which are too formidable for the average citizen to purchase or examine. It therefore in no way clashes with the important publications of the London Topographical Society. Each plate is faced by explanatory letterpress giving concise historical notes concerning "the London of our ancestors." An interesting plate is of the Mansion House in 1750 with the "Mare's Nest"—*i.e.* two detached blocks of two storeys each on the roof, and which were used for the servants' accommodation. The addition makes a striking change in the appearance of Dance's building. It is curious to be reminded that as recently as forty years ago the Thames used to wash the southern front of Somerset House. Mr. W. L. McNay, the compiler, has been able to make up an index.

"English Church Architecture, from the Earliest Times to the Reformation." By G. A. T. Middleton. (London: Francis Griffiths, 2*s.* 6*d.* net). Though not to be compared with the writings of Mr. Prior and Mr. Bond, or even with our old friends Parker, Bloxam, Britton, and Sharpe, to say nothing of Sir Gilbert Scott's lectures, this little book is useful as a "first-aid" to the study of our English mediæval architecture by the amateur or even the youthful professional student. Mr. Middleton's meat is not too strong for babes and sucklings, and while he does not attempt to teach everything about English Gothic, what he does teach is put clearly and simply, so that his reader will know something and that something worth knowing after by no means laborious study. We think Mr. Middleton hardly emphasises sufficiently the Keltic influence as a formative element of English architecture. It is rather the fashion to assume that the Saxons, the Danes, and the Scandinavians drove all the Kelts into Cornwall and Wales, but it is scarcely possible that the Vikings swept the land completely of its former inhabitants, and the production even late in the Norman period of such work as that at Shobdon—and this is by no means a singular instance—is evidence of the long continuance of the Keltic influence, while the fact that the square east end and the lateral entrances of our mediæval churches were undoubtedly derived from the Keltic church plan shows how powerful must have been that influence. Mr. Middleton, although somewhat timorously, upholds Parker's theory of the stone-carpentry origin of Anglo-Saxon wall treatment, but we hold that the view of the late Mr. John D. Sedding is far more rational, and that Earl's Barton and similar work is the untravelled English mason's translation of the verbal descriptions or primitive drawings of the Romanesque architecture of Ravenna



brought over by Italian clerics. The subjects of the illustrations are for the most part well chosen, and, by permission of the publisher, we reproduce one as a specimen of the draughtsmanship. The capital from Roche Abbey, fig. 55, is, however, a bad example, and proves that mediæval work was not always good. Jointing is so essentially part of the design in English Gothic that we are sorry to see, as in figs. 43, 44, 46 and 47, geometrical drawings in which the masonry joints are omitted instead of being shown as they should be and as they are in most other cases.

The "Cement Laboratory Manual" (London: Chapman & Hall; New York: John Wiley & Sons) has been prepared for the use of students taking the cement laboratory practice in Illinois University by Professor L. A. Waterbury, who is Professor of Civil Engineering in the University of Arizona. The title of the manual is therefore misleading in so far as it is not intended to serve for laboratories at cement works, but only for those in colleges and universities. An important feature of the book is the part devoted to problems in which the page facing the problem is left blank for the student's notes. For example, problem 1 is for the determination of fineness, and describes the apparatus required, the materials required, the method of operation, and of making up a report. These problems are not intended to serve as instructions for the testing of cement for commercial purposes, but they include all the usual tests.

Mr. Albert C. Freeman, who has already written books on Poor-Law buildings, mortuaries and crematoria, has now completed one dealing with "The Planning of Fever Hospitals" and disinfecting and cleansing stations (London: The Sanitary Publishing Co., Ltd.). The one hundred and sixty pages cover the restricted range of the subject; they are lightened by many text illustrations and by interleaved plans. After Mr. Freeman has intro-

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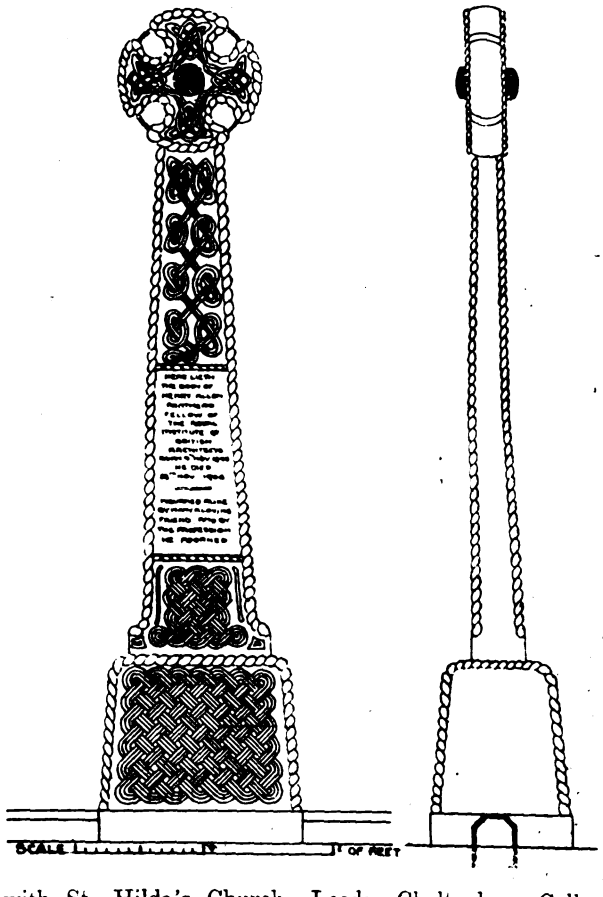
duced the subject as a whole, he deals with particular infectious diseases hospitals, giving briefly the principal features of each. In one or two instances, such as Coventry, the plans are left to speak for themselves. Needless to say, there is a wide difference in outlay. The Brook Fever Hospital, Shooter's Hill, was erected in 1895 by the Metropolitan Asylums Board at a total cost of 286,262*l.*, giving an average cost per bed of 503*l.* 15*s.*; whereas the Crewe Hospital cost 7,000*l.*, or an average outlay of 250*l.* for each of its twenty-eight beds. Mr. T. W. ALDWINCKLE, who designed the hospital at Shooter's Hill, advises the erection of two hospitals for 200 beds each, rather than one for 400 beds, and considers that the maximum number should be 300 beds. The book will prove a valuable and very practical guide to architects and officials who have to design these buildings.

It might seem an exaggeration to say that the castles of England have been neglected by historical-antiquarian writers, but that they are not a great source of attraction is undoubted. Mr. E. B. D'AUVERGNE, in the preface to his book "The English Castles" (London: T. WERNER LAURIE), says that since 1884 only two works of note dealing with the castles of this country have appeared—viz. CLARK'S "Mediæval Military Architecture" and Sir JAMES MACKENZIE'S "The Castles of England." The former is described as "a work written by an architect for architects, and contains a mass of details, valuable enough it is true, but a trifle wearisome, I imagine, to the general reader"; and in addition the theories advanced have been exploded. The author, whose aim has been to hold the balance even between the architectural and historical treatment of his subject, found the division of the work into chapters and the classification of the castles a perplexing and unsatisfactory task. The chapters are arranged thus:—(1) The citadels; (2) Norman and Pre-Norman castles; (3) castles of the Angevin period; (4) the Edwardian; and finally the palace castles. The introductory chapter gives a general review of castle-building from the advent of the Conqueror, who in the first year of his reign summoned Bishop GUNDULF to design the Tower of London, until the sixteenth century, when HENRY VIII. erected Pendennis Castle, in Cornwall, to accommodate artillery. There are now open to writers many sources of information which were closed to their predecessors, for manuscripts and other records have shed a flood of light on the intimate details of mediæval times. Mr. D'AUVERGNE seems to have fully availed himself of these opportunities, and his book has no doubt gained by the experience acquired in compiling his booklet "The Castles of England." This latest work might perhaps have been with advantage more profusely and better illustrated. Almost without exception the plates are small reductions of old engravings in which the "setting" has been of more importance than the castle which gives the title. But the publisher has brought out a highly useful complement to his Cathedral Series.

"The Everyday Uses of Portland Cement" (London: The Associated Portland Cement Manufacturers (1900), Ltd. 1*s.* 6*d.* net). It is suggestive of the universal use of cement when a book is published with the primary object of educating the non-technical public in its uses and of dealing with the domestic side of the material. The booklet, however, contains information that will be valuable and new to many who might be unwilling to class themselves as lay readers. It was impossible to exclude altogether mathematical calculations, but those few that are given should not frighten anyone. The book is divided under the following headings:—Portland Cement, Aggregates, Concrete, Memoranda for Concrete Users, Workmanship, Reinforced Concrete, Concrete Blocks and Moulded Concrete, and Various Uses of Concrete. The latter chapter gives, amongst other things, illustrated directions for making fence posts, paths, steps, water troughs, cisterns, cow houses and piggeries, fruit houses, greenhouses and sheds—all of which must arouse the interest of the farmer or estate owner. In addition some ten pages are devoted to "Concrete on the Farm," with several photographs of work carried out a few years ago at Borris, co. Carlow, and at Great Canfield, near Dunmow. But this is rather an inducement for the lay reader to diligently study the booklet than an essential part of it. The most instructive chapters are those which precede it. The publishers conclude with a leaflet which is to be filled in by those who desire to receive a free copy of any supplement that may be issued. The booklet should fulfil a very useful purpose in affording in simple language an excellent account of Portland cement and of its ubiquitous offspring, concrete.

MALPAS CHURCHYARD CROSS, MONMOUTH.

THIS cross, composed of Irish limestone, has just been placed in Malpas Churchyard, Mon., to the memory of the late HENRY ALLEN PROTHERO, F.R.I.B.A., of Cheltenham, by his brother, Mr. F. PROTHERO, of Malpas Court, near Newport, Mon. The late Mr. PROTHERO was at one time Diocesan Surveyor for the Archdeaconry of Monmouth. This name is associated



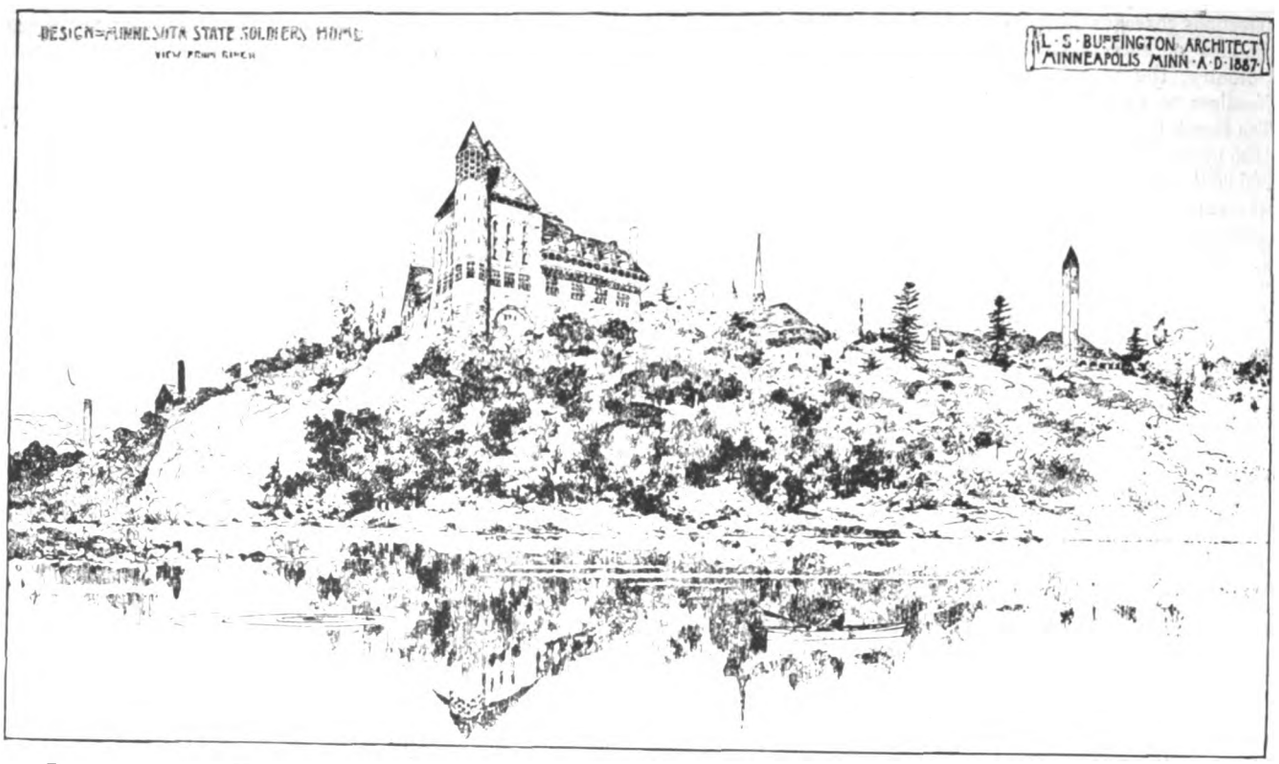
with St. Hilda's Church, Leeds, Cheltenham College Chapel, and the tower of Wrexham parish church. He built and restored a large number of churches throughout South Wales. The cross was designed by Mr. G. E. HALLIDAY, F.R.I.B.A., of Cardiff, and executed by Mr. W. CLARKE, sculptor, of Llandaff.

The Cuckfield (Sussex) Rural District Council have decided to use all British granite for their road repairs this year, it being proposed to use Penmaenmawr, Forest of Dean, Mendip, and Scotch granite in preference to foreign granite. The Council's district is a wide one, and the granite contracts will amount to about 5,300 tons.

At the Royal Institute of British Architects on Monday a lantern lecture will be delivered by Mr. M. H. Spielmann, F.S.A., on "British Sculpture of To-day," in place of the paper announced to be read by Sir Aston Webb, R.A.

Mr. H. B. Pollard, surveyor, has removed from 13 Henrietta Street, Covent Garden, to No. 5 Lower James Street, Golden Square, W.

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PERSPECTIVE BY HARVEY ELLIS FOR SOLDIERS' HOME ON BLUFF OVER THE MISSISSIPPI, NEAR MINNEAPOLIS
L. S. BUFFINGTON, Architect.

NOTES AND COMMENTS.

HARVEY ELLIS in the last quarter of the nineteenth century was in the United States as prominent a personality amongst architectural draughtsmen as HERBERT RAILTON or RAFFLES DAVISON has been amongst ourselves, and, like our own artists, almost founded a school of draughtsmanship. Almost, but not quite, for, however numerous their imitators, the works of these three men could not impart their individuality to the copyists, who, as always, picked up the peculiarities rather than the personalities of those whom they attempted to follow. The *Architectural Review* (Boston, U.S.A.) contains an appreciative sketch of the life and work of HARVEY ELLIS, illustrated by many examples of his genius, one of which we reproduce, interesting, we think, not only as a specimen of draughtsmanship, but as an example of modern American architecture.

THE case of VINCENT *v.* SKARDON and SELMON seems to be a curious one. The scene was laid in Plymouth, and Mr. J. H. VINCENT, who was, according to the report, described by counsel as "young and enthusiastic," seems to have been clever and capable of filling many parts, for he negotiated the purchase of a site by a syndicate of which he was a member, prepared designs for a building at an agreed fee of 5 per cent. on the estimated cost, superintended its erection not only as architect, but as builder, and acted as expert witness in a successful action against purchasers of the building, who were dissatisfied with their bargain. Although the syndicate made a profit of nearly 50 per cent. on the transaction, the remaining members objected to Mr. VINCENT's claim for payment as builder and expert witness. The jury gave Mr. VINCENT a verdict for more than he claimed. The moral is that legally an architect may, in partnership with others, be his own employer and still claim and receive full payment for his services as architect, builder, or anything else.

THE near approach of the date 1911, when the National Telephone Company must transfer their business to the Post Office, has suggested that the Company must be on the verge of dropping constructional work and dismissing the staff of that department, but the Postmaster-General in the House of Commons pointed out that the Company must continue constructional work for the normal growth of their system between now and the termination of their license, and that although he could not compel the Company to replace obsolete or worn-out-plant, the condition of the plant will form a material element in fixing the price at which the Post Office will purchase. Our personal experience is that the Company is at the present moment keener than ever on keeping the plant in good condition and on getting new business.

WHEN the Philistine begins to talk about ventilation he generally makes a mess of it, and the First Commissioner of Works scored easily over his interlocutor on Wednesday in last week, when yet one more attack was made on the ventilation of the House of Commons. Forty members are laid up with influenza and the majority of them, said Mr. PIRIE, attribute their illness to the bad ventilation of the House; therefore would the First Commissioner consider the desirability of a more natural system? Mr. HARCOURT pointed out that the proportion of members attacked was not larger than in other buildings and professions which are subject to the most natural ventilation, and in reply to further heckling on the topic of the Committee of 1903, scored again by stating that the Committee made a large number of recommendations, all of which he had carried out.

WE think the present President of the Local Government Board can be trusted to use any power he possesses to squash the vandalism of the Windermere Urban District Council in their proposal to establish a sewage farm on the shores of Lake Windermere between Bowness and the Ferry.

COMMENDATORE BONI, the famous archæologist, has proposed to the Italian Minister of Education that the vacant nunnery on the Palatine, near the Villa Mills, shall be converted into a museum for housing casts of the principal busts scattered about Italy, and thus form a supplement to the Forum Museum and Library now being established in the former convent of S. Francesca Romana.

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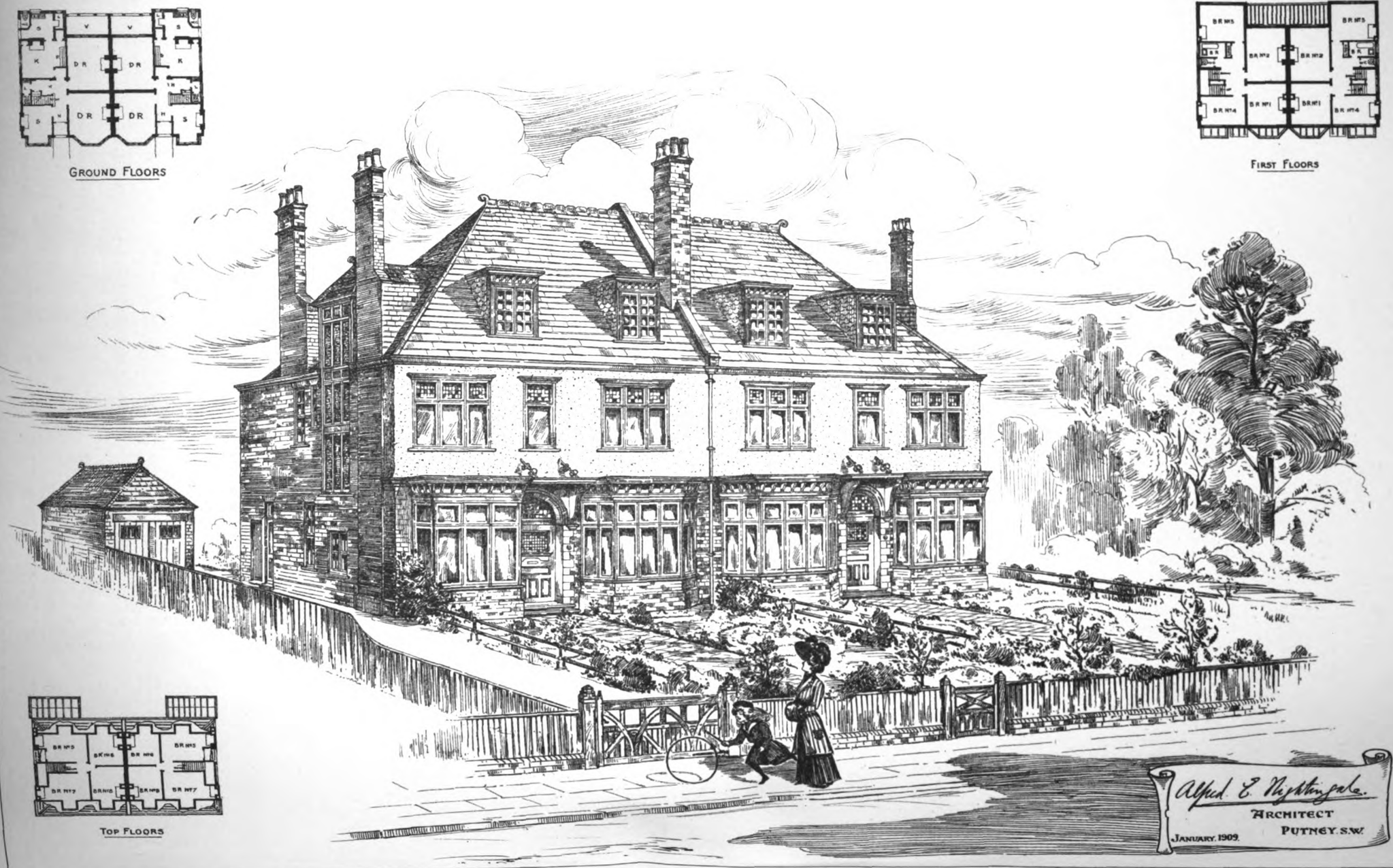
G. E. Halliday F.R.I.B.A.

THE RETREAT LLANDAFF

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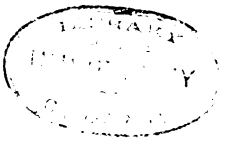


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RESIDENCES, CASTELLO AVENUE, PUTNEY.

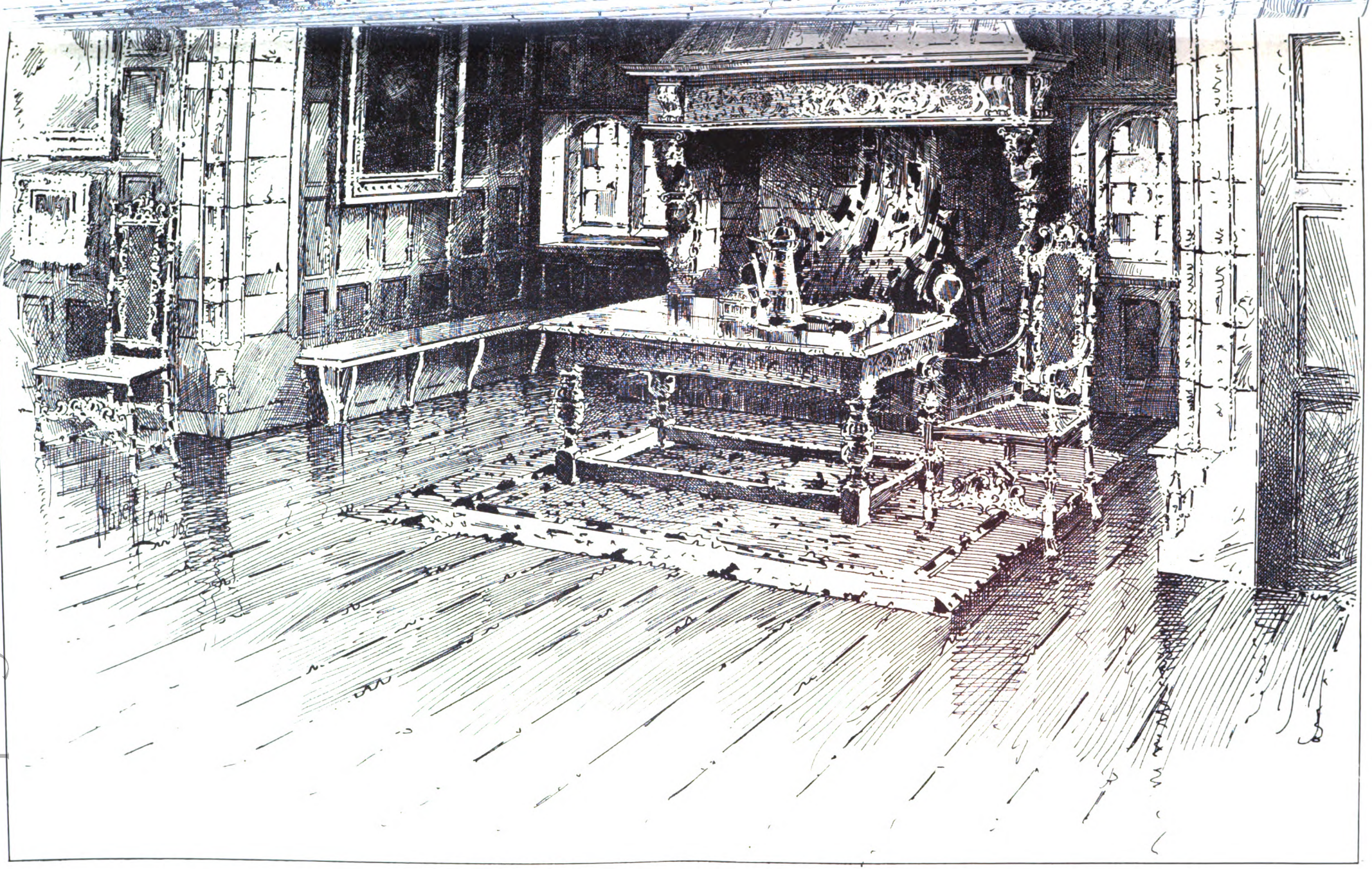
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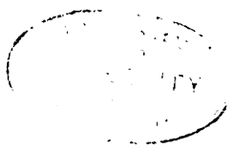


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DINING ROOM : WEST HALL : BYFLEET : G. L. SUTCLIFFE : A.R.I.B.A : ARCHITECT

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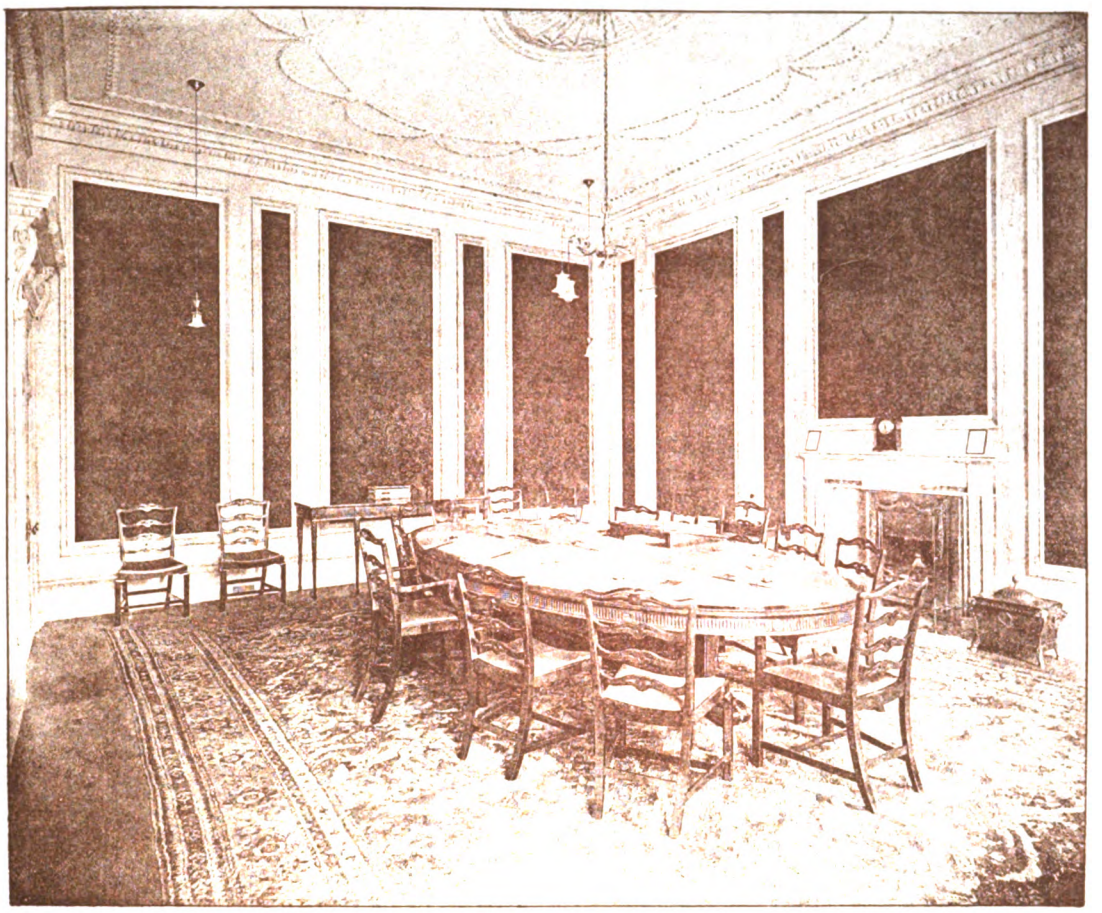
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THE EDINBURGH LIFE ASSURANCE COMPANY OFFICES, GEORGE
J. M. DICK ARCHITECT.

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Apr. 26th 1909.



BOARD ROOM.



PUBLIC OFFICE.

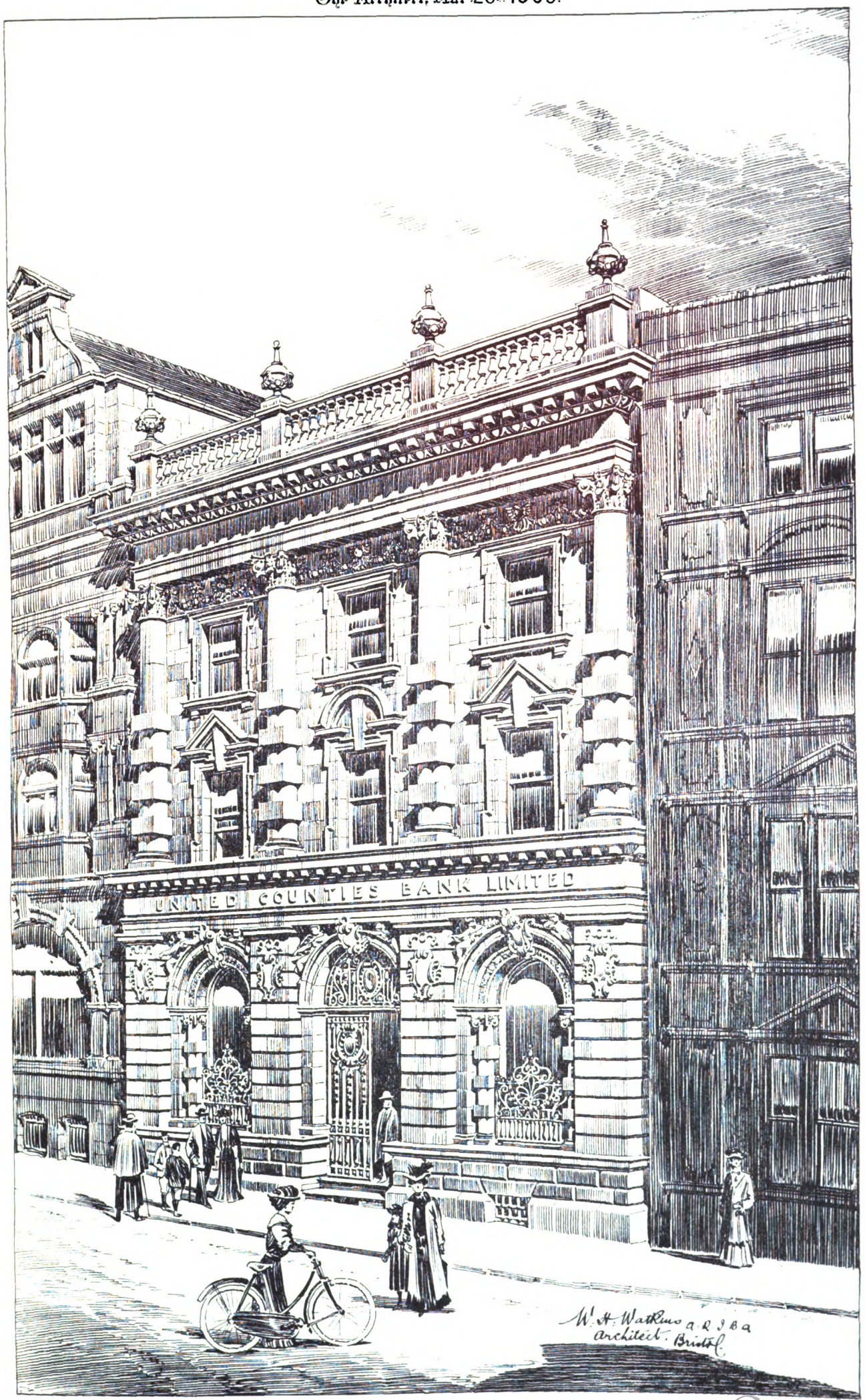
OFFICES, GEORGE STREET, EDINBURGH.

Architect.

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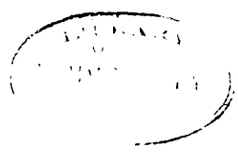


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THE UNITED COUNTIES BANK, BRISTOL.

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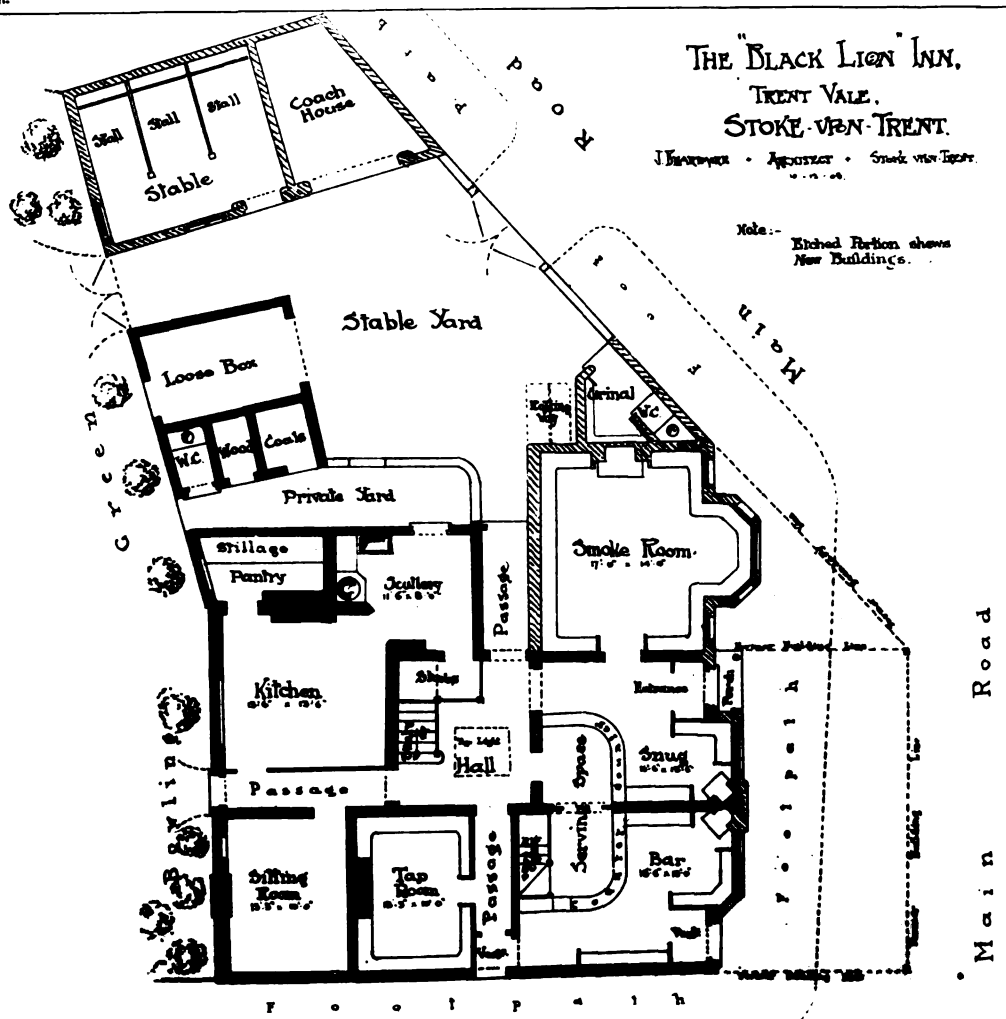


THE "BLACK LION" INN.

10.12.08.

As Altered.

J. Beardmore Jun:



THE "BLACK LION" INN,
TRENT VALE,
STOKE-UPON-TRENT.

J. BEARDMORE · ARCHITECT · STOKE-UPON-TRENT.

10.12.08.

Note:- Etched Portion shews New Buildings.

GROUND PLAN · AS ALTERED ·

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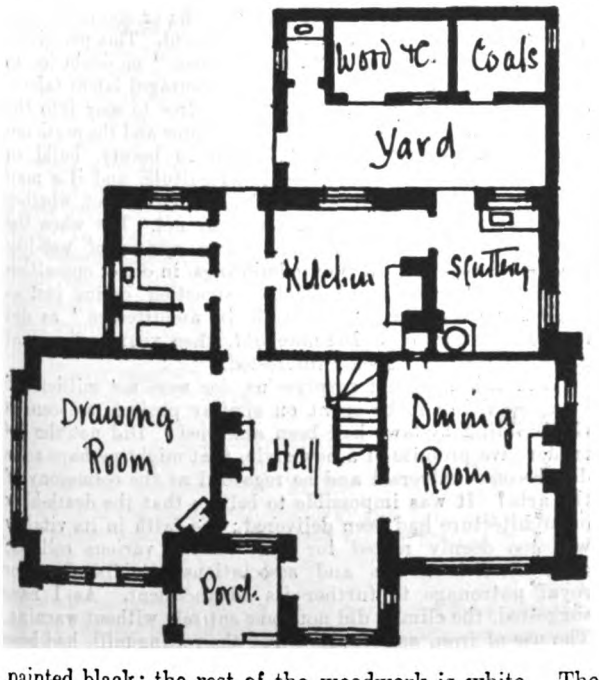
ILLUSTRATIONS.

THE EDINBURGH LIFE ASSURANCE COMPANY'S NEW OFFICES, GEORGE STREET, EDINBURGH.—BOARD ROOM—PUBLIC OFFICE.

IN 1823 the Edinburgh Life Assurance Company commenced business in the "Interim Office," No. 24 George Street, which site adjoins that of their recently completed head office, 26 George Street and 53 Hanover Street, Edinburgh. The architect being of opinion that the rounding at the corner of the site would be detrimental to the appearance unless vigorously treated, it was decided to introduce a dome of such diameter as to make it a marked feature. The dome rises to a height of 100 feet, its diameter at street level being 34 feet. It is surmounted by a bronze figure, "Prudence," the work of Mr. P. PORTSMOUTH, A.R.S.A. The base of the building is of grey unpolished granite. Above the granite, the ground floor is treated with plain rustication so as to give strength for the support of the columns which rest on it, and are carried up through the two storeys above. The company's public office measures 54 feet by 45 feet, and in it are four handsome pillars in Pavonazzo marble supporting the upper floor. The height of the ground-floor storey had to be made very considerable so that windows of adequate size could be introduced. There is an attic floor, lit by roof lights, for use as studios. The board-room on the first floor is panelled with figured Utrecht velvet, removed from the old board-room, where it had hung for sixty-four years, and is as good now as in 1844. The remaining part of the first floor and the floors above will be available for chambers and offices to be known as the Edinburgh Life Chambers. Owing to the difficulty of getting good weather-stone of satisfactory colour it was decided to use Portland stone. It was shipped direct from the quarries to Leith, and was worked in Edinburgh. The building is constructed throughout with steel stanchions and floors of reinforced concrete. The drum of the dome is made of steel and concrete, and the dome itself is covered with copper. The architect is Mr. J. M. DICK PEDDIE, 8 Albyn Place, Edinburgh.

THE RETREAT, LLANDAFF.

THIS house has just been erected in the city of Llandaff, situate about two miles from the county borough of Cardiff. The walls are of brick cement rough-casted. All the external dressings are composed of granolithic. The barge boards, half-timber gables, and shoots are



painted black; the rest of the woodwork is white. The house was designed by Mr. G. E. HALLIDAY, F.R.I.B.A., of Cardiff. Messrs. SYMONDS & SONS, also of Cardiff, were the contractors.

DINING-ROOM, WEST HALL, BYFLEET.

THIS dining-room, built for Mr. F. C. STOOP, measures 40 feet by 20 feet in addition to the large ingle shown in the illustration. It is panelled in oak to the height of 9 feet, and has an open oak roof with dormer lights along both sides. At one end an oak sideboard is worked in with the panelling, and at the other end are windows opening into a conservatory. The stone for the frieze, arch, and windows was obtained from Ham Hill. The builders were Messrs. J. PARNELL & SON, of Rugby, and the architect Mr. G. L. SUTCLIFFE, A.R.I.B.A., 17 Pall Mall East, London, S.W.

THE UNITED COUNTIES BANK, BRISTOL.

THIS building stands upon the site of the old Bristol Penny Bank in St. Stephen's Avenue, and faces the church of St. Stephen. The material employed for the façade was Monk's Park Bath stone, the carving being entrusted to Mr. GILBERT SEALE, and the wrought-iron gates to entrance and the window grilles to Messrs. GARDINER & SONS, of Nelson Street. The greater portion of the ground floor is occupied by the branch of the United Counties Bank, Ltd., and comprises a banking hall, measuring 40 feet by 27 feet, directors' room, manager's room, with the usual strong-rooms and lavatory accommodation. The large public space has been divided by a mahogany glazed screen, through which Messrs. A. TRAPNELL & Co.'s offices, on the first, second and third floors, are approached by a mahogany staircase, the second floor including a board-room, measuring 25 feet by 21 feet. The building has been effectually heated on the low-pressure hot-water system by Messrs. CRISPIN & SONS, of Nelson Street; while the electrical installation was entrusted to the Sphere Electrical Company, the fittings being supplied by Messrs. VERITY. The whole of the building work has been carried out by Messrs. C. A. HAYES & SONS, of Thomas Street, under the supervision of Mr. W. H. WATKINS, A.R.I.B.A., of Provident Buildings, 15 Clare Street, Bristol.

THE BLACK LION INN, TRENT VALE, STOKE-UPON-TRENT.

THESE drawings illustrate work that has been carried out at an old hostelry much out of repair, and a portion of which, from about the double gable end to the second chimney, caused a serious obstruction at the junction of two main roads. It was desired to keep up as much as possible of the ancient portion after the removal of the obstruction, but to retain the old style of inn. Most of the exterior has been finished in rough-cast, the lower portion of new front in red Accrington bricks 2¼ inches thick, and the roof in red brown tiles. The whole has a pleasing effect. The property belongs to a brewery company. Mr. J. BEARDMORE is the architect.

RESIDENCES, CASTELLO AVENUE, PUTNEY.

THESE residences are now in course of erection at a cost of 2,000*l.* the pair, from the designs of Mr. ALFRED E. NIGHTINGALE, architect, Putney, under the superintendence of Lord WESTBURY's surveyor, Mr. J. C. RADFORD, A.M.I.C.E., Putney.

The Sub-committee of the Exeter City Council recently had before them the elevation and sections of the proposed Day Training College and University College extension buildings with specifications, the approximate estimate of cost being:—Day Training College—According to plans and specification, including heating, lighting, and architect's and quantity surveyor's remuneration, also including 200*l.* for fittings (*i.e.* desks, &c., in class and lecture rooms), 5,950*l.* University College extension—According to plans and specification, including heating, &c., as above, also including 450*l.* for fittings in laboratories, &c., and class-rooms, 8,300*l.*; total, 14,250*l.* The plans and specifications were approved.

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THE ARCHITECTURAL ASSOCIATION.

A MEETING of the Association was held on Friday evening last at Tufton Street, Westminster, Mr. Walter Cave, president, in the chair.

The SECRETARY announced that the last spring visit, fixed for March 27, would be to the engineering works of Messrs. Richard Moreland & Son, Ltd., Silvertown. The directors, it was stated, have kindly arranged to have the machinery working, so that members of the party may see the various iron-casting processes.

The visit of the Association to the Building Trades Exhibition, Olympia, will take place on Saturday, April 17, at 3 P.M.

On the motion of the PRESIDENT, a hearty vote of thanks was passed to the Royal Institute of British Architects for its eighteenth annual grant of 100*l.* towards the A.A. education scheme.

Mr. J. A. MARSHALL read the following paper, entitled—

A Lesson from the Past.

Quite recently I came across an interesting collection of rare old books on architecture; they were in poor condition and it was not an easy task to determine their age, but after a careful examination, in the manner of the seasoned bibliophile, I had no hesitation in ascribing most of them to those enterprising publishers who flourished in London at the beginning of the twentieth century of our era. Among these books was one on "The Five Orders," this well-worn subject being treated in what was then quite a new way, with the object, I suppose, of giving to it a new lease of life. In another an attempt was made to throw some light on the strange obscurity so long associated with the ancient cathedral builders of this country. Others did the same for the temple builders of ancient Egypt, Greece, Italy, and these were embellished with conjectural restorations that rivalled in dexterity the efforts of a Cuvier or an Owen in another department of research. Others, again, illustrated every phase of the Renaissance; while still another, modest in size if not in subject, gave a comparative description of the architectural styles of all the ages. Besides these I found elaborate and exhaustive monographs, and, most entertaining of all perhaps, huge volumes of designs by the leading architects of that day and by many others who apparently were not so distinguished.

Judging from the publishers' advertisements that encumbered some of these books, we may, I think, safely infer that the age was one of considerable literary activity on the part of many whose calling or profession was essentially practical, if not technical, in its nature. There was evidently a widespread demand for information, in a handy and entertaining form, on subjects that had merely a superficial relation to the practice of architecture; and this demand was partly met, if not satisfied, by such works as those I have referred to, and also by the regular publication, at short intervals, of dissertations, criticisms, news, lectures. I feel sure you will pardon me for expressing the satisfaction I felt at my recovery of some fragments of this ephemeral literature of the twentieth century when I explain that I had already taken some interest in the remains, scanty though they are, of the buildings erected at that time in this country. In looking over these I had not failed to note the marked evidence they bore of that practice of selecting from and adapting the traditional styles of the past, termed "eclecticism"; they betrayed an extraordinary acquaintance with the outer aspects of the buildings of all time; yet it was clear the architect was invariably embarrassed by conditions and requirements more or less opposed to any recognised style, and his efforts too often lacked coherency and expression.

I have said the architectural remains were scanty for so prolific an age. Buildings extending for miles—yes, hundreds of miles—had once proudly reared their palatial fronts in the cities and the towns, but of these few vestiges are now to be seen; they have suddenly collapsed, as if by seismic disturbance or some more subtle agency; certainly there are no signs of that slow decay we associate with sound construction; and I was quite at a loss to account for this until I discovered that the work of the architect has been entirely dependent for support on that of the engineer; it had had no inherent strength, it did not express the construction; it was a mask, aiming at deception, yet never succeeding. Clearly the term "architecture" in this connection is a misnomer.

Science, that most progressive department of man's activity, was in direct conflict with art, as that term had long been understood; like the canker in the rose, its insidious encroachments could not be suppressed; new systems of construction—not amenable to any style of the past—had arisen almost without warning, and the older methods were becoming as obsolete as the sedan chair of Queen Anne or the *Fighting Témeraire* of Trafalgar.

Now, in case you should think these remarks are based on the vain imagination of the antiquary, permit me, in support of what I have said, to read to you an extract from a contemporary newspaper—a quite genuine copy, I may say, notwithstanding the pinky freshness of its complexion:—"The construction of this important building is being rapidly proceeded with. The most interesting point is that ferro-concrete is being used throughout. As was recently announced, the London County Council will shortly apply for Parliamentary sanction of amendments to its building by-laws, which will then, for the first time, permit the construction of buildings entirely of ferro-concrete. The Government, however, is exempt from the existing regulations, and are adopting this novel form of construction in their latest buildings. There will be a remarkable saving in space. For example, the retaining walls are only 7 inches thick instead of 7 feet, as would have been necessary for brick or stone. The continuous foundation slab upon which the whole of the building will rest is only 5 inches thick, but is so ingeniously reinforced by steel that the pressure over the whole area is absolutely uniform. The staircases and landings are entirely without vertical supports, but are simply cast in ferro-concrete and let into the wall; only an earthquake would make them tremble. The architect was anxious that certain parts of the building should be unimpeded by columns and stanchions, as would have been inevitable had ordinary methods of construction been adopted. The use of ferro-concrete, however, has made it possible to build a part of the upper storeys as a cantilever, projecting about 15 feet beyond their supports. The roofs will be flat, and upon them will be constructed four large shooting-ranges, as a precaution against assault by those representatives of the 'gentler sex' that now harass the Government. Members of the Council of the Royal Institute of British Architects are keenly interested in the work."

Now, ladies and gentlemen, I think you will agree there is nothing in the architectural descriptions of either Vitruvius or Pliny more remarkable than this, and it would be idle for us to speculate on the appearance of such a structure; that must be left to other commentators. It may, however, interest you to learn that the "Royal Institute of British Architects," referred to in the last line of the text, was a society established in the early part of the preceding century, the main objects being, I believe, to encourage the advancement of architecture and the interests of the profession generally.

At that time it was open to anyone, irrespective of sex, nationality, credentials or even qualifications, to practise in this country as an architect, if only he or she could find a client to bear the cost of the experiment. This principle, or policy, if you will, of "the open door" no doubt led to some abuses, but it must also have encouraged latent talent, and the young aspirant was then as free to soar into the realms of glory as the painter, the sculptor and the musician are at the present time. "Design in beauty, build in truth" was the watchword of the Institute, and if a man could do this he was, in all essentials, an architect, whether equipped with the diplomatic ægis or not. But when the Government of that day adopted a system of web-like tenacity for important public buildings, in direct opposition to all preconceived methods of construction, caring just as little for out-of-date "essentials in architecture" as did the constructors of a *Dreadnought*, then your professional ancestors became "keenly interested."

And this need not surprise us, for were not millions of money waiting to be spent on similar projects as soon as the building by-laws had been amended? Did not the intruder give promise of a new style, that might perhaps some day become universal and be regarded as the cosmogony of the arts? It was impossible to believe that the death-blow of architecture had been delivered; the faith in its vitality was too deeply rooted for that in the various colleges, academies, institutes and associations established under royal patronage to further its advancement. As I have suggested, the climax did not come entirely without warning. The use of iron, as formulated by the rolling-mill, had been tolerated for years, though incompatible with window recesses and thick walls, and your predecessors had thus gradually become inured to that feebleness and slightness which culminated in the extreme tenuity of the twentieth century.

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Ladies and gentlemen, it is very far from my wish to cast a gloom over this meeting by harping on this melancholy aspect of the past; I would rather—in closing the first part of this paper—suggest that the architects of those days were not entirely lost to virtue; they still held that truth was beauty, and beauty, truth, but unfortunately it was not always in their power to perpetuate these qualities in brick and stone.

Part II.—It is well stated in your curriculum that "the growth and development of the various phases of historical architecture have arisen mainly through constructional and actual necessities, modified by varying social conditions and the material available."

In following this development you will find that, although historical architecture has its phases of incipiency, maturity and decadence, yet throughout the ages there was a distinct and uninterrupted advance in the science of building, an advance that was as little affected or impeded by ornamental art as is the tidal ocean by the undulations on its surface; and your attention cannot fail to be arrested by those brilliant achievements in constructive skill that stand conspicuous and unapproachable amid the ever-widening stream of architectural activity.

Thus in the fifth century, when the religious zeal of the Emperor Justinian urged him to build the finest church in the world, the result was a sudden expansion—almost to the bursting point—of the crude principles of pendentive vaulting. In the twelfth century the constructive expedients resorted to by our own Wren were dimly, yet surely, foreshadowed in the Baptistery at Pisa. In the fifteenth century the citizens of Florence, in their religious pride, surmounted their cathedral and the whole city with the largest dome in the world, built on a principle for which there was absolutely no precedent beyond the obscure crudity of the Roman Pantheon. A century later the Roman pontiffs aimed at something still more daring, and at St. Peter's the massiveness of the Florentine dome is sustained by the buoyancy of the Byzantine. And finally, in the seventeenth century, Sir Christopher Wren, for the citizens of London, produced the greatest artistic effects by a novel and skilful disposition of the slenderest materials.

If you turn to the Gothic period you will find the continuity of the advance perhaps still more marked. During the early stages the statical conditions are abundantly maintained in the sturdy proportions of the design. Later, this timidity gives place to a more economic adjustment of the various parts on a grander scale, until all redundant material is eliminated and the structure may be said to present a diagrammatic illustration in stone of the strains and stresses. Finally, this open sincerity is succeeded by an artificial display of the mason's craft, as meretricious and as ingenious as it is splendid. Instances of these phases are well known to you. As intimated in the first part of this paper, the historian and the archæologist have very kindly traced for us their evolution. Due chiefly to varying social conditions, the mutation was generally a matter of slow time and there was nothing startling about it; but when a great calamity occurred—like the plague of the fourteenth century, which swept away more than one-half of the four millions who then formed the population of England—the thread of tradition was somewhat weakened, and the succeeding outburst of the mason's skill at Gloucester may, we are told, be regarded as something remarkable. The gossamer-like veiling that was then spread over the venerable features of the Norman choir and projected right through the apse compels our admiration, and the audacious interference is condoned in view of the independent expression it ultimately assumed in the lady chapel beyond, and later in the chapels at Windsor, Cambridge and Westminster.

(To be concluded.)

JOHN CARR, OF YORK, ARCHITECT.

BEFORE the Leeds Philosophical and Literary Society a lecture was delivered last week by Mr. Sydney D. Kitson on "An Eighteenth Century Architect: Carr, of York."

John Carr, of York, said the lecturer, designed practically all the large buildings which were erected in Yorkshire during the last half of the eighteenth century, besides many outside the borders of the county. In fact, he shares with Wood, of Bath, who was also a Yorkshireman, the distinction of being the greatest architect of his time who practised outside London. From 1750 to 1800 was a dull time in the annals of English architecture. Carr was content with the traditional language of design as he found it, and he reflected in his buildings the ideas and limitations of the age in which he lived. From the Middle Ages right down to the end of the eighteenth century there was a living building tradition, learnt in the workshop and on the works, and independent of drawing and books. Carr was one of the last exponents of the traditional manner. His work, although it was frankly dull, satisfied his generation, as was shown by the fact that he left a larger fortune than had ever previously been made by the practice of architecture. The son of a mason, he was also the grandson and the great-grandson of stonemasons who had practised their craft in Horbury, near Wakefield, for more than a hundred years. In 1750, before he was thirty, Carr left Horbury and settled in York. It was on the racecourse at York that he found his first opportunity, for in 1754 he designed and built the grand-stand on the Knavesmire, a work originated by two young Yorkshire noblemen, Lord Carlisle and Lord Rockingham. The grand-stand—a fine work of Palladian design—was paid for by the issue of five-guinea admission tickets.

Although Carr was responsible for a good many public buildings, it is as a designer of houses that he is chiefly known. His earliest house, so far as can be ascertained, is Arncliffe Hall, near Northallerton, built in 1753. This is the type of house he built for the country squire or the successful tradesman. The other type he used consisted of a central block with two balancing wings, which he built for the great noble or the merchant prince. The work by which he is perhaps best known came to him in 1759, when he designed Harewood House for Mr. Edwin Lascelles. Harewood took twelve years to build, thus showing the homely way in which the employers of the period were content to move. Unfortunately, the building was much altered eighty years later by Sir Charles Barry, who added attics to the wings and a high balustrade to the central block, removing at the same time the columned portico in the centre of the south front. As originally designed, it was well proportioned and as free from affectation as it was from originality.

GOTHIC STYLES IN MODERN ARCHITECTURE.*

(Concluded from last week.)

TURNING to modern Gothic work, this is now almost entirely confined to ecclesiastical buildings, but with the exception of the cathedral in Liverpool no very large new work of this kind has been commenced of late years. There are, however, a great number of parish churches being built all over the country, owing to the rapid increase of the population and consequent growth of the towns. These buildings are usually of no architectural interest, which is partly due no doubt to the necessity in most cases for great economy; but what is so deplorable is that the architects of them generally show very little knowledge in planning, arranging, and designing, and no motive of economy excuses this want. Rather does the need of economy demand a greater knowledge and skill.

Now I believe this lack is almost always due to a want of real living interest on the part of the designers of these buildings in the work they are doing, so that they are content for the most part with a constant lifeless repetition of a set of stock patterns, so to speak. But I can assure you that if there is to be good modern church architecture, it can only be obtained in one way—viz. by a thorough and a constant study of ancient examples and methods. As you know, there are plenty of examples of ancient ecclesiastical work of a severely simple and economical character as well as of the more magnificent and costly sort, but it is surprising how little attention these buildings receive, and I am convinced that the very weak and unsatisfactory character of so much of modern church work is at bottom due to this neglect.

The ordinary modern church almost invariably follows one set type, which is, roughly speaking, that of a nave with low lean-to aisles, a clerestory of very stunted proportions, a short, stumpy chancel rather lower than the nave, with possibly a chapel on one side of it and an organ-chamber on the other. If there be a tower, it is usually put on one side of the nave or chancel, a position given it, I suppose, with the idea of obtaining what is thought to be a Gothic irregularity of outline. I may remark in passing that I do not say a tower may not sometimes be advantageously placed at

* A paper read before the Sheffield Society of Architects and Surveyors by Mr. Temple Moore, F.R.I.B.A.

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the side of a building, as, for instance, in the charming little church of Skelton, in Cleveland, one of the best churches done by the late Mr. Johnson, of Newcastle; or in Mr. Bodley's church at Chapel Allerton, near Leeds; besides many other examples ancient and modern. But where this treatment has been adopted successfully it is invariably due to some special circumstance connected with the site or position which fully justifies a departure from the normal place of a tower in a parish church—namely, the centre of the west front. But to return to the common type of modern churches, which indeed has been little varied during the last thirty-five to forty years, and which is as a type surely as uninteresting and unsuitable one as could have been pitched upon, I can only suppose its popularity is due to the fact that it does not require much study or thought, and that it can be produced at a comparatively low price by being thinned down to the utmost permissible limits in its construction.

It is true that buildings of this type are not quite the same to-day as they were twenty-five or thirty years ago. Now the style is generally supposed to be some form of the late English Gothic, instead of being as formerly more or less of a caricature of French thirteenth century, and the east end now frequently finishes in an apse. Possibly there may be some little gain in this, but not much, for we still have the ugly red-brick interior, "relieved," as it is almost always described, by dressings of Bath stone, the thin weedy columns, and sprawling arches. The north side of the building almost invariably is an exact counterpart of the south, except for the chimney of the heating apparatus. The pitch pine and the gaudy, vulgar metalwork of brass or iron, the cathedral glass, which has lately started a development of its own, of wriggling patterns of sickly pink and green, suggesting a wall paper of the "new art." It is true that the coloured tile reredos suggestive of a lavatory has disappeared, and with it the stone pulpit, or parson cooler, as Sydney Smith called it. Their place has been taken, however, generally by hardly less unsatisfactory woodwork from the ecclesiastical furniture-shop, real pastry-cook's Gothic.

It is also true we miss now the striping of the internal walls with black and white bricks (a fashion taken from the peculiar methods of the late Mr. Butterfield and which was formerly highly popular), the polished columns of Aberdeen granite or marble, and the ponderous caps carved with rude representations of fruit and vegetables. These have given place to stone pillars and moulded capitals, but more often than not very ill-designed; and when all has been said, the ordinary modern church is mostly a dismal thing.

I do not think that the foregoing is by any means an unfair description of nine out of every ten modern church buildings, and we cannot wonder at the contempt that is frequently expressed for modern Gothic work, or at the curious remedies one sometimes sees suggested.

I noticed, for instance, a letter in one of the Church papers the other day suggesting the use of ferro-concrete as a material, and neo-Classic (whatever that may be) as a style, for producing good inexpensive church buildings. The former would certainly not be economical under present conditions in this country, though I believe it is by no means an impossible material where it could be suitably employed.

With regard to the latter suggestion, a mere change of style would not of itself produce better buildings, for there is no such thing as an easy style to design in, and never will be.

But although the picture of what I may call the ruck of modern Gothic is so depressing, there are happily many bright exceptions, and I consider that the works of the late Mr. G. F. Bodley, G. Gilbert Scott, jun., Thomas Garner, and Sedding, not to mention others, fully justify as possible and reasonable the use of Gothic work in the present day. These exceptions show that when men thoroughly study and understand their work modern Gothic may be produced which will hold its own with, or even rival, ancient examples, and I consider that they more than justify the retention and use of Gothic for modern requirements.

One often hears it said that, even admitting the Gothic styles are suitable for ecclesiastical work, they cannot be used successfully in public buildings or domestic work; but so far as the latter is concerned it may be fairly answered that much of the most successful modern domestic work has been designed in the late Gothic manner, and the more closely the spirit and feeling of the old models have been followed, the more successful has been the result. Can it be doubted that this is largely due to the fact that the country is rich in fine old examples of late Gothic and Tudor houses of all sizes and degrees of richness, and that men study them?

Regarding public buildings the case is somewhat different, because during the Middle Ages our towns were mostly small, and any buildings of the civic character they possessed, or that still remain, are of a very simple nature. The case is, however, widely different on the Continent, where in the Low Countries and the Hanse towns of Germany, and above all in many old Italian cities, may be seen and studied civic buildings of great size and often magnificence, which clearly show what splendid results can be achieved in the Gothic styles in this class of building.

I will make a few practical remarks here on what I feel should be the general guiding principle in the erection of our smaller and simpler ecclesiastical buildings.

There is no doubt that most people care little, and know less, about architecture, and are principally influenced in their appreciation or otherwise of a building by its size and cost. On the other hand, there are many who are thoroughly and intelligently interested in the matter to whom a good building is a real pleasure, and I am sure that as architecture becomes better, architecture will be better understood and appreciated. The church of either an ancient parish or a new district should be, and generally is, an important centre of influence and interest, and it is important that however simple and homely such a building may be it should be the best that is possible.

In the case of our old churches this is almost always so, but they have the additional advantages of historic association and gradual development which a new building must lack. I do not advocate the mere reproduction of ancient examples, as obviously the requirements of to-day are not exactly what they were in the past, and a building should express in its design the time and purpose for which it was erected.

Primarily, then, the careful working out of the plan is an essential of successful building, and this must always be considered in connection with the site to be built upon. It is very seldom that a church planned for one place will come in well for another, each case requiring special consideration. As our modern churches are required above all things for a large congregation, it is important in planning the building to obtain as open and spacious an interior as circumstances will permit. It is therefore, for instance, much better in a simple building to divide your nave and aisles (which is, by the way, generally also the most economical type) by a few wide and lofty arches, carried on fair-sized piers, sacrificing the clerestory altogether, and getting the centre and aisles as much of one height as is possible.

It is true this is a departure from the general run of old English churches, where the bays dividing the nave from the aisles are generally comparatively narrow; but remember that in the old churches it was the central nave that was used principally for the congregation, the aisles being largely occupied by chantry chapels; in fact, this was often the reason of their addition to an originally aisleless building. There are not wanting, however, old churches in the country of the type I describe, and they are very common, generally on a large scale, in Northern Germany, where frequently the nave and aisles together are practically as broad as they are long.

Of course, where funds are sufficient, a finely designed clerestory is a grand feature to the central aisle of a building.

It is also more reasonable as a general rule in a modern church to omit the chancel arch and to run the chancel through at the same roof-level as the nave. This arrangement is common enough in many of the later large churches of the eastern counties, and is also to be met with in a good many of the fifteenth-century churches of the West Riding and Lancashire.

Another type very suitable for our modern purposes, where economy is of importance, is that of two or three aisles of about equal width, such as is frequently met with in Devonshire and Cornwall.

Types such as these would be infinitely preferable to that ordinarily adopted and need not be more costly. There are indeed many ways in which the problem can be solved, though the success or otherwise of doing so depends, of course, on the skill and knowledge of the designer.

I mentioned that an apsidal termination to the chancel is less popular now than it was a few years ago, and there is no doubt that the square-ended chancel is as a general rule the right thing for us. It is the traditional plan in England, which tradition undoubtedly goes very far back. I have heard it said, though I would not express any opinion on the accuracy of the statement, that it arose in early times from the precedent set by St. Joseph of Arimathea, when he erected a rectangular church of "daub and wattle" at

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Glastonbury. However this may be, it is a fact that the square east end has always been the favourite plan in the British Isles, and has invariably reasserted itself after the introduction of the apsidal form from the Continent, as, for instance, by St. Augustine's missionaries from Rome, and again after the Norman Conquest. The few instances of apsidal terminations in English parish churches, such as St. Michael's, Coventry, are not strikingly successful, and one reason is that an apse to be satisfactory must have a vaulted roof, for a flat perpendicular wooden ceiling does not fit nicely to a canted or circular end, and the high-pitched roof of barrel form is still worse, because unless the walls are of great height, as one sees sometimes in France, the great mass of roof at the east end above the windows gives a very heavy and dull effect. Where the height to the wall plate is moderate, as it must be in any economical type of church, the square end to the chancel allows of the east windows being taken well up above the wall plate and gives the apparent height required for a satisfactory effect.

The French apse with its tall proportions and vaulted roof and circlet of chapels is probably the most beautiful finish to a Gothic church that could be conceived, of which we have an unrivalled example in Westminster Abbey.

I have heard it asserted that the actual merit of the design of the interior of a church is not of such very great importance; that it is possible to make it beautiful by good decoration and fittings. Statements of this kind may sound plausible, but are entirely misleading.

If a building is badly designed, I mean in the architectural sense, no amount of decoration or other adornments will make a good building of it. I could *name* instances within my own knowledge where much money has been spent in the attempt to get a satisfactory effect in this way, but the success has been invariably very limited.

On the other hand, a good building will repay proper furnishing, and its good qualities will even assert themselves in spite of, as is too often the case, mean and unsuitable furniture.

I do not wish to be misunderstood on this subject of the furnishing and appointments of the interior of the church. The matter of their design and workmanship is of the highest importance, and it is often most difficult to get people to understand this. The illustrated catalogues of the church furnishing shops contain almost everything in the way of ecclesiastical furniture and fittings, from the smallest to the most important, and all, I may say without exception, of the vilest description both in design and execution. There may sometimes be the excuse that their things are cheap, that they are the best that can be got for the money, and so forth; but this is really not so, for it is quite possible to get good simply designed things made at a moderate cost.

A few concluding remarks as to the type of English Gothic most suitable for modern work.

I do not consider it is advisable to set up the claim for the sole employment of either the earlier or later Gothic styles. It is not of great importance whether you prefer to design in Early English, Flowing, Decorated, or Perpendicular, so long as the design itself is good. But a good design in any of the Gothic styles can only be achieved by careful first-hand study of old examples, firstly in this country, but not neglecting the magnificent Gothic styles abroad. In the later styles the object was chiefly to obtain as much window space as possible for the display of the splendid stained glass of the period.

Now modern stained glass is not as a rule of such quality as to justify the provision of very large windows; and the risk of having your interior disfigured by, say, a large east window filled with some atrocious production from the studio of the cheap and popular glass painter, British or foreign, is well worth keeping in mind. Less risk of a disaster of this kind is run with the smaller windows of the earlier style, but in this case the lancets must have good broad splays, or be set in deep recesses, as nothing can be worse than windows of the early type put in thin walls.

Much more might be said on the choice of styles and other matters, but there is no time for it now. What I wish to emphasise above all things is the importance of a thorough and constant study of old work by architects if they wish to produce good work either in large or small things.

I once heard it stated by an architect in considerable practice that it was unnecessary now to spend time on the study of old work, because there are so many illustrated books of buildings in all styles that architects can easily give their clients anything they require in this way. Doubtless this has been the general practice with many, and is, I believe, responsible for much of the lifeless work we see and deplore.

VICTORIA AND ALBERT MUSEUM ACQUISITIONS.

A LIST is here given of the more important objects acquired for the collections by purchase in 1907 and 1908. In 1907: a collection of English furniture principally of the eighteenth century, Swiss and German stained and painted glass of the sixteenth and seventeenth centuries, and an incense burner with two vases of Chinese cloisonné enamel of the eighteenth century, formerly belonging to the Massey-Mainwaring estate; the panelling and fittings of two rooms of the first half of the seventeenth century from a house known as the Casa Mattei at Osogna, Switzerland; two carved wood groups representing St. Anne with the Virgin and Child, and the marriage of the Virgin, Flemish and German (Lower Rhenish or Westphalian) work, about 1500; an oak cabinet, Dutch carving of the first half of the seventeenth century; a collection of Hispano-Moresque lustred pottery dating from the fifteenth to seventeenth century; a collection of Persian lustred ware and tiles of the thirteenth century; a small collection of Græco-Buddhist sculptures of the third and fourth centuries, carved in talcose-schist, found in the Swat district, North Panjab Frontier; two carved stone chimney-pieces, English, about 1600; an English clock-watch of the late seventeenth century in silver case, pierced and engraved (the back inscribed with the dates of church festivals, saints' days, and law terms), with striking and alarm mechanism and an outer case of shagreen and brass, signed "Eduardus East Londini"; a collection of eighteen bowls and salvers of hammered brass, German, sixteenth-century work; a German badge of a guild of St. George of silver-gilt set with coral and malachite, in the centre an equestrian figure of the saint on a background of translucent enamel on silver, the back engraved with the inscription SANKTVS GEORGIVS ORA PRO NOBIS A.D. MDXXVIII; a large brass chandelier from the Nieuwekerk, Amsterdam, Dutch, early eighteenth century; a jewel case mounted in gilt metal, cast and engraved, Augsburg, sixteenth century; a double cup, silver-gilt, made by Jeronymus Behaim, Nuremberg, about 1600; a cup "Monatsbecher," silver-gilt, made by Hanss Beutmüller, Nuremberg, late sixteenth century; a bronze candlestick, inlaid with silver, Saracenic work of the fourteenth century; a brass tray and candlestick, inlaid with silver, Saracenic, thirteenth and fourteenth centuries; a chasuble of Florentine crimson velvet brocade of the middle of the fifteenth century, with English embroidered orphreys bearing the arms of Henry de Beauchamp, Duke of Warwick (d. 1445) after his marriage with Lady Cecily Nevill in 1434; a collection of woven fabrics, chiefly Italian and Spanish, fifteenth and sixteenth centuries; a collection of Persian brocades, sixteenth and seventeenth centuries; a Persian brocaded dalmatic of the late seventeenth or early eighteenth century; a miniature dated 1781 by John Smart, of Sir Philip Francis, the supposed author of the letters of "Junius"; a miniature dated 1719 by Christian Richter, of Dr. John Radcliffe, of Oxford, physician to Queen Anne.

In 1908: Florentine velvet chasuble with embroidered orphreys, fifteenth century; panelling and ceiling of a room with doorway dated 1493, from a house at Uerikon, near Zurich; seven small groups of oak, representing scenes from the history of the True Cross, Flemish, early sixteenth century; figure of a bishop in carved limewood, German (Franconian), late fifteenth or early sixteenth century; three panels of stained glass, Flemish, first half of sixteenth century; panel of stained glass with the arms of Elizabeth Plantagenet, duchess of Suffolk, English, about 1500; six watches in elaborately decorated cases, English and French, seventeenth century.

The complete lists of the gifts and bequests for the years 1907 and 1908 are given in the reports of the Museum. Notable among them in 1907 are:—a collection of Chinese porcelain of the period and style of the Emperor Yung Chêng (1723-1735), given by Mrs. Gulland; a collection of blue and white Chinese porcelain chiefly of the period of K'ang Hsi (1662-1722), given by A. Burman, Esq.; a pair of stirrup-irons of enamelled brass, English seventeenth-century work, given by J. H. Fitzhenry, Esq.; a silver-gilt chalice, with enamelled bosses, Dutch (Zwolle?), dated 1524, given by J. B. Carrington, Esq.; a collection of twenty-seven Japanese netsukés, principally in ivory and wood, of the eighteenth and nineteenth centuries, bequeathed by R. T. Pritchett, Esq.; a grand piano made at Vienna, and an upright piano, harp-shaped, made at Amsterdam, early nineteenth century, given by Sir W. Q. Orchardson, R.A.; objects of ancient Egyptian workmanship have been received

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from the Egypt Exploration Fund, and the British School of Archæology in Egypt.

Among the principal gifts in 1908 may be mentioned:—Portion of a woollen pile carpet woven with the royal arms of England and the initials E R, English, dated 1600, given by Major Harlowe Turner; oak dole-cupboard, English, about 1500, given by F. G. Hilton Price, Esq., Dir.S.A., through the National Art Collections Fund; pair of carved oak doors and walnut coffer, French, late fifteenth century, given by J. H. Fitzhenry, Esq.; Chinese cast bronze bell, Chou dynasty (1122-225 B.C.), given by the executor (A. Burman, Esq.) of the late Charles Meredith Dyce, Esq.; collection of 112 Japanese swords, daggers, &c., given by R. A. P. Davison, Esq. Objects of ancient Egyptian art have been presented by the British School of Archæology in Egypt.

There have been various gifts to the Art Library.

Herr Langhans, who has on former occasions given large numbers of interesting photographs of art objects in Bohemia to the Art Library, presented, in 1907, three sets of photographs of objects in the Archiepiscopal Palace at Prague; while a set of 161 views (principally of Byzantine churches) in Cilicia and Lycaonia was presented by Miss Gertrude Lowthian Bell. Additions were made by Mr. C. E. Keyser to the collection of photographs of sculptured tympana and Norman doorways in England which he has from time to time presented to the library.

Another notable gift was the "Inventaire de l'argenterie conservée dans les . . . palais impériaux," St. Petersburg, 1907, presented through the Imperial Russian Embassy.

The Phené Spiers collection of drawings of architecture received 493 additions during the year 1907, and on December 31 of that year numbered 652 measured drawings, plans, &c. Further additions to this collection have since been made. An important gift by Mr. C. Mallord W. Turner consisted of ten impressions from unpublished plates of J. M. W. Turner's "Liber Studiorum," and the collection of etchings was increased by examples of their own work presented by the following artists:—Mr. Frank Short, A.R.A. (one), Mr. W. W. Burgess (two), Mr. J. R. G. Exley (three) and Mr. Malcolm Osborne (three).

THE CONCRETE INSTITUTE.

AT the fourth general meeting, held on March 18 at the Royal United Service Institution, Whitehall, a paper on "Concrete in Arched Bridge Construction" was read by Mr. E. P. Wells, J.P., hon. treasurer, Concrete Institute. He said the materials used in the construction of arches in this country had been confined in the past to stone, bricks, iron and steel, and it was seldom that any other materials were used, unless it were for arches of very small spans, many engineers and architects, for reasons of extreme caution and safety, being indisposed to use concrete. But the use of Portland cement concrete was more satisfactory, not only as regards strength, but also as to first cost, an item which at the present day had in many instances to be seriously considered.

One of the principal reasons why concrete had not been more often used in this country was the fact that very few engineers had ever seriously experimented with this material; they had only considered it good enough for retaining walls and foundations, and some engineers did not place much faith in it even for the latter work, and where it was used it was very often made abnormally strong for fear of accidents happening.

The lecturer knew of cases where the loads on the foundations did not exceed 2 to 2½ tons per square foot, and the concrete was made in the proportion of four to one; whereas this material would carry with perfect safety 100 tons per square foot two months after being made, assuming, of course, that all the materials were good and clean and the Portland cement was of the ordinary best quality made and not adulterated.

Advantages of Concrete.

There was a homogeneity about concrete, when properly made, that was not obtained where bricks or stone were used; and those who had had to pull down structures built of either stone, brick or concrete, the lecturer thought, would agree with him that concrete was not the material he would prefer. His experience was that good concrete well rammed was a most difficult material to break up when made en masse; and if by any possible chance iron had been used in combination, then it required dynamite or some other explosive to shatter it.

The lecturer explained that he intended to confine himself principally to pivoted arches, which were theoretically and practically the only form of plain concrete arches that ought to be constructed, and he would show how pivoting at both the springings and centres came to be adopted.

Curve of Equilibrium.

Previous to the adoption of the pivot at both the springing and centre of the arch it was felt by German engineers that some method should be adopted whereby the curve of equilibrium could be absolutely confined within the centre third. It was well known that in a stone arch it was almost impossible to ascertain where the curve of equilibrium would run, as everything depended on perfect construction, especially in the grouting of the joints, &c.; any defects in grouting up would cause an alteration in the curve of equilibrium and in all probability might endanger the safety of the structure. It was this difficulty in bedding stones of large area that had compelled engineers to put such a large amount of material in stone arches so as to be on the safe side.

Settlement of Stone Arches.

To show what effect settlement had on a stone arch the lecturer called attention to the shore span of Waterloo Bridge on the Surrey side, where it was found upon examination that the abutment moved about half an inch, the result being that the joints opened at the keystone and the whole thrust of the arch passed through a few inches of the extrados; this had caused the voussoirs to spall, and a further movement of half an inch might cause serious mischief to this national monument.

Some years ago a bridge was constructed in Germany where mortar joints were dispensed with, and in place thereof sheet lead was used, each piece of lead being made the area of the centre third and fixed on the centre third of the stone. This overcame the difficulty to some extent, as the curve of pressure was compelled to pass through the centre third; but this method of construction was expensive, as the arch stones had to be very carefully dressed to an even thickness, so that all joints were linable throughout, or the thrust in the arch would have been very unevenly distributed. The lecturer believed only one bridge on this principle was constructed; but another bridge was built (viz. at Kirchheim) where only lead was used at the springing and centre, covering about one-sixth of the cross-sectional area of the arch. It was left to the late President von Liebbrand, the chief engineer to the State of Würtemberg, to adopt the method of pivoting in its application to the concrete and stone arches; and the adoption of this principle had enabled the State of Würtemberg to erect concrete bridges of large spans all over the country, where the use of stone would have been undesirable on account of cost.

Pivoted Bridges.

The first pivoted concrete bridge from the design of the late President von Liebbrand that was constructed in Würtemberg was a large one, viz. 164-foot span, and was the pattern in respect to facilitating erection, reducing the dimensions in the arch, and the use for the first time of the pivot at the springings and centre, which since then had been invariably adopted for concrete arch construction on the Continent, excepting those cases where the concrete had been reinforced with steel and the arches made with fixed springings and practically continuous from abutment to abutment.

Construction of Concrete Bridges.

The lecturer then proceeded to describe the construction of a concrete bridge having a span of 150 feet with a rise of 19 feet; this bridge, the dimensions of which he gave, was strong enough to carry the heaviest possible vehicular traffic as also the heaviest railway traffic, and to carry a load of over 3 cwt. per foot super on one half with the other half unloaded, and all this without the use of steel in its construction; but if steel were used then the loads could be very materially increased.

The principal reason why these concrete bridges were so safe under unequal loading was due almost entirely to the pivots at the springings and centre, which compelled the curve of pressures to pass through the same, the only sensible variation in the curve being at the haunches; even the loading given would not in any case alter the curve so that it passed above or below the middle third. Such being the case, it would be observed that no part of the arch could be in tension; but should such a thing happen theoretically, the spandril walls, by their great rigidity, would prevent any distortion of the arch; and, if the spandril walls and

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tables were reinforced, it would be possible to put a tension of 10 to 15 tons in either the extrados or intrados without the structure collapsing or changing its form.

Another advantage that a concrete arch possessed over a brick or stone arch was its homogeneity, there being an absolute lack of joints, which were an element of weakness, as was the mortar in the joints; e.g. in the case of a granite arch, one-twentieth the crushing strength of the stone itself if made of lime and one-quarter the strength if cement grout were used; then why use a material that was stronger than the weakest part?

The Arch.

In designing a concrete arch it would be found necessary to start on the assumption that the thinnest part of the arch—viz. at the centre—is approximately one-fiftieth of the span; this you must increase at the springing by about 7 per cent. and at the haunches by about 27½ per cent., to allow at this point for varying loads tending to make the curve of pressures rise or fall either below or above the neutral axis, and so to always keep the said curves within the middle third.

Having then apportioned the sizes of the spandril walls, or spandril pillars, to the loads that the bridge is intended to carry, also the intermediate tables and tables to carry the vehicular and foot traffic, proceed to ascertain the weight of the structure and find the curve of equilibrium for the dead load only; having ascertained that, make it the neutral axis of the arch, and alter the shape of the extrados and intrados by compounding the curves so as to make both equi-distant from the neutral axis. The normal condition of a concrete bridge was its dead load and the greatest stresses were set up by the dead load; so the lecturer considered that, unless extraordinary loads were to be passed over the bridge, it was not necessary to take into account the live load, especially if it were only ordinary or vehicular traffic. If the curves for equally distributed loads and also for one-half of the arch loaded were worked out it would be found that the curve of equilibrium at the haunches did not vary more than 3 inches either above or below the neutral axis; in the case of a heavy rolling load, it was only when the load was at the centre of the span or a few feet on either side of it that the increased stresses at that point in the arch could be accurately calculated; because nearly the whole width of the arch, from the point under the load to the springing, took up the stresses induced, and the same were reduced to a minimum by the enormous area of arch that they were spread over; the reason why concrete arches were so strong was that the stresses induced by the weights were so well distributed; otherwise there would no doubt be distortion of the arch and great deflection at the centre, whereas in no case where exhaustive tests had been carried out had this been proved.

Under these circumstances it was perfectly permissible to reduce the thickness of the arch until the stresses amount to 36 tons per square foot; but it would then be required to ascertain the positions of the curves of equilibrium for dead load, equally distributed live load and also for one-half of the arch loaded, and likewise for the maximum rolling load placed in the centre of the span; the neutral axis could then be made the mean of all the curves.

The effect of this would be that at the haunches, for dead load only, the compression at the intrados would be slightly increased and correspondingly reduced at the extrados; the curve of the intrados would not require so much compounding, but would be more segmental in form, unless they were placing excessive dead loads on the haunches, when the curves of pressure would rise, and so enable the curves of the intrados to be compounded and the appearance of the arch very materially improved.

If it were possible in concrete arch construction to make the arch so that the dead load were equally distributed, then the curve of equilibrium would be a parabola; but the appearance of the arch would suffer, though theoretically correct.

Spandril Walls.

In all cases the spandril walls, and also the concrete filling over the arch beyond the spandril walls at the centre, should be bonded to the arch by means of stone figs or old iron rods, in the shape of bolts, &c., as by this means any separation taking place between the extrados of the arch and the spandril walls could be absolutely prevented and the cementitious nature of the concrete had not to be depended upon, which was not always desirable unless very great care be taken in roughing the concrete and making the same absolutely clean.

Centrings.

The centres needed for the erection of a concrete arch were similar in every way to those required for a stone or brick arch, with this exception, that less strength was wanted, owing to the fact that a concrete arch weighed less.

Where it was required to construct the whole arch of concrete and make imitation stone voussoirs, special shuttering must be made. This could be moulded to any desired form, but great care must be exercised in fixing the shuttering and in well strutting the same, so that in making the concrete voussoirs the ramming did not cause the shuttering to bulge. The shutters for concrete voussoirs could be formed out of 2-inch to 2½-inch wood strengthened with rails, &c., the surface exposed to the concrete being machine-wrought; but it was not essential that they should be of an even thickness, as a light variation would, when the voussoir was constructed, act as a key. On the top of the laggings the thickness that the concrete voussoirs were required to be formed should be marked off, the shuttering fixed, the faces in all cases being radial to the curve and care taken to thoroughly well strut the shuttering, so as to prevent undue distortion in consequence of the weight of concrete. After this was done the surface of the laggings should be covered with about 1 inch of one part sand to one part Portland cement (made dry), and then as rapidly as possible concreting commenced; the quicker the concrete was put in and well rammed, the stronger and better it would be. When once a concrete voussoir was started it must be finished without a break, and sufficient men should be employed so that from start to finish not more than two hours would elapse. When about three-fourths of the voussoir had been finished, the stone figs or iron rods, &c., should be built in for bonding the spandril walls to the extrados of the arch.

After the concrete was set the surface should be covered over with wet sacks and kept well wetted during the whole time that it is exposed.

Order of Fixing Voussoirs.

It was advisable when forming the concrete voussoirs to always place the first voussoir between the points of support of the centres, not over the supports; thus, if any deflection was caused by the weight, it was put into the beam before the remaining voussoirs were made.

In closing in with the voussoirs Nos. 3, 5, 7, 9 and 11 care should be taken that the faces of the existing concrete voussoirs were thoroughly clean and well roughened; and, as the concrete was brought up, neat cement grout or one to one cement mortar put on the faces of the existing concrete, so that a perfect bond was obtained between the new and the old. When ramming the concrete care should be taken that the existing faces of the voussoirs were not in any way damaged. To prevent this it was advisable to use special hardwood rammers. Lest by any chance the faces of the voussoirs previously put in should be honeycombed, some one to one mortar should be used to fill up all interstices previous to the concrete being filled in.

After the completion of the voussoirs Nos. 2 to 12 it became necessary to adjust the granite blocks.

Pivots.

The pivots should be made of the best annealed cast steel, carefully machined all over to uniform thicknesses; the rolling curves should be machined and finished to a dead smooth surface, the pivots being forced into the bearing plates by hydraulic pressure; if it be found that the faces of the pivots were not parallel with the bedplate, then the back of the same must be re-machined.

The granite bearing stones must be recessed for about 1 to 1½ inch, and the bearing surface bush axed or (which is preferable) sand rubbed, as it was advisable that there should be no inequalities in the stone to prevent a perfect bearing being obtained.

The stones should be made in about 2-foot 6-inch lengths, and the pivots should be about 1 inch less in length. The joints for these stones should be about ¾ inch, and were not to be made until after the final concrete voussoirs were filled in.

Before fixing the pivots in the stones, sheet lead, about ⅛ inch thick, should be put in the recess in the stones, and the pivots laid in and well hammered with a heavy wooden mall, after which the stones should be fixed in position, and very great care exercised in gauging the distance between the rails so as to ascertain whether the bearing of the two rails is true; any inequality in the position of the stones could be obviated by packings laid on top of the laggings.

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Use of Screwjacks for Fixing Pivots.

After all the stones were in their correct positions it would be necessary to obtain four screwjacks so as to force the pivots as close together as possible and at the same time put a certain amount of compression on the lead seatings; when this was done, 2-inch square iron or steel bars should be forced between the back of the stones and the concrete voussoirs Nos. 2 and 12, so as to prevent any movement when the screwjacks are taken away.

In Germany they use ¾-inch bolts top and bottom, placed in the joints of the stones; but by this means very little pressure was exerted, and the bolts had to be left in until concreting was finished and afterwards cut out, which was a most difficult and very expensive method of procedure; it was, in the lecturer's opinion, one of the principal reasons why there was so much deflection in the arch when the centres were struck, owing to the fact that so little pressure was put on the seatings previous to concreting in.

There was no doubt that concreting exerts a large amount of pressure on the granite blocks, especially when the concrete was made fairly dry and heavy ramming was employed; but the pressure was light as compared to that exerted by four powerful screwjacks.

After all the stones were placed in position the concrete voussoirs Nos. 1 and 13 should be filled in; the voussoirs in the centre ought to be filled in simultaneously.

Striking Centres.

It was not necessary that the whole of the outer spandril walls should be constructed before striking the centres; but, if there were no urgent reason why the centring should be removed, it was better to let the same remain, as it acted as a staging to enable the masons to set the stones on the spandril faces. But within three weeks after the completion of the final concrete voussoirs it was advisable to ease the centres a trifle, so as to allow a moderate amount of pressure to be exerted on the pivots; where screwjacks were used this could be easily done without in any way setting up vibration in the arch such as takes place when folding wedges are used.

Roadway.

After the centres were finally struck the concrete over the arch, forming the roadway and footway, might be filled in, care being taken to make an expansion joint over the pivots in the centre of the span and also at the springing pivots. In this country a joint ⅛ inch was sufficient at the centre, and the same could be made with soft felt; but at the springings, if the concrete be put in in cold weather, fully ½ inch must be allowed. In forming the roadway, whether of wood paving, granite pitching, asphalte or macadam, the expansion joint might be ignored, though one must be put in on the footways, especially if the same were made of York paving or concrete.

In order to allow the arch to expand, the outer spandril faces must not be bonded to the abutments or piers, but be recessed into the same, so as to allow perfect freedom of action; this also applied to the parapet and cornice, because, if securely fixed, an accident was bound to happen in winter if the bridge were completed in summer, and vice versâ.

The lecturer then described some tests on a model bridge of 150-foot span to a scale of ½ inch to the foot, and then described a few of the principal concrete bridges that have been erected abroad, commencing with the Coulouvrenière Bridge across the Rhone at Geneva. These were illustrated by means of lantern slides. Finally, the lecturer made extended remarks on the making of concrete and the proper proportions that ought to be used for different kinds of work. The results of many tests and experiments on concrete carried out by the lecturer formed addenda to the paper.

The Conference on roads and motors, which is being called by the County Councils Association, will be held from April 29 to May 1, at the Institution of Civil Engineers, the Institution of Mechanical Engineers and the Surveyors' Institution, sectional gatherings assembling on the first two days, and a full meeting, at which alone resolutions will be put, on the last day. Lord Belper is to be president of the conference, and Colonel Dixon (chairman of the Cheshire County Council) chairman of the committee. Between forty and fifty papers will be submitted and most of the county councils, many of the municipalities and the principal societies interested in road matters have already appointed representatives.

GENERAL.

Sir G. Frampton, R.A., is to be invited to execute a statue of the late Marquis of Linlithgow, which is to be erected as a memorial in Edinburgh.

Mr. Solomon J. Solomon, R.A., has been entrusted with a commission to paint a portrait of Mr. William Longair, ex-Lord Provost of Dundee.

Mr. Mervyn Macartney, F.S.A., F.R.I.B.A., has been appointed by the President of the F.R.I.B.A. to act as assessor to the Berkshire County Council in their proposed competition for county buildings at Reading. Mr. Macartney will prepare the information for the competition advertisement and will report upon the plans submitted.

The Council of Liverpool University on Tuesday appointed Mr. Stanley D. Adshead, F.R.I.B.A., as associate professor of civic design in the University for a period of three years. This appointment has been rendered possible by the generosity of Mr. W. H. Lever, M.P., and is the first appointment of its kind made at an English university. It is hoped to found in Liverpool a strong department of civic design and landscape architecture in the School of Architecture. Mr. Adshead has had a distinguished professional career and is still a young man, having been born in 1868. It is believed that the new professor has not only the technical knowledge but the initiative, independence of judgment and power to conceive original schemes necessary for the teaching of this subject. Mr. Adshead has given proof that he possesses the ability to express his ideas clearly, more especially in the pictorial form.

Messrs. J. M. Bottomley, Son & Wellburn, architects, of Leeds, have been awarded first place in a competition for a municipal high school for girls at Doncaster. The cost will be 13,000*l.* Mr. E. F. Robson acted as assessor.

Grimsby Town Council has decided to invite competitive designs for the enlargement of the town hall at an estimated cost of 30,000*l.* The first prize will be 250*l.*, the second 150*l.*, and the third 75*l.* Should any of the winning designs be carried into effect the prize will merge into the successful architect's fees.

As a Protest against the threatened demolition of Bath Street, Bath, the agitation for its preservation still continues. A public meeting has been convened, at which the Rector of Bath will preside, and the speakers will include Mr. MacColl, keeper of the National Gallery of British Art, and Professor Beresford Pite.

Whalley Church, Lancashire, is to be renovated and altered at a cost of about 3,000*l.* The present church was erected in 1283. Whalley's legal parish is the largest in the county, covering in all sixty-six parishes.

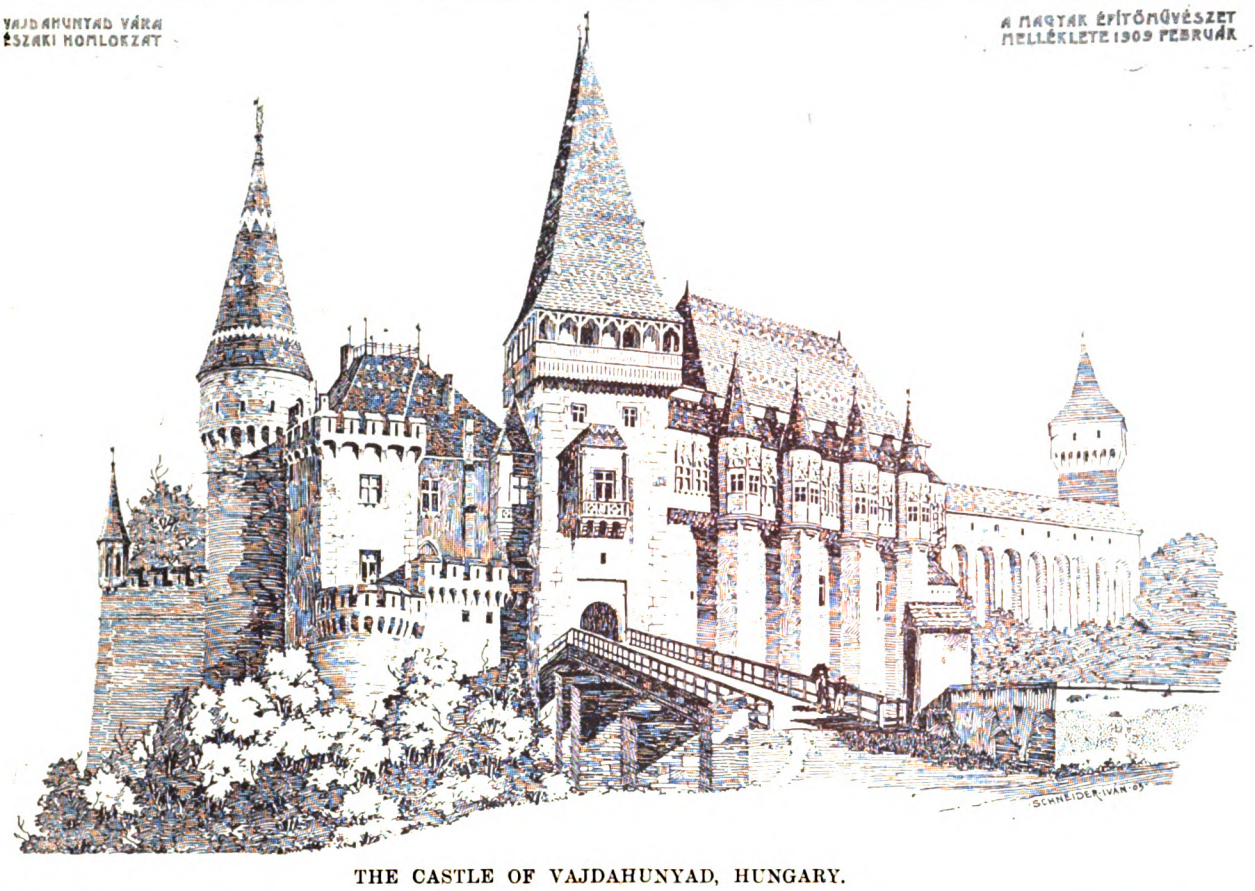
An Anonymous Donor has offered the Plymouth education committee a copy of the thirty-seven volumes already issued of the library edition of the works of John Ruskin. The conditions attached to the gift were that the volumes should be placed in the school of art for study or reference there by teachers and students of that school, and that they should not be taken out of the school by any person except with the express permission of the head master. The committee decided to accept the gift with thanks.

An International Exhibition of railways and land transport is to be held at Buenos Ayres from May to November 1910. The first section includes projects, drawings and photographs of stations, general plans, passenger and freight stations, passenger buildings, platforms, tunnels and viaducts for communication between platforms. Anyone wishing to take part in the exhibition should apply to the district committee local board or delegates. Applications should be submitted not later than June 30, 1909, and the exhibitor binds himself *ipso facto* to abide by all rules of the executive committee.

Lady Margaret Hall, Oxford, is to be enlarged. Plans have been drawn up by Mr. Reginald Blomfield, A.R.A., for a building which will contain a dining hall, kitchen, library, principal's and students' rooms. The cost of the whole, with the addition of a chapel large enough for the increased numbers, will be between 17,000*l.* and 18,000*l.*—7,000*l.* for the dining hall and library block, 7,000*l.* for the new students' wing, and not less than 3,000*l.* for the chapel. A commencement of the work is to be made at once.

Dunbar Town Council have decided to augment their existing water supply by putting down storage tanks sufficient to provide about 20,000 gallons per day for thirty days, and negotiations are now in progress for the acquisition of the necessary land on which to erect the tanks.

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THE CASTLE OF VAJDAHUNYAD, HUNGARY.

THE WEEK.

Few of us realise, when we take our "Hunyadi Janos" in the morning what the name means to a Hungarian. John Hunyadi was one of the greatest warriors and statesmen of Hungary, the world-famed defender of Christian Europe against the Osmanlis, the father of the splendid King Mathias the Just. Belonging to what was in his day a Magyar knightly family of new creation, he by merit as much as by favour rose rapidly in rank, married the daughter of a Hungarian lord, distinguished himself as a leader of the king's troops against the Turks, and, as Banus of Szörény, himself rose to the rank of lordship. Finally, after the early death of King Albert, he was elected, by the Diet, governor of Hungary during the time of the infancy of King Laszlo V. As a fitting residence for his exalted rank he built the castle of Vajdahunyad, of which we give a view and which is fully described by Professor Virgil Nagy in the "Magyar Epitömüvészet," together with numerous excellent illustrations. The castle was finished in the year 1452, but must not be taken as strictly representative of Magyar architecture at that date, for Hunyadi accompanied the Emperor Sigismond on his five years' Western journey to Switzerland, Germany, France, the Netherlands and England, and, being a man of refined taste, imbibed some of the feeling of the foreign architecture, especially of France, that he had seen on his travels. The castle was much damaged by fire in 1854, and practically all the present roofs are part of the restoration carried out by Professor Steindl. The Hungarian language is no doubt incomprehensible to most of our readers, but Professor Nagy has included with his descriptive article a page in English epitomising the main points of the history of the castle of Vajdahunyad and its owner, Hunyadi Janos.

Mr. M. H. Spielmann, in his lecture last Monday at the Royal Institute of British Architects on "British Sculpture of To-day," very ably put the case for our modern British sculptors. He not only pointed out the vast improvement that has taken place in our sculpture during the last thirty years which he was, as we all know, fully justified in doing, but upheld the doctrine that sculpture is and should be idealised form without colour. This doctrine we hold to be heretical as regards the exclusion of colour, and due only to the incomplete revolt of our sculptors against the paralysing thraldom of the ideas and conventions of the eighteenth and nineteenth century schools of sculpture. Our best men to-day have broken away from this thraldom as regards form and subject, but we cannot help thinking they are still slaves to monotint. In all great ages of art in the past, Greek, Mediæval and Renaissance, coloured sculpture was in vogue; in Nature there is no such thing as monotint, and our sculptors, in adhering to monotint, are maintaining an artificial convention that has no warrant either in Nature or in the best periods of art. There is no need for the colour to be imitative or realistic, but we believe colour must be allied with form, both idealised, before sculptors can expect the Philistine to properly appreciate their art. The art that requires explanation and education before comprehension is, like the work of the sculptor in the early Victorian era, artificial and dead. There is in the Philistine, after all, a good deal of Nature-instinct, and his taste is not always to be despised because he does not regulate it by the rules of academic teaching. Architects know very well how the colour of material modifies the effect of form in their mouldings, and in asking our sculptors to add colour to their form we are aware that we are setting them a stiff row to hoe, and that very considerable modifications of their technique will have to be adopted, but the strides that have been made are sufficient to lead us to believe that the added difficulty will only still further enhance the excellence of modern sculpture.

As a field for archæological research, Egypt proper is practically exhausted, but a rich field appears to be still open for explorers in the Sudan, where the Ethiopian kingdom of Meroë has left many monuments of its greatness, some still above ground, but many more probably still requiring excavation. The only trouble is that for the want of 500*l.* a year unauthorised pilferers are clearing away what should be unearthed by capable investigators, and that no adequate accommodation at present exists for the finds that the latter are obtaining.

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THE DEVELOPMENT OF MEDIÆVAL ARCHITECTURE.

FROM the earliest times until the upheaval of the Renaissance movement, the history of architectural development was so unbroken in its continuity, at least in Europe, that the fixing of any particular date at which to commence an account of Mediæval architecture is purely arbitrary, and it is only the sharp contrast between the comparative slackness of building in Christendom during the tenth century, which prevailed whilst the minds of Churchmen were oppressed with the foreboding that the world would end with the year 1000 A.D., and the remarkable activity that occurred during the eleventh century, that affords a reasonable excuse for taking the beginning of that century as the starting-point for the study of Mediæval architecture, as does Professor Simpson in his second volume of the "History of Architectural Development." *

The history of Mediæval architecture is the history of building with the arch. In Greek architecture the column with its lintel reigned supreme; in Roman times there was a dual monarchy of column and arch; in the latter days of the Roman empire, the days of Diocletian and Zenobia, there arose a contest between the joint rulers, a contest in which the Romanesque period saw the victory of the arch, which henceforth during the Mediæval era reigned alone and rendered possible the construction of great and beautiful buildings with small stones. The evolution of the arch of small stones is admirably elucidated by Professor Simpson, who rightly points out that it is not the shape of the arch, circular or pointed, but its construction that determines whether the architecture that employs it is Gothic or Classic.

Small stone arches lead naturally to groin-rib vaulting, which, says our author, is "the most characteristic trait of Mediæval architecture," and the development of which, both constructive and æsthetic, is clearly and fully explained. What a pity it is that, when we are writing in English about vaulting, we cannot all agree on a consistent and uniform nomenclature. If we borrow "tierceron" and "lierne" from the French, why not also "formeret" and "croisée d'ogive"? But surely the resources of our native tongue are sufficient. The tierceron is intermediate between the wall-rib and diagonal-rib, and the title of intermediate-rib sufficiently denotes its position in the vaulting scheme. The lierne is wholly on the soffite of the vault, and, if we agree to call it soffite-rib, is more readily comprehensible by the student, and, after all, books on architecture are written chiefly for those who want to learn, not for those who know. In the second edition of Professor Simpson's book, which can hardly be long in appearing, we hope to see the barbarisms "four-tite" and "six-tite" amended to "four-part" and "six-part," which are quite as terse and far more expressive.

We are delighted to find that a writer on Mediæval architecture, with the authority that Professor Simpson's position carries, has emphasised, no more than is due, the high importance for a true realisation of Gothic architecture of the recognition of the part that colour played in Mediæval churches. He says, "When built they were a blaze of colour from floor to roof." It is true he limits his assertion to "the interiors of many Mediæval churches" with the care for scrupulous accuracy that is an outstanding feature of the book before us. We should go further and say that we believe that, at least in our own country and in the fifteenth century, every church in the land contained colour decoration. We do not even except our Romanesque or Norman churches, but hold that Copford, instead of being unique, is but the fortunate survivor of many contemporaneous examples. We are aware that the painting in Copford Church was restored by Mr. Bell, but it was conservatively done, with knowledge and reverence. The Professor, ever careful, says of the Romanesque workman, "the absence now of paintings in his churches does not necessarily mean that none ever existed there. Many have doubtless been destroyed." It would make a fifteenth-century builder or cleric shriek with horror to see what has been done in the nineteenth century, in ignorance of the general Mediæval use of colour—walls stripped of their plaster and rubble masonry pointed in black mortar!

It is well, therefore, that it should be universally recognised that a Mediæval church is incomplete without colour decoration.

The concentration of loads on definite points that resulted from the use of groin-rib vaulting gave the opportunity for the development of the traceried window, and the steps by which this grew from the simple lancet to the elaborate consummation of the fourteenth and fifteenth centuries is clearly traced by Professor Simpson. From the concentration of loads also followed the development of the buttress with its flying arches and pinnacles, and these go far to produce the predominance of the vertical line in the design of Mediæval buildings.

Thus all the characteristic elements of Gothic architecture which differentiate it from Classic spring from the development of arcuate construction with small stones, the typical treatment of mouldings, vaulting, tracery, and verticality in composition.

The development of church planning during the early part of the Mediæval period is best studied in the buildings of France and Germany, where there was evidently a struggle between the Eastern or Byzantine type and the Western or Basilican, as is evidenced by such examples in France as Germigny-les-Prés; S. Croix, Montmajour; S. Benigne, Dijon, and possibly Charroux; and in Germany, Aix-la-Chapelle; St. Gereon, Cologne, and Ottmarsheim. In England the Byzantine bid for supremacy is comparatively feeble, but the four so-called "Templar" churches, London, Northampton, Cambridge, and Little Maplestead, may be cited as examples, to which may be added the circular chapel in Ludlow Castle.

In the thirteenth century the typical church plan of Mediæval architecture may be said to have become settled, subsequent modifications being of minor importance, and then we have the characteristic French plan of a short and broad building with the chevet at the east end, the English long and narrow, with a square east end and prominent transepts. In Germany no one type predominated; there we find square east ends and apsidal, either with or without the encompassing chevet, long churches and short ones, with the peculiarly Teutonic hall-church plan, having its aisles of the same height as the nave. We are glad to find the authority of Professor Simpson endorsing the view that we have always held to be correct of the reason for the predominance of the square east end in English Mediæval church plans—the traditional influence of the early British Christian or Keltic type of plan, an influence that was only temporarily threatened by the reintroduction, after the cessation of the Roman domination, of the apsidal form by Augustine and his compatriots. By the way, Professor Simpson refers somewhat doubtingly to the two apses, one at the east end, the other at the west, that Augustine's church at Canterbury is believed to have possessed. The discovery, some few years back, of the foundations of an almost contemporary church at Lyminge and the collateral evidence of German examples lead us to believe that in Western Christendom during the Romanesque period this type of plan was very widely prevalent. We do not remember, for the moment, the precise instances, but we believe that examples exist also in Spain. We cannot believe that the original plan on vellum of the church of the monastery of St. Gall, Switzerland, is an unique example, but rather a sample of the plans sent out by the great Romanesque architectural university of Cluny. To our mind, the double-ended type of plan has been unduly neglected by writers on architectural history, and a comparatively unworked field is here open for archæologists. Although we agree with Professor Simpson that the square east end is not due to the Cistercians, we think that their activity in England during the "transitional" period of Sharpe assisted in the recrudescence of our national form, and we also imagine that

* *A History of Architectural Development.* Vol. ii.: "Mediæval." By F. M. Simpson, Professor of Architecture in the University of London, &c. (London: Longmans, Green & Co. 1909. 21s. net.)

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it is not improbable that the Puritanism of St. BERNARD and his order, exerting its influence, as it did, at a critical period of development, had something to do with the superiority of English moulding.

Professor SIMPSON disposes, once for all, of PARKER'S theory of the "stone-carpentry" origin of Anglo-Saxon work as at Earl's Barton, and shows how it was derived from the Romanesque work of North Italy.

In conclusion, we commend the second volume of the "History of Architectural Development" to all serious students of architecture. It is clear, logical, and, above all, accurate, and far better value for the money than many lower-priced and carelessly compiled books on architectural history.

STEELWORK.—VIII.

By C. V. CHILDS, A.M.I.C.E.

IN the case of the floors being constructed of cross joists, spaced 2 to 3 feet apart, it is seldom that sufficient headroom can be allowed to permit of the joists resting on top of the girders, consequently shelf angles have to be rivetted to the web of the girders to form a seating for the cross joists; this means an additional expense to the girders in two ways. In the first place one 3-inch by 3-inch by ½-inch angle rivetted to each side of the web adds an extra weight of 20 lb. per foot run to the girder; and in the second place the price is raised by about 25*s.* per ton.

Another expense is incurred by having to notch the top flanges of the larger sized cross joists, in order to keep the floors within a reasonable thickness. It is mainly these three items of expense that allow of the various forms of ferro-concrete floors to compete successfully with floors constructed in the ordinary way of cross joists with concrete filling between them. A mere comparison between the price of the ordinary cross-joist construction—viz. the cost of the cross joists, the concrete filling and the centring—and that of the ferro-concrete floor is not sufficient to arrive at the true value, as the extra weight and cost of the girders, due to the shelf angles, are the chief points that tell in favour of the ferro-concrete construction.

The designer may find the following method of assistance to him in calculating the sizes of the girders. For symmetrically disposed loads it is easy to see at a glance where the maximum bending moment occurs. It is not so easy, however, when the system of loading is a complicated one. In this case the simplest method to adopt is by bringing in the aid of the differential calculus. It sounds complicated, but in reality it is exceedingly simple in practice, as the following example will show. Required the distance x of the point of the maximum bending moment from the point of support of a beam of 20 feet span, carrying a concentrated load of 10 tons 4 feet from that support, and a uniformly distributed load of ½ ton per foot run, equal to 10 tons. The reaction at the point of support nearer to the concentrated load is (8+5=) 13 tons; the expression for the bending moment at a point distance x from this support is:—

$$13x-10(x-4)-\frac{x}{2}\times\frac{x}{2} \text{ or } 3x+40-\frac{x^2}{4}$$

In putting the first differentiation of this expression equal to zero all that it is necessary to remember is that:—

where no x occurs this must be converted into				0
where x	"	"	"	1
where x^2	"	"	"	$2x$

Substituting these values the equation is:—

$$3+0-\tfrac{1}{2}x=0, \text{ or } x=6.$$

By substituting 6 for x in the original expression, this gives, as the maximum bending moment, 49 foot tons.

The same result is obtained in a simpler manner by working from the other point of support; e.g. the bending moment is:—

$$7x-\frac{x^2}{4}$$

$$\text{then } 7-\frac{x}{2}=0 \text{ hence } x=14.$$

So that the point where the maximum bending moment occurs is 6 feet from one support, or 14 feet from the other, in the case of a beam of 20 feet span loaded as stated above.

This is a simpler, quicker and more accurate method than that of employing graphic statics.

Whilst on the subject of bending moments a natural sequence is the selection of the required joist or girder; the tables given in some of the steelwork contractors' handbooks are apt to give the architect a wrong impression altogether in regard to their actual strength. The term "factor of safety" should be abolished entirely, as it is quite a misnomer. The writer has on various occasions been told that engineers design the girders far too heavily, as the joists, &c., will carry four times the load for which they are designed, because the tables state the safe load is one-fourth the breaking load. The breaking load in this case is based on the amount of tensile stress that is required to pull a small specimen test-piece into two pieces. Supposing this stress to be 28 tons per square inch, when the stress is about one-half this amount the elastic limit of the steel has been reached; that is to say, the steel has stretched to a point where, when the pull is released, it will not return to its original length and has taken on a permanent set.

In a beam this is the point where the deflection will cause a permanent sag and the beam will not recover after the load is removed, consequently 14 tons is the crippling stress; this alone should be the determining factor in regard to its strength. In some cases tables have been given based on what is called a factor of safety of three, leading anyone but an engineer to believe the beam will carry three times the amount stated; the breaking stress may have been taken at as much as 32 tons per square inch, so that the beams, to carry the loads stated in the tables, would be stressed to 10⅔ tons per square inch.

The breaking stress of mild steel is more frequently 27 or 28 tons per square inch, and half this amount—viz. 13½ tons—may be the crippling limit, so that the real factor of safety is 13½ divided by 10⅔—that is, 1.25; in other words, an addition of one quarter the amount stated in the tables will cause the stress in the beam to reach the elastic limit of the steel, and the deflection will cause a permanent set—a very different state of affairs from what the tables would imply.

The allowable safe stress should alone be the basis of determining the strength of steelwork.

Joists.—The chief point of difference between English and American joist sections is that, especially in the case of the larger sized joists, the American sections are rolled down to a considerably less weight per foot run, and the width of the flanges is less, than the English sections of similar depth; e.g. the flange of a 20-inch deep British standard joist is 7½ inches in width, and the weight per foot run is 89 lb.; whereas the finishing pass for an American joist is 20 inches deep by 6¼ inches wide, the weight being 65 lb. per foot run. By raising the rolls this can be increased to a maximum of 75 lb. This depth of joist can also be procured up to a weight of 100 lb. per foot, the finishing pass of this section being 80 lb. per foot; that is to say, there are two distinct sets of rolls. In a few of the larger sized joists this system might be adopted by English rolling-mills with advantage, so as to reduce the sizes to more economical sections; the only alteration required would be in the last few passes of the rolls; the breaking down mills would be the same in either case.

Formerly, in the days of wrought iron, the American joists were heavier in section, and new designs were made when steel was introduced. Apparently no alteration was made by English manufacturers, and this accounts for the joists (even in the case of those which have come into existence since that time) being heavier in section.

Within the last few years the sizes of British steel structural shapes have been standardised. Certainly this is a great advantage to the designer, in that it is now possible to make the sizes of the girders such that all firms are able to supply, and prices can be obtained from different firms all on the same basis. Before this occurred each firm almost invariably desired to alter the sections to conform with those they were in the habit of procuring from certain rolling-mills. The result was confusion and delay in rearranging the sizes of the girders, &c., before the work could be put in hand. At the same time, the British Standards Committee might have done a great deal more in the way of making the sizes of the joists such that their strength increases more uniformly in accordance with their sizes, instead of, as apparently has been the case, paying more attention to standardising certain makers' rolls. The moments of resistance of the various sections—that is to say, their strength—should have followed a uniformly increased increment as the sizes grew larger. For instance, in the smaller sections a 4 inch by 2 inch and a 5 inch by 2½ inch would have been far more useful, and might have superseded the present 4 inch by 1¾ inch, the 4¾ inch by 1¾ inch and the

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5 inch by 3 inch; the latter, weighing 11 lb., is too nearly alike in weight and strength to the 6 inch by 3 inch, weighing 12 lb. So, again, in the larger sizes there is a considerable gap between the 14 inch by 6 inch, weighing 46 lb., and the 15 inch by 6 inch, weighing 59 lb.; also this latter too closely resembles the 16 inch by 6 inch, weighing 62 lb. Their respective moments of resistance are 62.9, 83.9 and 90.7, whereas the strength of the 15 inch by 6 inch should have been exactly intermediate between that of the other two sizes, and its moment of resistance, instead of 83.9, should have been about 77. As it is, the thickness of the flanges of the 15 inch by 6 inch is greater than that of the flanges of the 16 inch by 6 inch. If the rolls for the 15 inch by 6 inch, weighing 59 lb., joist could not have been adapted for this alteration, those for the 15 inch by 5 inch, weighing 42 lb., might have been re-turned; this latter size could have been dispensed with without being very much missed. Certainly there is the 14 inch by 6 inch, weighing 57 lb., joist, but this is not an economical section and is one of the standard sizes it is best to avoid, owing to its not being so generally procurable as the other sections. This size, together with the 12 inch by 6 inch, weighing 54 lb., the 10 inch by 8 inch, weighing 70 lb., and the 9 inch by 7 inch, weighing 58 lb., are more adapted for stanchions than for beams, the two latter so much so that they are almost solely used for that purpose. The 8 inch by 6 inch, weighing 35 lb., joist is but of little use as a beam; it might well have been increased in size to make it essentially a stanchion section, as it is to a great extent at present; but the want is often felt of a size intermediate between it and the 9 inch by 7 inch, weighing 58 lb., joist. Taken all in all, the British standards might have been greatly improved from the designers' point of view.

A few remarks may be made in regard to the spacing of the cross joists. The earlier forms of fire-resisting floors appear to have set the fashion in regard to the distance the cross joists should be spaced apart. In America one of the earliest types of floor was the corrugated iron permanent centreing sprung in between the bottom flanges of the joists in the form of an arch, on which the concrete was laid; this type was superseded by the terra-cotta flat arched floor, which probably still holds the record for the greatest amount of floor area constructed of a fire-resisting nature.

In each of these types the most suitable distance at which to space the cross joists was about 6 feet, and this distance became practically standardised in American design. In England the usual type of floor was that of the cross joists, spaced 2 to 3 feet apart, embedded in concrete; also floors were constructed of terra-cotta tubes resting on the bottom flanges of the cross joists, with concrete filling over, the joists in these cases being spaced 2 feet apart, so that 2 to 3 feet was practically the standard distance in English design. The English tube system was introduced into America, but it found no favour with the steelwork designer, mainly on account of the fact that joists spaced so closely together are not of sufficient depth to provide the desired stiffness when calculated for strength only. This is certainly the great drawback to the cross-joist system of floors; e.g. a 6 inch by 3 inch joist spaced 2 feet apart may be safe to carry a light floor, but is insufficient as regards stiffness. During construction the vibration is very noticeable before the wood fillets and floor boards are laid; these latter absorb to a great extent the vibration of the finished floor; but still it is the lack of sufficient stiffness that militates against the cross-joist system.

When the spacing becomes as wide as 6 feet the size of the joist would be of sufficient depth to make it rigid; the stiffness of a joist depends on the square of its depth whereas the strength depends directly on its depth. As against the wider spacing must be set the difficulty of filling in between the joists; solid concrete makes the dead weight of the floors too heavy. Other light systems may require a false ceiling, which means expense. The terra-cotta flat arch, laid in segments, was almost universally adopted in America to overcome this difficulty; but though it was introduced into England and was manufactured by Messrs. Doulton & Co., it has not been used to any great extent. Since the introduction of ferro-concrete floors and where this type of floor is used the spacing is more a question of the girders than of the cross joists.

(To be continued.)

Mr. Edwin J. Tench, A.R.I.B.A., architect and surveyor, of Station Chambers, Foundry Bridge, Norwich, has been appointed a diocesan surveyor to the Ely Diocese.

THE A.A. PLAY.

By Y. Y.

DULCE est desipere in loco.—The title should have been sufficient warning to me not to carry through my suggestion to her mother that Miss Innocent Trust should accompany me to this year's "Association" play. For in the past she has shown a curious inability to understand certain kinds of jokes. It is, indeed, related of her (though the story has to me something of a chestnut flavour) that not so very many years ago she was reduced from boisterous hilarity to stifled sobs at the pantomime, when in the Harlequinade, after the terrier jumped into one end of a mincing machine sausages came out at the other. This disconcerting tendency to take things literally proved disastrous on the ladies' night. I now realise too late how ominous was the title "The Rise and Fall of Architecture." But on the surface it seemed to promise an educational evening's entertainment for a serious-minded young lady, and one likely to still further heighten the esteem of Miss Trust for the profession to which I, her uncle, belong. How completely these expectations were belied I shall now proceed to show. It is hardly necessary to say that I very quickly realised what was afoot, and was able to enter into the fun of it; but it has been so far impossible to altogether restore Miss Innocent's trust in the profession which she had been encouraged to regard with awe as being full of sacred mystery.

It will be admitted that the sub-title is calculated to mislead anyone as to its true purport. "An up-to-date pageant, being the application of six stages of Architectural Art to present-day practice. Culled from the pages of the past by the Editors of the Purple Patch and brought into harmony with the present by the musical inspirations of Mr. Claude Arundale-Kelly." Nor was the arrangement of the Episodes calculated to arouse suspicion of its serious intentions. Act I. scene 1, The Youthful Prehistoric; (2) The Tactful Egyptian; (3) The Omnipotent Greek. Act II. scene 1, The Mighty Monk; (2) The Eighteenth-century Amateur; (3) The Present Age and the Descent of Man.

But the trouble began as early as the Prologue, for we were told:—

In Act I. we show that "art" isn't wanted at the start—
Simply "cheek."
Then as art becomes a fact, we require a little "tact"—
Just a streak.
But when art its summit reaches, true "forbearance" great it preaches;
Act II. will show you symptoms of its wane.
Dilettanteism spreads—in scene 3 our art is dead;
Try "advertisement" to set it up again.

The evil genius of Architecture is clearly proved by this historical review to have been the Purple Patch as far back as the dim days of palæolithic man. It was he who, announcing himself as a messenger from the gods, put strange implements into the hands of Ari-Ba and told him that he was to practise the profession and preach the art of architecture. And it is the Purple Patch who prompts this bewildered mortal how he is to bluff his first clients Ung and Boo, who are wanting immediate shelter after being evicted from their ancestral cave by a Great Green Beast.—Cheek.

In the course of the centuries which separated the Stone Age from the era of Ancient Egypt the status of the architect has so improved that he and his colleagues have formed themselves into the order of priesthood known as Riba. The high priest Manrula, F.R.I.B.A., has learnt by bitter experience of the waywardness of lady clients, and especially that of Queen Hatezu, who wishes to build a temple to Christabel. The queen is never of the same mind for two successive hours as to what kind of place she will have. Finally, she commands that a commencement be made with the foundations and all the rough walls; when these are ready she will decide what the superstructure shall be like. The distracted architect is again saved by the crafty Purple Patch, who comes disguised as interpreter to a foreign prince. His advice is for Manrula to erect the temple according to his own design, and then for

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him to go to the client and extol her judgment to the skies, for "she'll soon believe 'twas all her will," and so must always be constrained to call it good. Here is TACT.

With its help you make a client, most uncertain,
Decide on just the thing you want to do;
By its aid you make a builder, old and cranky,
Quite cheerfully adopt all methods new.

Although architecture rose to its greatest height in the time of the Greeks, it is evident that the fatal influence of the PURPLE PATCH has been insidiously poisoning the honest minds of its practitioners. The incident taken from history is the little-known arbitration case between PERICLES (to whose generosity the Parthenon owes its existence) and BRYX, who carried out the contract. PERICLES claimed 30,000 drachmae under the penalty clause for delay, and also maintained that the temple was not up to specification. The case is being heard by CALLICRATES, P.R.I.B.A., and his partner ICTINUS, who has been made a partner so that he may do all the dirty work of the President's immense practice. The case goes hard with BRYX, especially as CALLICRATES wants it finished in time for lunch. The witnesses for the plaintiff are many and their evidence overwhelming. But the builder at last gets a hearing at the suggestion of the PURPLE PATCH. His defence is that, in addition to finding the marble harder than expected, and the frieze longer than it ought to be, he was hampered in his work by a slip of a girl who sat chatting on the scaffolding the whole day long. He appeals to CALLICRATES to make allowance for a lover. The arbitrator thereupon adjourns the case so that the beautiful damsel may be brought into court—FORBEARANCE.

By the fifteenth century the profession had deteriorated in something more than honesty, for the ecclesiastics who won fame as architects are nothing more than figureheads. Witness the behaviour of Sir THOMAS DE TUFTON, abbot of Blastonbury, who pretends to be superintending the erection of the south transept of his abbey. Progress in the operations is rudely checked by the arrival of the Sheriff's Clerk, who serves injunctions to restrain the monks from further trespass on the light and air of their neighbours by continuing to erect the three towers, which are being set up to mortify the monks in the neighbouring rival Benedictine abbey. The dilemma is solved by the PURPLE PATCH, the abbot's jester, who whispers that the official is something more besides the Sheriff's Clerk. He proves to be also the urban district surveyor and open to reconsider his complaint that no plans have been lodged. The rich benefactor once more finds that "when steel fails gold is the best metal to use"; in fact, to employ the auro-concrete system of construction. The difficulty with the local authorities is thus overcome by TACTICS.

Some three centuries later the PURPLE PATCH is at hand when ADDISON, in despair as to finding a subject for his weekly article, offers his artistic soul for an inspiration as to how to tilt at architects. The pledge is accepted, and ADDISON is told to "imagine a house designed as a place to live in: not an exercise in gentility, not an illustration of what its master would like to be thought, but a place in which a man of plain good sense might live, and move, and have his being"—DILETTANTEISM.

Miss INNOCENT TRUST had only been slightly affected by all this, for the rather damaging incidents that had been mirrored on the stage belonged to a dead and gone age. But the last scene was a painful reality to her with its twentieth-century garb and thoughts. It showed the exhibition of *Daily Mail* Ideal Home Competition drawings at Olympia. The prize-winner, Mr. SNATCHALL, has been living for the past two years on his articled pupil's premium. But when he pins his office card on his drawings orders crowd in. This idea is due to the lesson learnt as to self-advertisement from Messrs. SPARING & FLASHY, decorators, builders, and whatnots, who had almost ousted him out, and also thanks to Mr. SNATCHALL'S own energy in touting for clients. He has likewise discovered—

That clothes give a sense of stability;
We have now discovered that
A tail coat and good top hat
Are worth more than artistic ability.

The PURPLE PATCH, in order to show how little architects have really advanced in all these years in execution and the British public in powers of appreciation, conjures up the cottage that ARI-BA had designed in the palæolithic days, to find that (as STEVENSON wrote), the brick seemed to be blushing in the walls, and the slates on the roof to have turned pale with shame. The PURPLE PATCH then delivers this warning:—

Oh! you architects, you must be going blind;
Can't you see you're getting left centuries behind?
Your antiquated methods do not pay.
The wholesale art-providers soon will have you on your knees;
Your practice is already growing smaller by degrees
And beautifully less.
You'll be in a horrid mess
And a pickle when they come to you and say:—
Oh! you architects, you must be going blind;
No good to cuss,
You're left by us
Hopelessly behind.

Miss INNOCENT left the King's Theatre, Covent Garden, a sadder and a wiser maid.

The principal parts were sustained, and well sustained, by Mr. F. DARE CLAPHAM and Mr. G. B. CARVILL, the former in many aspects, but always the architect in each successive age—ARI-BA, the first architect in the prehistoric age; MANRULA, F.R.I.B.A., in the reign of the Egyptian Queen HATEZU; CALLICRATES, architect of the Parthenon and P.R.I.B.A.; Sir THOMAS DE TUFTON, a great architect and abbot of Blastonbury in the Mediæval period; and finally SNATCHALL, architect and designer and winner of the *Daily Mail* Competition. Mr. CARVILL, as the PURPLE PATCH, the organiser of the play, is throughout the piece the guiding spirit that ever prompts the architect and supplies him with the motive force—HUMBUG.

IRISH ARCHÆOLOGY.

IN Alexandra College, Earlsfort Terrace, Dublin, Professor Wm. Ridgeway, D.Litt., LL.D., delivered last week a series of three lectures dealing with the subject of Irish archæology, in connection with the Margaret Stokes Memorial Lectures for 1909. The title of the first lecture was "Ireland in the Bronze Age."

Professor Ridgeway outlined at the commencement of his remarks the lines upon which his course of lectures would proceed. The first period of Irish archæological history with which he would deal would be that of the earliest times, covering the stone and bronze ages, at the same time drawing attention to the question of the ethnology of this country. In his second lecture he would deal with a further stage of the development of the bronze age, and the final lecture would deal with the early mediæval period of Irish archæology, coming down to about the year 900. Ireland, of course, had her stone age, though not like that of the sister island. Ireland in those far-off days was detached from the mainland by stormy seas, so that here in this country no real palæolithic instruments had been found. Britain, on the other hand, was in those same days joined to the mainland, and hence there were found in that country remains of the palæolithic times in the form of ancient domestic implements and of weapons. Such monuments of the past spoke to them eloquently of what happened to man in those old ages. He had to struggle, not so much with the elements, although there were at times huge natural cataclysms. He had, rather, to struggle with the mammoth animals of the palæolithic ages, and all too often, it would appear, the beast had the best of the struggle. The new stone period was the first stone age which they had in Ireland. In that stage of the history of man a great change had taken place, and the rude implements of the earlier times had been very largely replaced by polished and pointed implements of attack and defence. There was a wonderful sameness about the implements of the palæolithic age; but when one came to the neolithic period man had learned, at least in the southern regions of Europe, to make better implements, and the methods of using those styles of implements were better known to archæologists than those adopted in regard to the earlier ones. The lecturer having shown on the screen examples of the various classes of weapons used in the Irish stone age and in the succeeding

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bronze age, proceeded to state that in the matter of the manufacture of bronze implements Ireland at no time in the course of the bronze or iron age had been dependent upon Britain. It had been a fondly cherished idea of the people connected with the British Museum that everything in the matter of Irish culture in that particular branch depended entirely upon the supply making its way into Ireland through Britain. All the evidence, however, was directly to the contrary, and went to show that Ireland had always direct communication on her own account with the Continent, and particularly with either Spain or France. The fact that they found in North-Western Spain axes of the type of those in use in Ireland in her bronze age showed that Ireland was not indebted to Britain for her implements, but that she had direct communication with the mainland. In the case of the Irish bronze axes they frequently found specimens of them beautifully decorated and beautifully engraved—the most beautiful things, in fact, in the way of such implements to be found in any part of the world. The lecturer next showed examples on the screen of ancient Irish bronze spears and daggers, the different forms of construction of which he pointed out, explaining the nature and properties of the composition of bronze, and its adaptability to such a use as the manufacture of those ancient implements with which he was dealing. As he did not accept the theory of Ireland owing her progress in those matters to help from Britain, neither did he accept the theory that those arts might be, in some measure, traceable to the Phœnicians, a suggestion which had been so frequently put forward. He, personally, did not believe that the Phœnicians had ever passed the Bay of Biscay, and he had never been able to ascertain that any single ancient article which could be described as Phœnician had been at any time found in Britain. "However," added the lecturer, "the Phœnician dies hard. He has in his time played many parts, and I have no doubt that he will often be revived in the future."

The second of the three lectures was entitled "Ireland in the Early Iron Age."

Professor Ridgeway pointed out that in the whole history of the progress of mankind from one stage of development to another no more important step had ever been taken than that initiated by the men who first discovered the power of working iron. The question was, Where did that power first come into use amongst men? It had for long been held that the discovery of the uses and the working of iron so far as Europe was concerned was a gift to that Continent from Africa or from Asia. He held that the art of working in iron had not come into Europe from those places, but that, on the contrary, the use of that particular metal had been evolved in Europe itself, and that, from the earliest period of the iron age, the working of that metal had been in the hands of Celtic peoples, who carried the knowledge of the art with them wherever they went. There was evidence that iron was in use in Central Europe long anterior to the year 1500 B.C. About 400 years before Christ the Gauls invented a species of ornamental work which distinctively belonged to the iron age, and of which traces had been found in Ireland, including six examples of a peculiar and highly ornate form of brooch, three of which had been discovered in the celebrated Navan-rath, itself the centre of the exploits of some of the ancient heroes of Ireland. The epics relating the adventures of those heroes, about whose existence there could be no doubt, though their doings might have been very greatly exaggerated by those who had written about them, showed them as users of chariots in the accomplishment of their warlike exploits. These chariots were examples of the methods adopted by warriors in the iron age, before the introduction of cavalry as a means of fighting, and proved conclusively that Ireland shared, to no small extent, in the progress and development which was to be found in that particular period of the world's history. That fact was further borne out by the examples which had been discovered of ancient Irish armour, and of the specimens of swords and other warlike implements which were fashioned from iron. In dealing with those matters the inquirer was once again, as in the case of the progress of the bronze age in Ireland, afforded proof that the art of working in iron had been introduced to this country without having come here from Britain.

Professor Ridgeway, in his concluding lecture, dealt with the subject of "Ireland in the Middle Ages," and stated at the commencement that by the combined study of ancient literature and of archæology great advances could be made in the matter of historical research. Whilst the archæologist lent a helping hand in securing a proper estimate of the ancient life of a people, he, on the other hand, owed a great debt to the scholar and to literature. In the elucidation of those matters in which they were on the present occasion interesting themselves, archæology and literature must go hand in hand. If archæologists could only get something substantial in the matter of the history of the countries whose archæological records they were investigating, that fact would be of great assistance to them. In the case of Irish archæology they could attain more and more to that end as they advanced in the study of the various cycles of Irish poetry. The cycles of Cuchulain and of Conchobar afforded them good reason for believing that the poems dealing with those periods were shaped at dates not very far removed from the times in which the events narrated therein were supposed to have taken place, and they brought them back to the end of the first or second century after Christ. There was no literature to be found in Europe north of the Alps which could compare in wealth of information with the ancient Irish poems. Teutonic literature had nothing to compare with those Irish works. Thus they would see the extraordinary importance of a work like the "Tain Bo," which represented the life of a certain number of those ancient Celts who had played such a prominent part in the history of Central Europe from the earliest dawn of history. The lecturer then proceeded to deal with the subject of the literature of the Ossianic cycle, which, he said, afforded most interesting and instructive glimpses into the lives and customs of the people who had lived in this country in that particular period. The same was to be said regarding the literature dealing with the exploits of Finn and the Fionna. Works like those were amongst the oldest literature in Europe, and some of them went back far beyond any of the records contained in the oldest known forms of Teutonic literature, and had given a literature not to be found in any country of Europe in its richness of detail and in its importance. He was glad to see that that literature was being studied by people at home as well as by foreigners. But the ancient literature of Ireland must be studied in connection with the archæology of Ireland in order that certain important definite results might be arrived at. They had Irish scholars to-day who were doing much useful work on both the literary and the archæological sides of that very important matter, scholars like their chairman, who was doing so much for the development of the literary and ecclesiastical side of the subject. All that work would lead up to something being accomplished which would show in time the extraordinary heritage which the people of Ireland had in their native land.

The abstracts of the above three lectures have been taken from the reports in the *Irish Times*.

THE LAND REGISTRY.

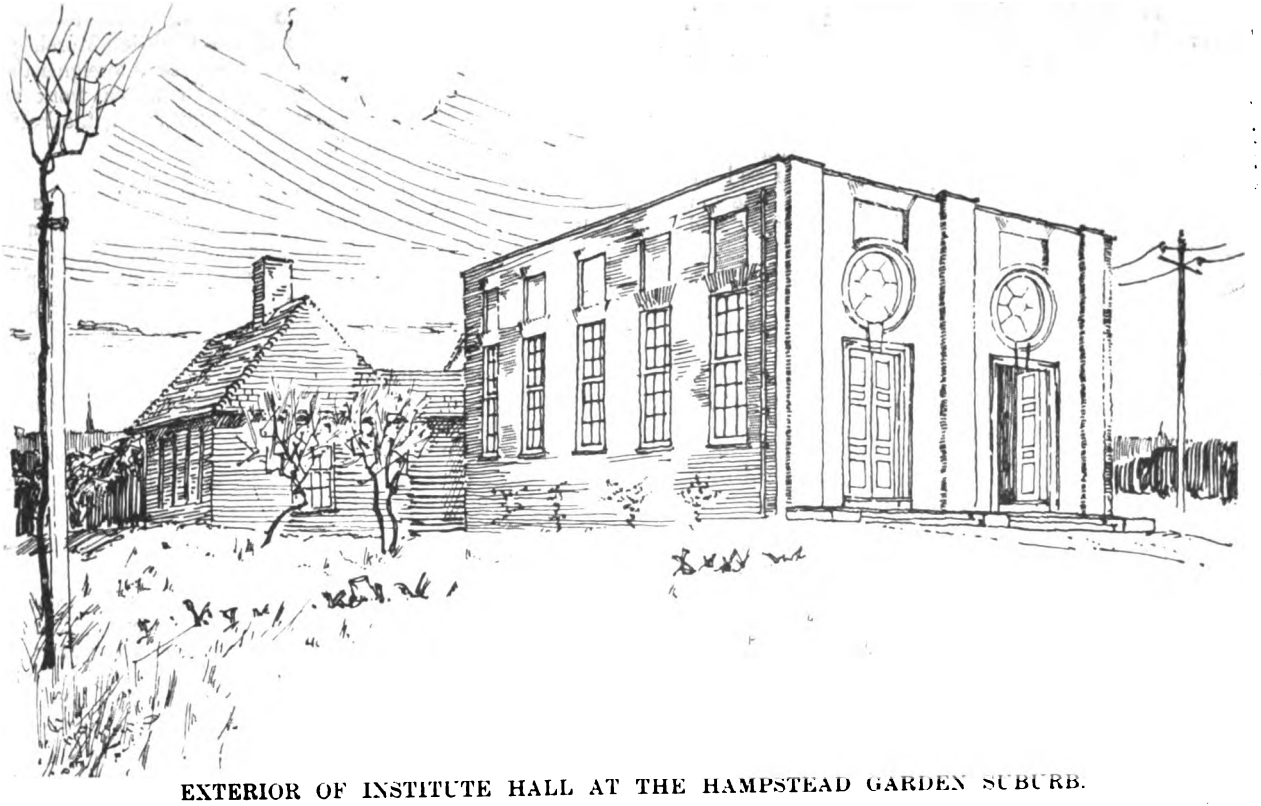
AT the annual meeting of the Land Law Reform Association held last week in the Conference Room of the National Liberal Club, the following resolutions were put to the meeting and carried:—

1. That in view of the fact that the system of compulsory registration of title that has been on trial as an experiment in the County of London since January 1899, has not proved satisfactory, and that as a consequence a Royal Commission has been appointed to consider the subject, and further in view of the fact that the Land Registry officials have since giving evidence before the Commission found it necessary to completely alter the practice, and to seriously increase the registration fees, this meeting is of opinion that the Privy Council should forthwith exercise the power they possess to suspend the operation of the Order applying compulsion to the County of London, so that pending the report of the Royal Commission, property owners may be left free to register or not as they deem best in their own interest.

2. That copies of the foregoing resolution be sent to the Lord Chancellor, the Privy Council, the Chairman of the Royal Commission, the Attorney-General, and the London County Council.

Mr. L. Harcourt, M.P. (the First Commissioner of Works) in reply to a question as to what progress has been made with the Queen Victoria Memorial in St. James's Park, and by what date it is likely to be completed, stated last week that a large portion of the sculpture was completed, and arrangements have been made to begin fixing it as soon as possible. The fountains and marble work around the base are finished, and it is intended to remove the hoarding during April, when they will be visible to the public. It is not possible to name an actual date for completion.

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EXTERIOR OF INSTITUTE HALL AT THE HAMPSTEAD GARDEN SUBURB.
Edwin L. Lutyens, Architect.



INTERIOR OF INSTITUTE HALL AT THE HAMPSTEAD GARDEN SUBURB.
Edwin L. Lutyens, Architect.

On Saturday last the Institute Hall, built by the directors of the Hampstead Garden Suburb from the designs of Mr. Edwin L. Lutyens, was opened by Canon Barnett for the use of all the inhabitants of the new community. This building is but the first instalment, as it now stands, of what is anticipated in the future, a group of buildings providing an educational and recreative institution for the suburb, and comprising museum, galleries and library, in addition to the hall now provided. Our sketch shows therefore merely the embryo of the future scheme. The hall is built of red brick (on the faces shown) with stone for the architraves to the doorways and the circular panels over. The roof is flat. The interior of the hall is very refined in treatment and finished at present in white plaster.

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NOTES AND COMMENTS.

HIS MAJESTY'S Government has adopted a welcome change of policy by advising the appointment of a Royal Commission to assist the Board of Trade in taking measures to ensure the proper representation of British Arts and Industry at the forthcoming International Exhibition at Brussels in 1910 and at Rome and Turin in 1911. The only architects whose names we note on the list of the Commissioners are Sir THOMAS DREW and HIPPOLYTE JEAN BLANC, Esq., the former as President of the Royal Hibernian Academy of Painting, Sculpture and Architecture, and the latter as Deputy President of the Royal Scottish Academy of Painting, Sculpture and Architecture. Whilst we acknowledge these two gentlemen as worthy exponents of the art of architecture in Ireland and Scotland, we regard it as an insult to the "Mistress Art" that she should be represented, on the advice of His Majesty's Ministers, only because two of her sons are so well acknowledged as artists as to be selected to preside over painters and sculptors. Why should not architecture be represented by a member of the Royal Academy or by a present or past President of the Royal Institute of British Architects? The Brussels Exhibition is to include an art section, and the Exhibition at Rome is to be wholly devoted to art and archæology. Is Great Britain to surprise her Belgian and Italian hosts by leaving out architecture as one of the arts practised in this country?

SIR F. BANBURY'S proposal in the House of Commons to omit from the London County Council (General Powers) Bill the clause granting a right to appeal to the County Council from a decision of a district surveyor by any person dissatisfied with that functionary's decision in regard to buildings of iron and steel skeleton construction has, to our mind, strong justification. The position of the new order of district surveyors and the method of their appointment makes them increasingly officials of the County Council rather than independent professional men, and the Tribunal of Appeal, which is independent, is the only authority to whom any appeal from the decision of a district surveyor ought to be allowed.

PROFESSOR HERKOMER says that in the past Art was an integral part of life, that now it is an "extra," and is charged for accordingly. He suggests that the remedy is to follow the example of his countrymen, the Bavarians, who send round the country collections of reproductions of modern and past masters, and encourage the peasant to buy copies from an exhibition in the local school-house. But is the Professor right? Has not the Philistine begun to recognise that oil painting is not the only form of art? The success of the Arts and Crafts movement would seem to answer this question in the affirmative, as does the increasing readiness of the public to prefer artistically designed furniture, textiles, and jewellery. The numerous well designed small houses that our younger architects are producing in such profusion in garden cities and suburbs are doing more to produce an appreciation of art by the people than any number of reproductions of the works of modern masters of picture painting, and the speculating builder, shrewd man as he is, has grasped the fact that an architect's house sells better than the atrocities of which he could readily dispose ten or a dozen years ago.

HIS HOLINESS Pope PIUS X. on Saturday last formally opened the new picture gallery at the Vatican, which is approached from the back of the building in the Vialone di Belvedere, and is on the ground floor, immediately below the Vatican Library. The architect of the gallery is Commendatore CONSTANTINO SNEIDER, and the collection and arrangement of the pictures is the work of the late Professor SEITZ and Professor PIETRO D'ACHIARDI. The arrangement of the rooms is mainly chronological, one room being devoted to Byzantine and trecento artists, one to those of the quattrocento and cinquecento, one to the seicento painters. Other rooms are given respectively to works of the Umbrian-Marchegian schools, to those of RAPHAEL and to those of foreign artists. The general superintendence of the whole work was assumed by Monsignor Marquis MISCIATELLI, the Prefect of the Apostolic Palaces.

THE Royal Scottish Museum at Edinburgh is the fortunate possessor of a large collection of specimens of pottery of the mysterious Incas of Peru. This has been recently presented by Mr. THOMAS COLSTON, and supplements the bronze and silver work of the same age given by Mr. COLSTON some ten years ago. The marked resemblance between the decorative work of the ancient Peruvians and that of Egypt is a very interesting feature, and lends colour to the theory that there was some connection between the peoples of the two countries, far distant in space though they were, whilst no little information is afforded by this pottery as to the fauna and flora of Peru under the Incas.

IT seems that the commission of eminent experts appointed by the Italian Government has decided that the Government has so many important excavations on hand that it would be quite premature to attempt to commence upon Herculaneum, which, however rich it might prove in discoveries, they say can only be adequately excavated at an enormous cost. Thus, having refused the assistance of Dr. WALDSTEIN, the Italians now find they cannot themselves do the work of unearthing Herculaneum, and they are content to believe that as the remains of that city have lain where they are for nearly 2,000 years, they will be quite safe for another century or two. They seem to ignore the fact that eruptions of Vesuvius have not ceased, and that possibly a fresh flow of lava might cover the site of Herculaneum.

THE Royal Victorian Institute of Architects evidently has to fill in Melbourne the functions of both the Institute and the Association in London, for at their annual conversazione, of which an account appears in the number of the Journal of Proceedings now to hand, they not *only* distributed prizes for the annual students' competitions—and very good are the winning drawings—but entertained themselves with an architectural comedietta, "The Blotted Blot," quite on the lines of those initiated by the Architectural Association. The plot of the play was a competition, limited, between a clever but struggling young architect, NORMAN CROCKETT, and a successful but unscrupulous architect, ADOLPHUS TUCKPOINTER, for an asylum for Unelected Politicians at the new Federal Capital of Never Never. Of course youth and virtue triumphed.

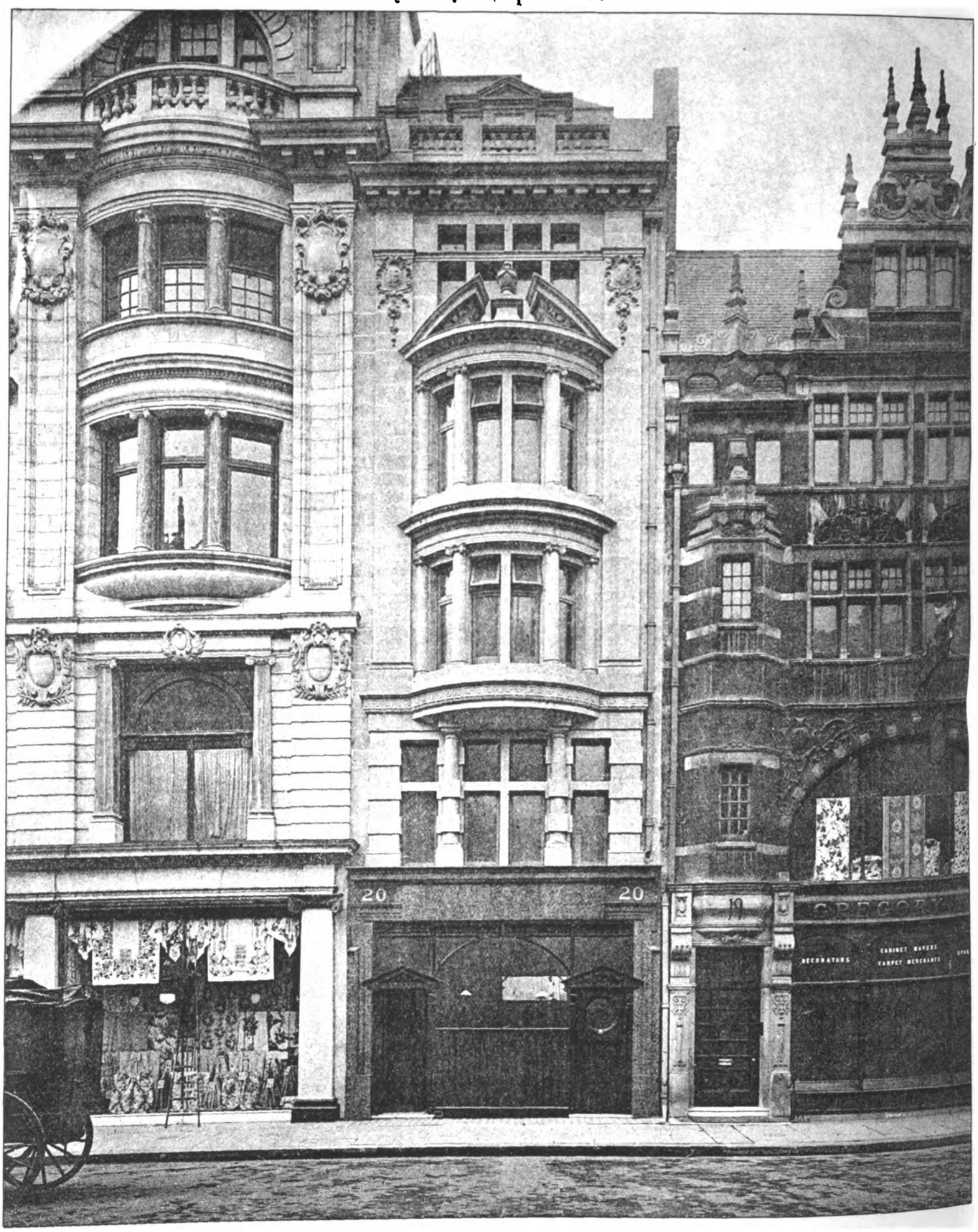
WE noted a few weeks ago that the New Yorkers proposed to restrict the height of tall buildings in that city to 350 feet. We now learn that the municipal authorities have refused to adopt the restriction, and decided that there shall be no limit to height, provided sufficient allowance is made for light and air to adjacent buildings. This provision is the crux of the whole question. If one man erects a skyscraper his neighbours are prejudiced because they cannot do the same without injuring his light and air. But "jumping the claim" is recognised in the States as a justifiable proceeding.

WATER paints or washable distempers sometimes give unsatisfactory results on newly plastered work, and treacly tears run down the walls. The reason is simple: many of these compounds contain a certain amount of oil, the lime in the plaster combines with which to form a soap. Hinc illæ lachrymæ. Others are themselves saponaceous, and the wet and still active lime plays the part of a reagent on their chemical composition. The best prevention of the trouble is to wait till the wall is dry and the lime carbonated and inert.

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NEW PREMISES, OLD CAVENDISH STREET, W.

Messrs. BULMAN & DEAR, Architects.

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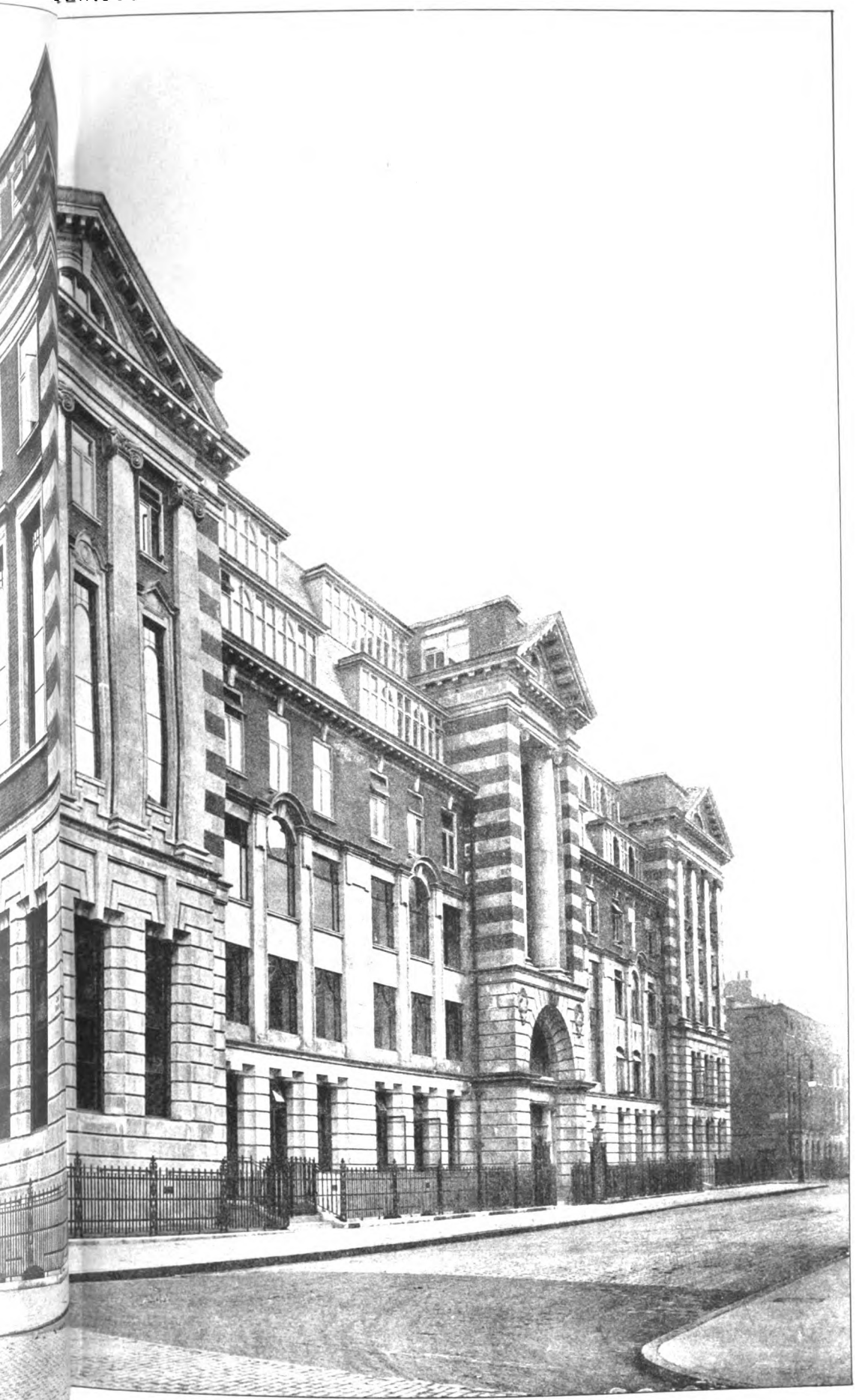
PHOTOGRAPHED BY BEDFORD LEMERE & Co 147, STRAND, W.C.

UNIVERSITY COLLEGE TAL MEDICAL SC

PAUL WATERHOUS F.R.I.B.A. Architect.

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12th 1909.



AL MEDICAL SCHOOL.

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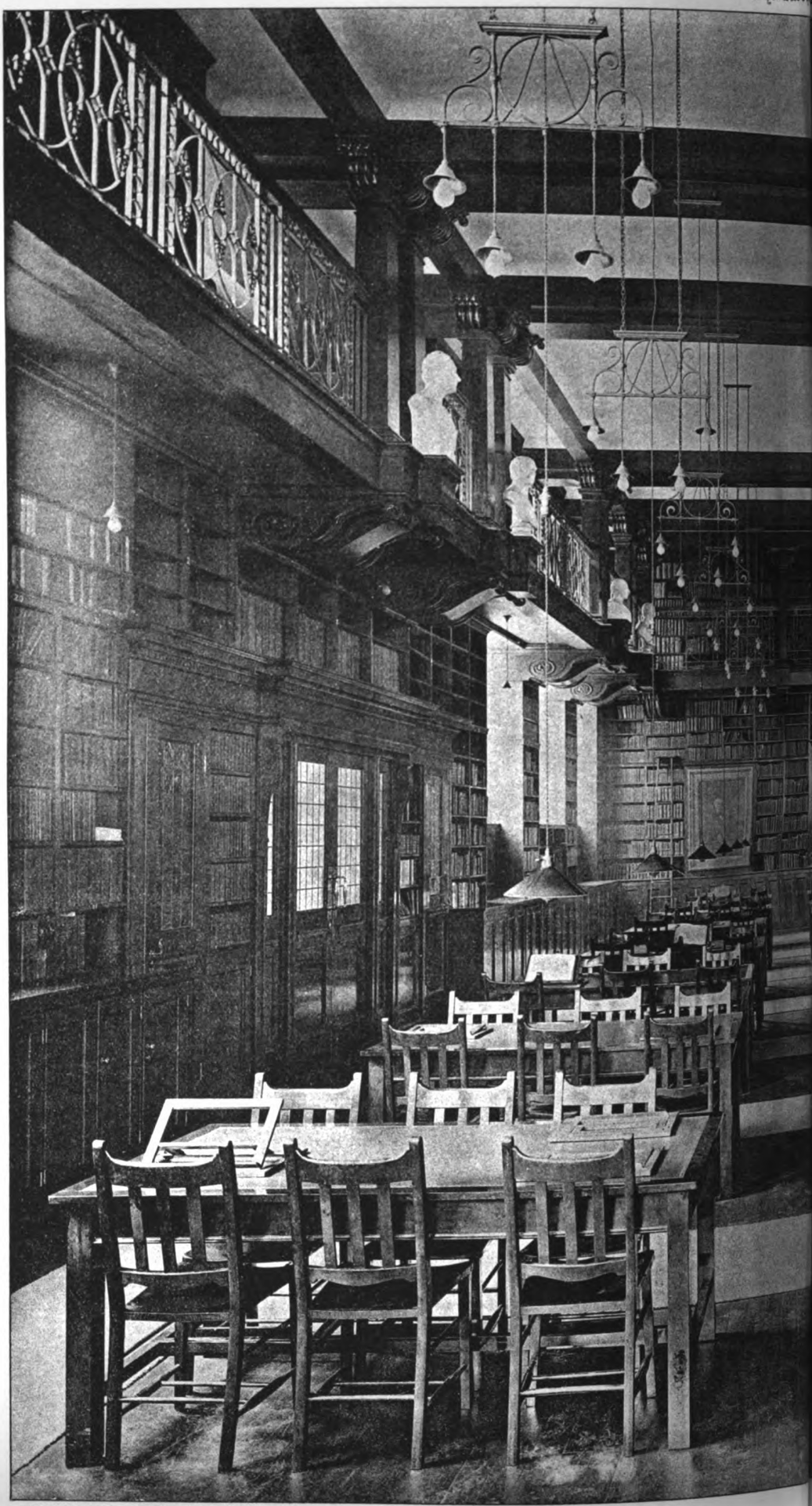
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UNIVERSITY COLLEGE HOSPITAL MEDICAL SCHOOL

PAUL WATERHOUSE, F.R.I.B.A. Architect.

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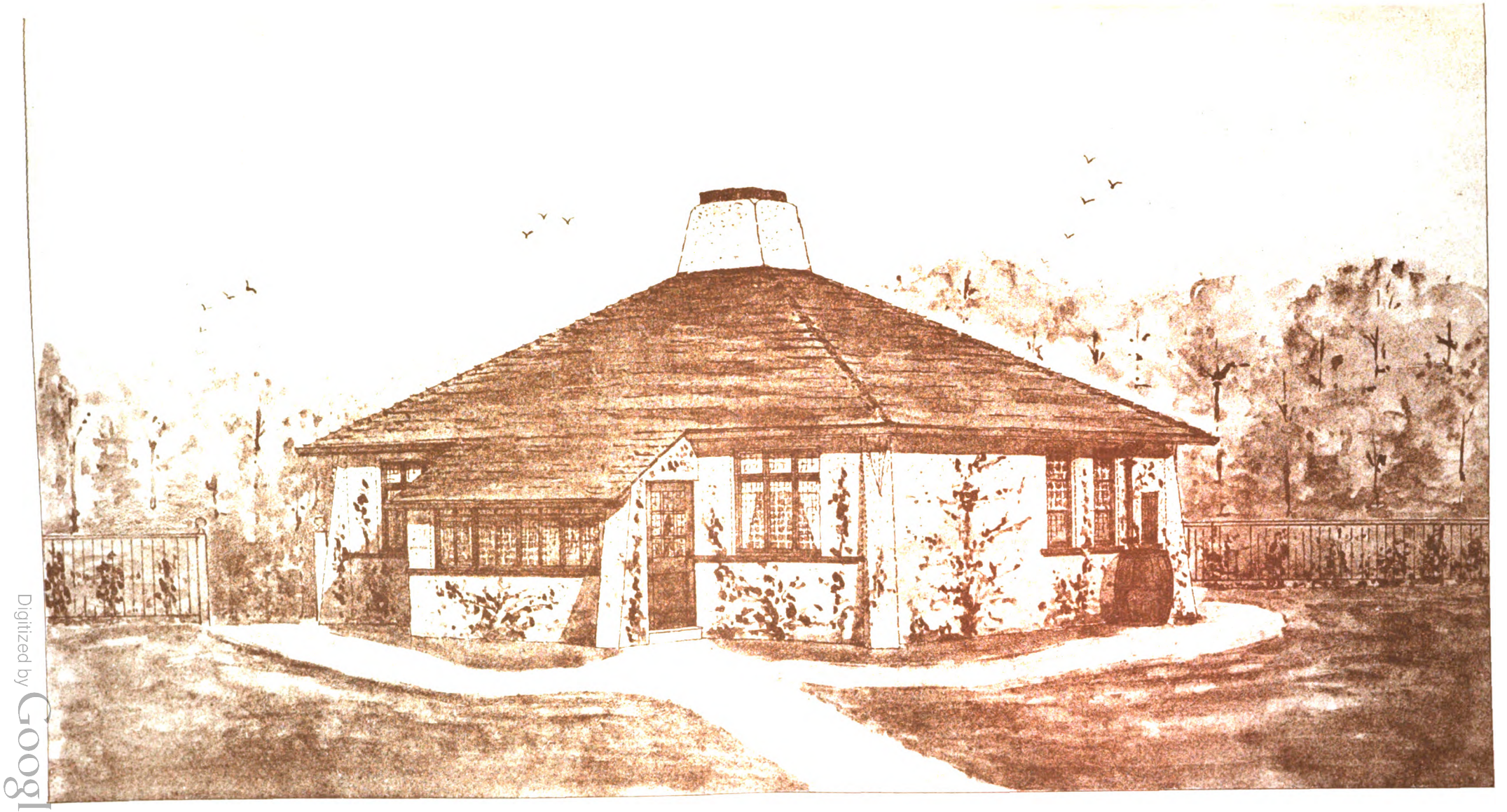
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R.I.B.A., Architect.

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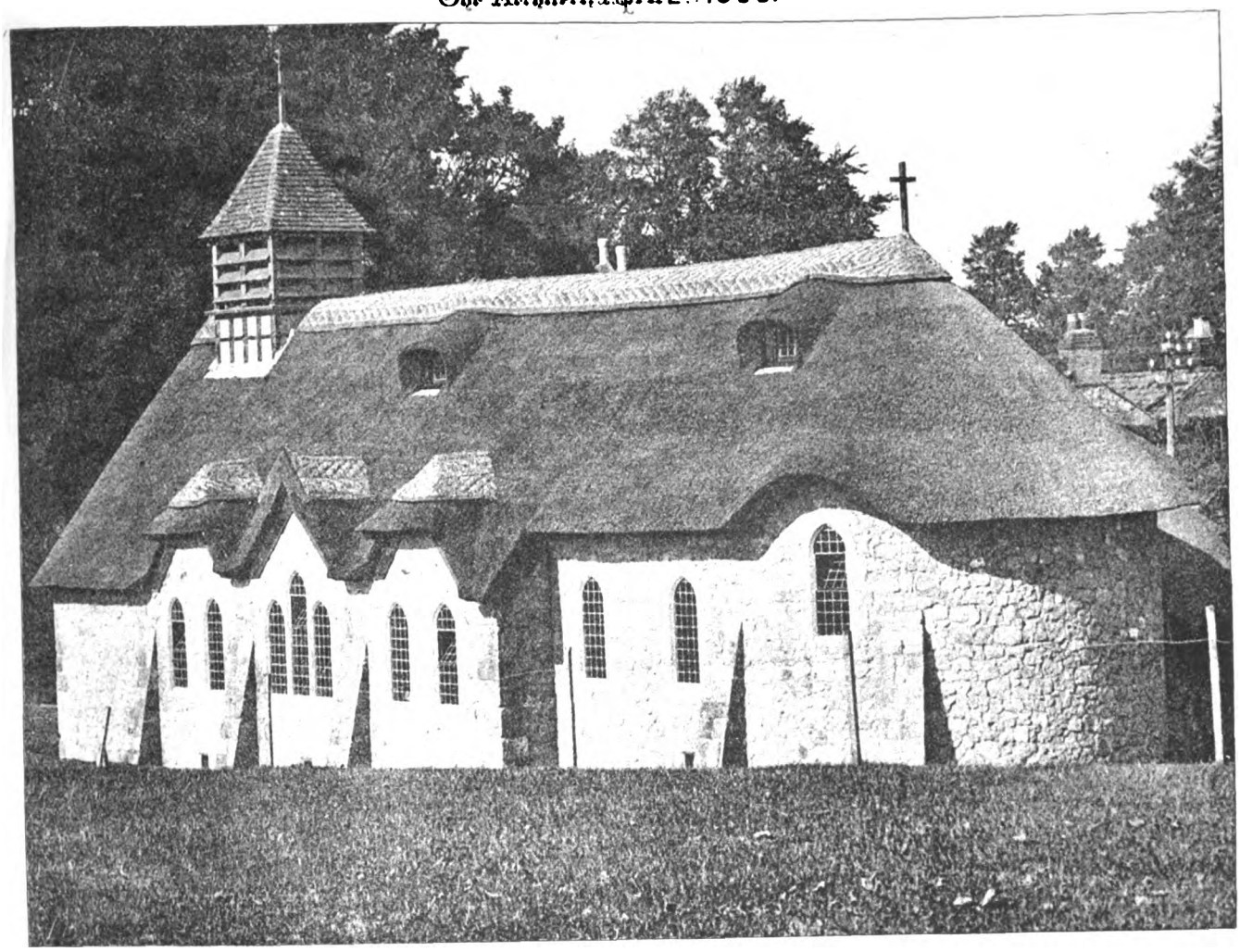
DESIGNS FOR COTTAGES

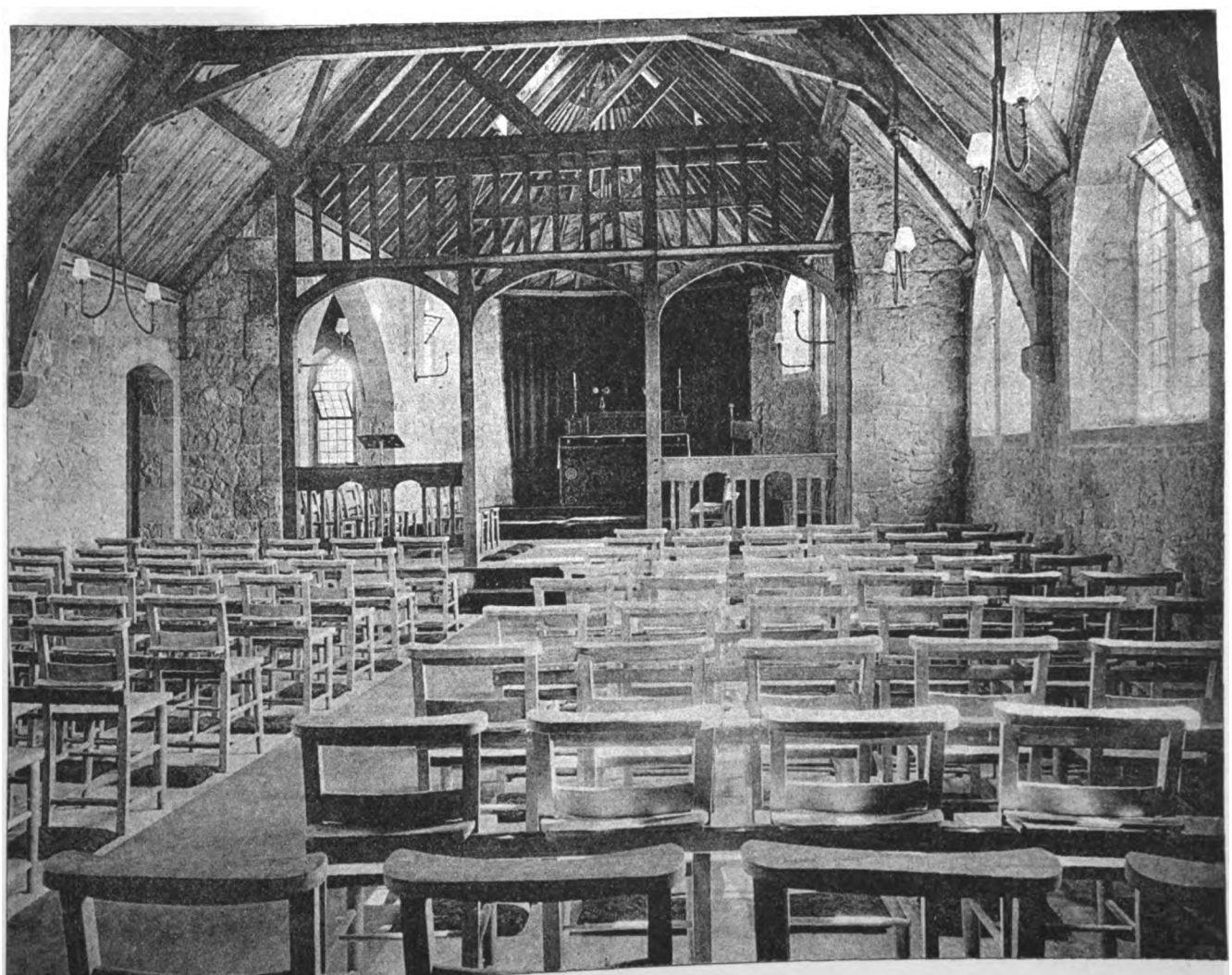
By A. WHITCOMBE, A.R.I.B.A.

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ST. AGNES' CHURCH, FRESHWATER, I.W.

ISAAC JONES, Architect.

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ILLUSTRATIONS.

UNIVERSITY COLLEGE HOSPITAL MEDICAL SCHOOL—LIBRARY.

MR. PAUL WATERHOUSE, the architect of this building, in response to our request for some particulars, writes:—"The difficulties of this design consisted in the fact that very large rooms, like the library and the museum, had to be combined in the same building with the nurses' quarters, which are, for the most part, rooms about 10 feet square. It was essential, in my opinion, that the complete composition should be of an Academic character and of balanced proportions. I therefore disguised the differences of window sizes and floor heights by making a large pilaster order the dominant feature of the wings and of the centre. The nurses' home is in the end furthest from the spectator (in the published illustration), and the Gower Street front contains the gymnasium (basement), library, museum, and on the upper floors rooms for research, anatomy, &c. The large lecture theatre, chemical class-room, administrative and official rooms, and theatre class-rooms for microscopic work are grouped in the central portion. The building contains, besides the scientific and technical accommodation, various clubrooms for the convenience of students, as well as a board room for the meetings of the governing committee. Between the nurses' home and the school is a small house of residence for medical students engaged in obstetric work. The contractor was Mr. CARMICHAEL, and the clerk of works Mr. KENNEDY. The whole undertaking owes its realisation to a generous gift by Sir DONALD CURRIE, whose portrait occupies the place of honour in the library."

ST. AGNES CHURCH, FRESHWATER, I.W.

THIS church, which was erected last year, was an attempt to produce a building which should be worthy of its purpose, and form a picturesque feature in the landscape, but should be at the same time inexpensive. It is, in fact, a contribution towards solving the problem of "cheap churches," coming year by year more to the front. With such a motive simplicity is imperative, but the materials are good and the work substantial. The walling is of local stone both inside and out, a large portion of which was taken from a demolished house in the parish. The tiles of the roofs of porch and turret are from the same building. The roof is covered with reed thatch. The floors and roof are deal; the remainder of the woodwork is English oak. The north front with porch and vestries faces the road. It is lighted and heated by gas. The site was given by Lord TENNYSON, on whose estate the church is built. The cost of the building was about 1,000*l*. The seating accommodation is for 150. Mr. ISAAC JONES, of London, was the architect, the quantities were supplied by Mr. J. N. NEWMAN, and the builders were Messrs. BROS, WHITE & Co., of Freshwater.

DESIGNS FOR COTTAGES.

THE cottages are of 9-inch work, with cream-coloured rough-cast, local plain tile roofs, red tile sills and green painted woodwork and leaded casements. The buttresses are put only where structurally necessary. The pair of cottages are near Reading. Mr. ARTHUR WHITCOMBE, A.R.I.B.A., is the architect.

NEW PREMISES, OLD CAVENDISH STREET, W.

THIS building, which has just reached completion, has been erected for Mr. JOHN SOPER, window-blind manufacturer, by Mr. W. J. MADDISON, of Clarkson Street, Canning Town, from designs by Messrs. BULMAN & DEAR, architects, of 67 and 69 Chancery Lane, W.C., who have been influenced in their choice of materials by the adjacent buildings. The ground-floor frontage is of royal blue granite (polished), and the shop front and doors of polished teak. Above the ground floor the whole of the front elevation is built of blue Forest of Dean stone. This stone has hitherto not been much used in London for elevations, owing to its cost, but of late, by the aid of the most modern machinery and appliances and an enormous development of the quarries, the finished price has been very considerably reduced, and Forest of Dean stone can now be put on the London market at a figure to compare favourably with Portland or other first-quality stones. For its wearing properties, blue Forest of Dean stone is renowned as one of the finest and most durable sandstones in the country. It withstands the London atmosphere most successfully and quite equally with Portland, and, contrary to all other stones, it weathers clean and retains its natural colour. It is wonderfully durable, and has been known to retain the tool-markings after hundreds of years' exposure, as can be shown in many old buildings throughout the country. The stone has been quarried, worked and fixed complete by the Forest of Dean Stone Firms, Ltd., of Bristol, and 13 Buckingham Street, Strand, W.C., who own a large number of quarries in the Forest of Dean. The carving has been executed by Messrs. E. J. & A. T. BRADFORD, of 62A Borough Road, S.E. The upper part of the building is divided from the shop by a concrete floor, and consists of five storeys, which will be used as offices and showrooms. The staircase and doors therefrom are of teak fire-resisting construction, and the stairs are lighted by means of borrowed lights in the doorways filled with electro-glazed fire-resisting glass panels by the Luxfer Prism Syndicate, who have also supplied the tiled-pavement lights. From the first floor the upper storeys are also reached by means of an automatic electric passenger lift on STIGLER'S patent, supplied and fixed by Messrs. SPAGNOLETTI, Ltd., of Shepherd's Bush. The Coalbrookdale Co. have supplied the "Tilt fires" and mantel registers used, and Messrs. LEGGOTT & SONS the door and window furniture throughout.

ARCHITECTURE AND THE CRAFTS.

MR. H. PHILLIPS FLETCHER, F.R.I.B.A., the architect to the Carpenters' Company, as chairman of a recent lecture to plasterers at Carpenters' Hall, in proposing a vote of thanks to the lecturer said that from his experience in different parts of the world he believed that the British craftsman, when given the time and the opportunity, was still the best in the world, but that owing to the stress of modern conditions he had fewer opportunities than heretofore. A debt of gratitude was due to the Carpenters' Company for stepping into the breach and trying to neutralise to some extent the decadence of apprenticeship by the establishment of their craft schools and the founding of lectures by eminent craftsmen. The problem of such modern conditions must be faced, and it was useless to sit down with folded hands to deplore the present condition of things. It behoved us all to be up and doing our utmost to turn out good work, and to tackle the problems of to-day as they were presented to us, not in the leisurely manner of our ancestors, but in such a way as to conduce to the benefit and enjoyment of our clients who, as they paid the piper, were entitled to call the tune. It was our duty to try and get them to appreciate the things that are inherently good and refined, or in other words to call for the right tune, which latter was not often improved by being produced upon a German band.

Architecture had been ignorantly described as ornamental building. This was entirely contrary to the proper spirit of architecture, and indeed good architecture often consisted of buildings without any ornament at all. If the ornament did not arise in the course of the constructive efforts of the architect, but merely had an appliqué appearance, it must be an outrage to a cultivated mind and the inappropriate ornamentation of many buildings of the present day was the cause of their being so unsatisfactory.

Mr. Fletcher mentioned that he had that afternoon received a catalogue containing designs in iron which obviously had been executed by someone who knew nothing at all about iron, and the result was that the draughtsman had produced drawings which were entirely incongruous, and must show to any practical man blatant ignorance of the first properties of the metal.

While it was impossible for architects to be absolute masters of every craft, they must at least understand the properties and the feeling of materials before they attempted to convey to craftsmen and manufacturers their ideas in design, and indeed they must try to be mates of all trades and master of their own; or in other words, to understand something about everything, and everything about something.

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A LESSON FROM THE PAST.*

(Concluded from last week.)

THE decline of what has been termed "organic" architecture was attended by the development of a style of which a great deal is seen and heard at the present time. Precise and scholarly, with a close affinity to the articulation of antique art, it is devoid of virility, and rises superior to "constructional and actual necessities." With such attributes and with details that can readily be expressed on paper, when they are not tortured into some wild freak, it is well within the capabilities of the modern practitioner and the modern workman; therefore it is not surprising that the beguiling influence of its later phases should now be almost universal.

The German poet Goethe, whose mind, as you know, was pre-eminently receptive and discriminative, visited Vicenza 120 years ago. He there saw the finest buildings by the last great master of the Italian Renaissance. Of these he says:—"When once one stands in the presence of these works one immediately perceives their great value, for they are calculated to fill the eye with their actual greatness and massiveness and to satisfy the mind by the beautiful harmony of their dimensions. Therefore I say of Palladio, he was a man really and intrinsically great, whose greatness was outwardly manifested. The chief difficulty with which this man—like all modern architects—had to struggle was the suitable application of the orders of columns to buildings for domestic or public use, for there is always a contradiction in the combination of columns and walls." (An old-fashioned objection that we hear nothing of nowadays.) "But with what success," Goethe proceeds, "has he not worked them up together! What an imposing effect has the aspect of his edifices; at the sight of them one almost forgets that he is attempting to reconcile us to a violation of the rules of his art. There is, indeed, something divine about his designs, which may be exactly compared to the creations of the great poet, who, out of truth and falsehood, elaborates something between both and charms us with its borrowed existence." Again, he says:—"The noble buildings which Palladio has erected are disfigured by the mean necessities of the people; the plans of most of them exceeded the means of those who undertook them, and these precious monuments of one lofty mind are but little adapted to all else around." At once a eulogy and a condemnation. The architect, you see, has now become a great personality; he builds for fame, the structure is his monument, the necessities of the people are ignored, and the Gothic town hall at Vicenza is henceforth buried in Palladio's "imposing" arcades.

About 100 years later a mathematician and astronomer named Christopher Wren was entrusted with the important task of rebuilding a great part of the City of London, after the fire that succeeded a calamity like that I have referred to of the fourteenth century. It is not my purpose this evening to enlarge on the career of this great man, whose works are so well known to you, but merely to remind you of the fact that throughout his extensive practice he accepted the prevailing fashion of his day, and by a scientific adjustment of slender materials produced artistic effects, stamped with individuality, yet charmingly varied to suit the exigencies of the site and the purposes of the building.

Wren's works present a happy combination of that "truth and falsehood" so much appreciated by the German poet; but, partly owing to the fact that the English architect had seldom the leisure or the means to elaborate his designs beyond their natural development, it is the "truth" that is predominant. The germs of decadence—inseparable from a Renascent style—are present, but the high-water mark of constructive skill had been reached, in combination with a definite and artistic expression.

Thus throughout the ages, say, from the hall at Karnak to that at Westminster and onwards to the eighteenth century, the capacity to produce really interesting work, and an absence of that aptitude—so prevalent in the present day—to produce anything uninteresting, seem to have been universal. In this connection it should be remembered that not only were the social conditions simpler than they are to-day, but the amount of architectural building was comparatively small; the materials used were the natural products of the country; the style of building was universal and so was the system of workmanship.

The world has turned round many times since then, and to-day constructive skill has overreached the legitimate capabilities of honest material. We are invited to leave the path of architectural rectitude for the labyrinthic deceits of the persuasive engineer, and the intimacy between the two professions is now so cordial that one is apt to identify the Royal Institute of British Architects in Conduit Street with the Institution of Civil Engineers in Great George Street; indeed, the amalgamation is becoming more firmly consolidated, or cemented, every day, and we must, I suppose, regard it as the inevitable sequence to that steady advance in scientific construction that I have ventured to draw your attention to this evening. Is it not, I would ask, the result of those "actual necessities" that have arisen from ultra-commercialism and overcrowding? And so long as these remain the dominant features of our social conditions the investigation of the engineer's anatomy will be retained as a subject on the pages of your curriculum. No doubt this is very flattering to the engineer. He has nothing to lose by the interest you take in his work. His susceptibilities and instincts of form and beauty are not likely to be weakened or destroyed by the coalition. But what of yours? A gasometer may be more expansive, but is it more impressive than the Roman Pantheon? The Tower Bridge may be "a joy for ever," but is it really more beautiful than Waterloo Bridge? Can any combination of engineering and pseudo-architecture rival the transparent candour of the Crystal Palace? The works of Palladio and his compeers are, indeed, "divine" when compared with those parodic efforts, exalted to the skies, at the corners of our streets.

You have been reminded of the utilitarian principles adopted by the builders of ancient Rome; how they threw aside the stone lintel and the wooden beam to make use of their natural cement for concrete vaults, that covered the space, without thrust, like a metallic lid. Well, we have improved on the Romans in the manufacture of metallic lids and iron grids, but whether these are destined to survive the decay of our civilisation is a question that need not concern us; it is of greater importance to know that utilitarian architecture is not necessarily opposed to art. The evidence of Roman greatness, as reflected in its architecture, is not to be sought for in the borrowed styles of Etruria or Greece, but in the native style of imperial days, "when beauty was in a great measure incidental, and not specially aimed at by the designer." This spirit led naturally and easily to the development of a style which at least had that beauty which fitness is supposed to bring with it. The motto of the Roman architect was merely, "Build in truth." No question arose in his mind as to whether "agreement in the principles of architectural design was possible," or whether "the system of architectural education was ideal." These were settled for him by the principles of authority and continuity. By the principle of authority we mean that recognised standard which enabled the profession as a whole to agree about the truth; and by the principle of continuity we mean the tradition by which this standard was carried on, and modified or expanded to suit the wants of the time.

It is evident, after the lapse of hundreds of years and after many attempts, we cannot successfully resume the thread of tradition; and even the principle of authority—according to our definition—seems beyond reach, in view of the complexities of modern requirements and the duplicity that permeates our methods. What the future has in store it is impossible to say, and it is well we do not know. But if growth is the law of art, as of every kind of life, then undoubtedly there will come a time when architecture will be entirely free from those archæological entanglements that now retard its progress. As the Romans threw aside the lintel, so are we throwing aside the arch, and time alone can show whether, like our great progenitors, we shall be able to evolve an unaffected yet expressive style of architecture. But if ever again there is to be a prevailing style—assuming this to be desirable—there must of course be a general compliance to established methods and rules. In the meantime the efforts of those whose ideal is a universal system of training for the architect in this country should be acknowledged with gratitude by all who desire the advancement of architecture. What that system should include and what it should reject are questions that could not have arisen a century or two ago; now they are both wide and deep, and cannot properly be discussed here. Indeed, I fear I have already incurred the displeasure of your Council, and I await their vote of censure with "fear and trembling." May I therefore hasten to remind you that your first duty

* A paper read by Mr. J. A. Marshall, at the last meeting of the Architectural Association.

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as students of this Association is unquestionable submission to the course of study laid down for you by your advisers?

"What you best can understand,
Is just the thing that's near'st to hand."

Goethe.

You need not fear that obedience to rules and methods will check the artistic impulse or the latent genius, any more than it did in the past. Salutary restraint in art is not opposed to originality. As Ruskin has said:—"A man who has the gift will take up any style going that is the style of his day, and will work in that and be great in that, and make everything that he does in it look as fresh as if every thought of it had just come down from heaven." When Ruskin wrote, modern architecture was—to him—in a hopeless condition, and he was oppressed by the futility of preaching a doctrine of celestial excellence in view of the want of that obedience, unity and order without which the architecture of the past would have been impossible.

Your hope to-day, then, should be that these conditions will be re-established in your profession, on a basis favourable to that art with which sublimity and beauty are peculiarly associated. These it was that ensured the transcendency of Hellenic art, the majesty of imperial Rome, the glowing wonders of Byzantium.

Mr. H. Home proposed a vote of thanks to Mr. Marshall for his paper, and wished, as a constructional engineer, to be permitted to make a few remarks upon some of the points raised by it. Four or five years ago he was asked to design a steel bridge; it was specially arranged that it should be of steel, and he was told that when the bridge had been designed and constructed an architect would be employed to make it beautiful. The architect was supposed to have accomplished this by hanging little stones all over the bridge, thereby adding sixty tons of extra material to be carried by the main girders. In another instance a ferro-concrete roof, admirably designed in every way, was used on a building supported by buttresses which would have served in any Gothic cathedral. As an engineer, he would not have employed the buttresses. In commenting on the use of ferro-concrete, Mr. Marshall had brought an accusation against the engineering profession, and yet the extensive use of the material was a question in which all constructors were very much interested. He (the speaker) had had an opportunity of examining a number of the old buildings of the world, and it had struck him that the designers and builders of early times seized on any material which would simplify construction. He contended, therefore, that if the builders of those days had had a material like ferro-concrete at their disposal they would have employed it. Then, too, in judging of engineers' works there must be discrimination between those of a monumental character and those which were only temporary, for the two could not be judged by the same standard of quality. In the carrying through of important schemes the speaker held the opinion that the engineer of to-day showed as much imaginative power and skill as the men of any age.

Mr. Gerald C. Horsley seconded the vote of thanks. Mr. Marshall, he said, made an appeal for honest architectural construction, and hoped the future would bring with it that almost universal artistic sense which the world once had. They could the more understand Mr. Marshall's views when they remembered his connection with the cathedral in Westminster, which they all so greatly admired. While, however, the speaker sympathised with the author of the paper, he could not follow him in the remarks he made upon the assistance an engineer could give an architect in his work, nor could he (the speaker) see why the use of steel should be objected to in buildings. They frequently used brick, and both brick and steel were manufactured materials. If steel were used in a building the architect should have some knowledge of the material he was handling, otherwise the architectural quality of the building would suffer. So long as architects understood the limits and possibilities of steel in any particular case, consultation with an engineer and assistance from him was of the utmost value. An alliance of that kind had certainly produced some fine work in France, such, for instance, as the new Lyons railway station on the Quai d'Orsay in Paris. With regard to reinforced concrete construction, the whole method was so much in its early days that its capabilities were hardly known. He did not see why an artist should not be able to make use of the new method; it might lead, by the wide spans which were possible in it, to some extraordinary developments in planning. He believed the architect of the Post Office building to which Mr. Marshall referred had said that architects using that form of construction should make their own drawings themselves, instead of handing sketch plans to the engineer of the particular patented process it was proposed to use. The speaker did not see how it was possible to design unless that was done, and after all there was no mystery in the different systems; the principle of the processes could be mastered in a short time. But designing in ferro-concrete was in its infancy, and as it was a very hard material to cut into or make alteration in once built, it was hardly likely to be widely used for private houses or in buildings likely to need alterations in the future. There was certainly one advantage the material had given us; it had made it clear that steel embedded in Portland cement was practically indestructible. All steelwork in future building should be embedded therefore in Portland cement. Passing on to the second part of the paper, the speaker said he thought we were apt, in our admiration of the magnificent qualities of mediæval architecture, to over-admire its constructional virtues. We did not know how much real statical knowledge was abroad at that time, but we did know that most of it was the result of experiment from the time the first dome of Justinian's church fell to the collapse at Beauvais and later still. It was not till we got to the time of Sir Christopher Wren that we found building based upon more certain knowledge. Sir Christopher had, too, a shrewd opinion of some of the mediæval methods of construction, as might be seen in his reports upon old St. Paul's, Salisbury Cathedral, and Westminster Abbey. In conclusion, Mr. Horsley said their chief hope for designing in beauty and building in truth was in education—the education both of themselves as artists determined not to scorn science but to learn from it, and also of the public, and thus to arrive at a general appreciation and consensus of opinion in art.

Mr. J. H. Markham suggested that even if architects could not spare the time to go very thoroughly into the scientific methods of reinforced concrete construction, it was essential they should have a rough notion of the principles; and when it came to making actual calculations for the carrying out of such construction the architect very rightly handed over that part of the work to the engineer.

Mr. Edwin Gunn and Mr. J. H. Elder Duncan also spoke.

Mr. Marshall, in his reply, said the object of his paper had been to remind the student that it was the duty of the architect to meet the wants of the hour without prevarication, while maintaining as far as possible the privilege of the artist, which was not, he believed, claimed by the engineer. The styles of the past had perhaps seen their day and nobly fulfilled their use, but they still had many lessons for the architect. It might happen that the ferruginous method of construction would eventually lead them back to that path of architectural rectitude which they seemed to have missed and the new material become invested with a sublimity and beauty hitherto undreamt of. Receding frontages rising tier above tier, with hanging gardens against backgrounds of gleaming faïence, would be an improvement on the sky-scraper that cast its gloom over cities.

A Meeting was held in the Jerusalem Chamber of Westminster Abbey on the 25th ult. for the purpose of furthering the movement for placing a John Bunyan memorial window in the Abbey. The window, which is being executed by Mr. J. M. Comper, will be a large one, and it is proposed to place it in a prominent position, with two main openings, each measuring about 20 feet by 6 feet, containing scenes from "The Pilgrim's Progress." The estimated cost is 1,400*l.*

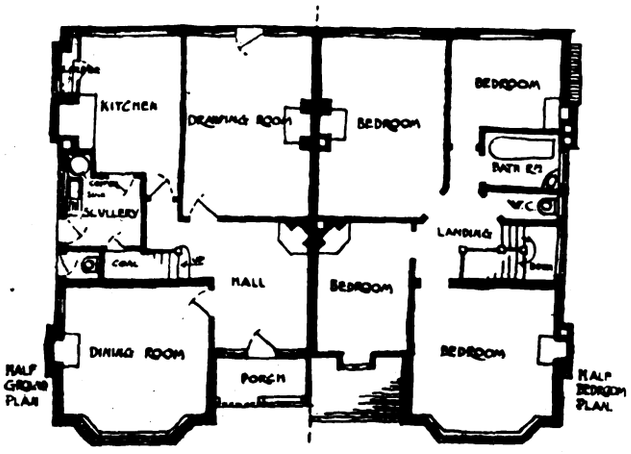
The Annual Report of the Derbyshire Archæological Society alludes to a suggestion that the remainder of the Brough exploration fund be utilised for excavations at Peak Castle, Castleton. It is considered that the work, if done under careful supervision, would probably result in discoveries of great interest, but that it is so greatly important that it cannot be undertaken lightly. Members of the Society undertake to keep the Council informed of any discoveries of interest or of any contemplated acts of destruction or alteration to ancient buildings in the county. The report adds:—"Great acts of vandalism are now fortunately rare, and when they occur they usually come to our knowledge; but there are constant little alterations and additions being made to our old buildings, particularly the churches, of no great importance in themselves, but through which their features of interest gradually disappear, and these we often do not hear about until it is too late to interfere."

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HOUSES AT THE HAMPSTEAD GARDEN SUBURB.

THE erection of these two houses has just been completed in "Hampstead Way," a main street through the suburb. They are opposite the houses illustrated in this paper on August 14 of last year by the same architect. The accommodation, as will be seen from the plan, consists of two sitting-rooms and a good hall with a fireplace, and all the usual offices have been provided. On the first floor there are four bedrooms (each with a



fireplace), a bathroom and w.c. The roof and chimney offsets are of dark red tiles, contrasting well with the white rough-cast walls. The chimneys are faced with red brick, and part of the bay windows is decorated with a simple design stamped in plaster.

Mr. BRETZFELDER, of Hampstead, has built these houses from the designs of the architect, Mr. J. GORDON ALLEN, of Dashmonden, Holmdale Road, West Hampstead, N.W.

STORAGE OF RAW RIVER WATER.

AT the meeting of the Metropolitan Water Board on Friday of last week the third report on research work by Dr. A. C. Houston, Director of Water Examinations to the Board, on "The Storage of Raw River Water antecedent to Filtration," was considered. This storage has been up to the present generally recommended for the raw water as obtained from sources of the metropolitan water-supply.

The work of the water examination staff of the Metropolitan Water Board has been largely devoted to investigating the matter anew, in the light of recent knowledge and with special attention to those tests which gauge the viability of excremental bacteria in water, note at the same time being taken of considerations previously neglected or assigned a position of subordinate importance.

A practical outcome of the above work has been that dependence is now being placed more and more on experimental proof that the water reaching the filter-beds is, as the result of adequate storage, in a reasonably "safe" condition antecedent to filtration. When the stored water results are satisfactory, this really constitutes a new and important element in the "safety" of the London water-supply. It means, indeed, that even if a breakdown in the filtering arrangements occurred, the quality of the water distributed to consumers, although possibly open to criticism on physical grounds, might yet be relatively (if not absolutely) innocuous.

Before proceeding to consider the results obtained in this investigation it is desirable to deal with a matter which, like mere physical sedimentation, is apt to allow of misconception.

The biological benefits accruing from storage of water are due to vital reactions rather than to mechanical effects. But it must not be assumed, as is commonly believed, that the death of pathogenic bacteria in water under storage is due solely to the antagonistic action of other and harmless bacteria. It has been found, indeed, that if a water be deprived, by filtration through a Pasteur filter, of all its bacteria and then inoculated artificially with typhoid bacilli, the typhoid bacilli perish as inevitably (although possibly less quickly) as if the water had not by filtration been robbed of, among other things, its normal bacterial flora. In other words, the death of pathogenic bacteria can take place in a water deprived of all particulate matter, living and dead.

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The question to which Dr. Houston especially addressed himself in the investigation now to be recorded was:—Are the results of storage of water, as at present practised by the Water Board, of a sort to encourage a project of storage of all river water before submitting it to filtration? The degree to which storage has been (nominally) maintained varied widely at the several works of the Board, and thus arise many interesting considerations of a comparative sort. But in the first instance there was less concern with the relative merits of greater and less duration of storage than with definite advantage that might appear to have been gained from a reasonable degree of storage, the object being to ascertain whether the number of days storage capacity which it is necessary to provide in avoidance of shortage of water service under conditions most unfavourable, as regards weather and state of the river, may be held to suffice in the matter of satisfactorily securing safety of the water in an epidemiological sense.

The report then gives the bacteriological and the chemical results, and then treats of the shape, size, depth, construction and method of working storage reservoirs.

This is largely, says Dr. Houston, an engineering problem, and it is not proposed to trespass on debatable ground. It is necessary, however, in this connection to point out one or two matters which are of importance from the point of view of quality of water.

It is important that the inlets and outlets of the reservoirs should be so arranged as to permit of as complete a circulation of water as possible. If this matter is not attended to, part of the water reaching the filter-beds may have travelled by surface currents from inlet to outlet without practically any storage, while another part may have been stored for a length of time quite unnecessary for the purposes of safety. Over-stored water, too, may dilute and mask the bad quality of under-stored water, and this without destroying its potentially dangerous qualities. A storage reservoir in which the circulation of water is imperfect is economically a failure so far as the purification of water is concerned, and conditions of stagnation may operate in encouraging growths of algæ. It is probable that the "continuous flow" method is better than the "quiescent" method of working storage reservoirs, and that it is better to have a series of small reservoirs rather than one large reservoir. There might be advantage in causing the raw river water to pass first through a small settling reservoir before entering the storage reservoir proper. This would keep a good deal of the grosser and heavier suspended solids out of the main reservoirs and such a small reservoir could be cleaned out comparatively easily when occasion arose. The relation of the inlets and outlets of reservoirs to prevalent winds may also be of importance. These, however, are matters which may be open to dispute, and the point upon which stress is laid is that the circulation of water in the storage reservoirs should be rendered as complete as is reasonably practicable.

At the very end of this report the difficult question is considered of whether the storage of raw river water should be fixed on a maximum or on a minimum basis. If the Board elect to store raw river water on a minimum basis of thirty days' storage, it would be necessary to build reservoirs capable of holding far more than thirty days' supply of water, the reason being that sometimes, owing to conditions of floods or drought, the storage reservoirs are receiving little or no river water to make up for the water which is being daily abstracted from them for waterworks purposes.

On the other hand, if the Board decide to store water on a maximum basis of thirty days' storage, this means that occasionally the storage will fall short, it may be far short, of thirty days.

The former method means the construction of enormous reservoirs at an unremunerative cost, inasmuch as the storage would have to be unnecessarily prolonged under ordinary conditions in order to provide thirty days' storage under exceptional circumstances. The latter method would result in deterioration in the quality of the stored water during periods of stress and storm.

It is possible that the disadvantages of the latter method might be overcome in the following way:—

Mechanical filters or "roughing" filters or precipitation tanks might be interposed as a middle process between storage and sand filtration, and used only when the stored water results were unsatisfactory. As a matter of fact this process has been used (Puech's "roughing" filters) for many years in connection with the East London (Sunbury) Works. Or, either as an alternative or in combination with the above, the same processes might be employed antecedent to storage whenever the raw river water results were specially unsatisfactory.

I do not bring forward these suggestions in an egineering sense. Nevertheless, if the number of days of storage of raw river water is to be based on a maximum figure, they appear to me to be the only means of securing uniformly good results under all conditions of weather and state of river. During periods of drought it is obviously impossible to avoid temporary loss of volume of stored water. But when the volume of water in the river again allows of water being used for replenishing the storage reservoirs, its quality could be enormously improved by suitable means. Conversely, during periods of flood the intakes need never, or hardly ever, be closed if temporary expedients could be devised to render the water reasonably satisfactory for storage purposes.

If these tentative suggestions are practicable, the water in storage reservoirs could always be maintained at top water-level, except during periods of drought; and in times of flood succeeding drought, the water capacity content of the reservoirs could be restored without seriously fouling the water still remaining in the reservoirs.

Alternative Measures.

It is desirable to consider very briefly measures for the improvement of London's water-supply that may be regarded as alternative to storage.

It must be premised, however:—(1) That for crude purposes of quantity of water London must possess a huge reserve of storage capacity; (2) that the water must be filtered, even if it were proposed on biological grounds to resort to sterilisation processes of treatment; (3) that the London water-supply has been taken over by the Water Board as a going concern, with all the machinery and waterworks plant pertaining to the old régime.

On biological grounds the only possible alternative to storage would, it seems to me, be sterilisation. As regards sterilisation, perhaps no one in this country has been so favoured as I myself have been with opportunities of studying the subject practically. Thus I have had prolonged experience of the sterilisation of sewage effluents, in the first place with the Royal Commission on Sewage Disposal, and secondly with the Water Board. I have also, in conjunction with Dr. McGowan, faced the responsibility at Lincoln of sterilising the water-supply of over 50,000 people during a prolonged period. No one could be more sympathetic to projects of sterilisation or more favourable to its adoption, in particular and suitable cases, than I am, but in the case of London it is necessary to deal with existing facts and conditions, which militate against its adoption.

Having regard to the necessity of storage (for purposes of quantity apart altogether from questions of quality), to filtration in utilisation of existing plant and to the epidemiological history of the metropolis, the wholesale sterilisation of London water appears to me, on available evidence, economically out of question and therefore impracticable.

Disadvantages of Storage.

It is desirable that this aspect of the question should receive in this report, as in previous reports, full consideration.

1. The serious expense of constructing huge reservoirs is worthy of the closest consideration. But the cost of storage for "purposes of quality" is not to be estimated on the total expenditure involved, but only on that part of it which may be found to be in excess of that storage which is necessary for "purposes of quantity."

2. Excepting part of the New River and East London supplies, nearly all the raw water has to be pumped into the storage reservoirs. That is, the great bulk of the river water does not flow by gravitation into the storage reservoirs, but has to be raised into them. In so far as gravitation is not available for impounding purposes, acceptance of the principle of "active storage," as opposed to "passive storage," necessarily involves increased expenditure in coal and in general pumping charges.

3. Although it would be wrong to infer that storage often, or habitually or necessarily, creates conditions inimical to filtration, there is inevitable danger that prolonged storage, especially if the water remains stagnant, may lead, seasonally or occasionally, to the abnormal and abundant development of vegetable growths—materials harmless in themselves, but resulting in the deterioration of the water as judged by chemical and physical standards and causative of practical difficulties with its filtration. In this connection it is impossible to forecast the future or to offer any assurance that trouble will not arise in the future from this cause. On the other hand, there is the

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gratifying fact that usually the use of stored water prolongs the life of filters to a remarkable extent.

4. Another plea commonly advanced against the habitual use of stored water is that when the river water is bright and clear there is no disadvantage, possibly even an advantage, in preferring it for filtration purposes. It is true that during a considerable part of the year, when the meteorological conditions are favourable, the river water improves very considerably in quality as judged by most, if not all, the ordinary analytical tests. It may also be the case that river water may sometimes be more amenable to filtration than stored water. It is true, too, that sand filtration is normally so effective a method of purifying water that the effluent from filters dealing with raw river water may sometimes be apparently as good as (possibly in some respects even better than) the effluent from filters dealing with stored water. This ability of sand filters to bring unfiltered waters of quite different character on to the same plane of apparent purity as the result of the filtration process is apt to create the impression that the quality of the water to be filtered is a matter of indifference. This view is undoubtedly unsound, though it is not easy to controvert it in a convincing manner. For example, one filter might be dealing with raw river water containing 100 B. coli per c.c., and another filter with the same water which, as the result of storage, contained only 1 B. coli per 100 c.c. of water. The filtration process would easily bring the raw river water to apparently the same condition as the stored water before filtration, whereas the stored water, being already so pure, could hardly be rendered much purer by the filtration process. Yet from the biological point of view there can be no question which would be the safer water to drink. I would not seek in the least to minimise the value of filtration in tending to make unequal things equal, or apparently equal, but this should not lead to too easy faith in filtration irrespective of the quality of the water to be filtered. It needs to be remembered that the chief source of pollution of river water is sewage, that the dangerous element in sewage is excremental matter, and that the amount of excremental matter discharged into the sewers from a given population does not vary with the seasons, although heavy rainfall influences greatly the amount of surface and subsoil water which also reaches the sewers. It is not, indeed, contended that dry weather may not materially diminish the impurities actually reaching a river. Nevertheless it is most desirable to keep in view this never varying contribution to sewage of human excremental matter, much of which finally reaches the river in an imperfectly purified condition. Considerations such as the above, coupled with the results of the routine examination of the river water, inevitably suggest doubt whether the raw waters, even during the best months of the year, are sufficiently free from impurities to be filtered without antecedent storage. If it be admitted that the raw water is never wholly free from undesirable bacteria, which become largely, if not entirely, eliminated in the process of storage, and further that sand filters do no more than afford a relatively, not an absolutely, effective barrier to the passage through them of these microbes, it is obvious that the filtration of adequately stored water cannot be attended with the same risks as the filtration of raw river water. That it may be difficult, or even impossible, directly to prove the full benefit of storage in this connection does not destroy the validity of the pleas in favour of using stored water for filtration purposes.

5. An objection which may be legitimately cited against the continuous circulation of river water through storage reservoirs is that it inevitably leads to a gradual accumulation of mud at the bottom of the reservoirs. This is a matter which deserves consideration in the future, because the fermentation of this accumulated mud is apt to cause some deterioration in the quality of the supernatant water. Of course, the smaller reservoirs can be cleaned out periodically, but this involves considerable expense. It may be practicable, as suggested elsewhere in this report, that raw river water, instead of being passed directly into the large storage reservoirs, might first be allowed to undergo some settlement in a reservoir small enough to allow of its being cleaned out occasionally without serious difficulty or expense. Alternatively, the great bulk of the suspended matter in the raw river water could be largely removed, antecedent to storage, by "roughing" filters or by precipitation tanks, but the cost of this as a routine measure would be serious. As a means of partially purifying specially impure river water, which otherwise might be considered too impure to be impounded, such a project is, however, worthy of consideration.

6. A possible disadvantage of using stored water is that the "blanket" or "skin," which forms on the surface of the sand in the filter-beds, may not prove so effective a bacterial filter as that resulting from the use of raw river water. There may be an element of truth in such a contention; but it is certain that sometimes the "stored water skin" errs on the side of being too impervious, and it is obvious that it is much less important to have a microbe-tight blanket when using comparatively safe stored water than when using potentially dangerous raw river water. Subject to absence of abnormal development of algæ, there can be little question which kind of water engineers would prefer to use year in and year out; and there can be no question from the bacteriological point of view that preference should be given to the stored water. Further, it needs to be noted that the blanket formed on sand filters is not solely a passive accumulation of dead particulate matter derived from the water "feeding" the filters. It is an "active" skin in that it is a mixture of living and dead suspended matter, built up not only from the "feeding" water per se, but from developmental changes occurring in this water as it lies on the top of the sand and also doubtless in the skin itself. My experience since 1905 of the quality of filtered water supplied to East London from the East London (Clapton) Works, which deals, after prolonged storage, with the initially unsatisfactory Lee River water, does not lead me to think that this question of "stored water skin" versus "raw water skin" need necessarily be of vital importance.

To sum up, it is desirable to point out that most, if not all, of the real or assumed disadvantages of storage disappear if the use of stored water is regarded, not as an unalterable law of the Medes and Persians, but an elastic policy which can be departed from on occasions when the local conditions render this feasible and at the same time desirable.

Advantages of Storage.

In the following few sentences endeavour has been made to condense the chief points in favour of the storage of raw river water:—

1. Storage reduces the number of bacteria of all sorts.
2. Storage reduces the number of bacteria capable of growing on agar at blood heat.
3. Storage reduces the number of bacteria capable of growing in a bile-salt medium at blood heat, chiefly excremental bacteria.
4. Storage reduces the number of coli-like microbes.
5. Storage reduces the number of typical B. coli.
6. Storage alters certain bacteriological river water ratios; for example, it reduces the number of typical B. coli to a proportionately greater extent than it reduces the number of bacteria of all sorts.
7. Storage, if sufficiently prolonged, devitalises the microbes of water-borne disease (e.g. the typhoid bacillus and the cholera vibrio).
8. Storage reduces the amount of suspended matter.
9. Storage reduces the amount of colour.
10. Storage reduces the amount of ammoniacal nitrogen.
11. Storage reduces the amount of oxygen absorbed from permanganate.
12. Storage usually reduces the hardness and may reduce (or alter the quality of) the albuminoid nitrogen (see text).
13. Storage alters certain chemical river water ratios; for example, the colour results improve more than the results yielded by the permanganate test.
14. Storage has a marked "levelling" effect on the totality of water delivered to the filter-beds.
15. Storage tends generally to lengthen the life of the filters. (Only under exceptional conditions is the converse true.)
16. An adequately stored water is to be regarded as a "safe" water, and the "safety change" which has occurred in a stored water can be recognised by appropriate tests.
17. The use of stored water enables a constant check to be maintained on the safety of London's water antecedent to and irrespective of filtration.
18. The use of stored water goes far to wipe out the gravity of the charge that the chief sources of London's water-supply are from sewage-polluted rivers.
19. The use of adequately stored waters renders any accidental breakdown in the filtering arrangements much less serious than might otherwise be the case.
20. The habitual use of stored water would lighten the grave responsibilities of the Water Board as regards the safety of the London water-supply, and would tend to create

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a sense of security amongst those who watch over the health of the Metropolis.

It will be remembered that in the introductory part of this report it was stated that the primary question to be solved was whether the stored water results were so greatly superior to the raw river results as to justify the policy of storing all river water before filtration. I venture to anticipate that it will be considered that this question has been answered satisfactorily in the affirmative.

The difficulty of answering the subordinate question as to the exact number of days that a water should be stored before filtration may be rendered easier if certain assumptions are entertained. These are:—

1. That the principle of "active storage" as opposed to "passive storage" is accepted as sound.

2. That it is possible to "pool" the existing stored-water interests, so as to remove the anomaly of using over-stored water for some districts and under-stored water for others.

3. That the river water can be effectively and continuously circulated throughout the several storage reservoirs.

These assumptions being granted and bearing in mind that the Board's existing storage reservoirs are now capable (in the aggregate) of holding about forty times the average daily supply, it is considered that, subject to one qualification, the present storage capacity (say, thirty days) is reasonably sufficient (on the present consumption of water) for purposes of safety. The qualification is that sometimes no river water can be used to replenish the storage reservoirs for the reason that the rivers are in high flood and in too unsatisfactory a condition to permit these waters to be impounded, or because, owing to drought, there is too little water in the rivers to allow of its being abstracted for water-works purposes. In these untoward circumstances the water in the storage reservoirs must needs sink lower and lower each day, with the result that when the conditions again admit of refilling them (possibly with water of an inferior quality), a period inevitably follows during which the duration of storage of necessity falls short, it may be far short, of thirty days.

There are two ways of coping with this difficulty:—

1. To consider thirty days as a minimum period of storage. This would entail the construction of huge reservoirs at an unremunerative cost, capable of holding far more than thirty days' supply of water, in order to cope with the emergency conditions just mentioned.

2. To consider thirty days a maximum period of storage, but to adopt during times of stress and storm some such additional methods of purification, antecedent to storage or subsequent to storage, but antecedent to final sand filtration, as has already been briefly outlined.

My final conclusion is that raw river water should be stored antecedent to filtration, preferably for thirty days. The question of whether the thirty days' storage should be fixed on a maximum or on a minimum basis must be left unanswered, but if the former alternative be chosen, the desirability of employing supplementary processes of water purification to tide over emergencies is worthy of consideration.

THE OUSE BRIDGE CHAPEL AT YORK.

DR. EVELYN recently gave two lectures before members of the Yorkshire Archæological and Architectural Society. On the earlier occasion Dr. Evelyn's subject was "The Old Ouse Bridge and Her Burden," and on the last he spoke of "St. William's Chapel"—one of those burdens.

Dr. Evelyn endeavoured to prove approximately the date of the erection of the St. William's Chapel by historical data and by architectural detail shown in drawings by Halfpenny and Cave, the two great York topographical artists of 100 years ago. Some said it was built in memory of the miracle performed by St. William in 1154, when the then wooden bridge was broken down by a crowd which followed him and none were drowned. (This bridge was rebuilt and stood until, in 1564, the two central arches were washed away by a flood.) Others maintained the original bridge was built as an atonement by the citizens after a conflict in 1268 with John Comyns, a Scotch laird, several of whose followers were killed; others, again, that it was built in 1154 and added to in 1268. The second contention he hoped to get deleted, as false, from the history of York. It was that after the "row" the citizens were made to pay 300*l.* and to build the chapel, for which they were to find two priests to pray for the souls of the slain Scots for ever. Drake, Cæsar, Caine, Halfpenny, Cave, and Hargrove followed this idea, and Dr. Solloway, as recently as 1905, gave four reasons why the chapel could not have been built before 1235. He (Dr. Evelyn) had documentary evidence which a friend had given him casually when he asked for "anything fresh" bearing upon the subject. His friend fetched it, as an afterthought, from a corner of an old drawer. It was written in Latin 650 years ago; the ink was good and clear and beautifully legible. The translation of the document is as follows:—

To all the faithful in Christ who shall see this writing. Roger de Holgate, near York, eternal greeting in the Lord. Let all men know that I with the counsel and good wish of Agnes, my wife, and Abel, my son and heir, and Robert, my son, both for the safety of my soul and those of my ancestors, and for a certain sum of money given, granted, and by this my present letter confirmed, for the sustentation of the service of the blessed Virgin Mary in the Chapel of the blessed William upon Ousebridge, an annual Rent of 2*s.* in that land with its appurtenances in Micklegate, which stretches in breadth to the land of Hugo Cady on one part and the land of Nicholas Maysand on the other and in length from the Royal-street of Micklegate in front as far as the Nuns of St. Clement behind.

To have and receive the aforesaid rent of 2*s.* for the aforesaid chapel for the sustentation of the aforesaid service of the blessed Mary in the same chapel at 2 annual terms in equal parts namely, 12*d.* at Pentecost, and 12*d.* at the feast of St. Martin in the winter, from the aforesaid land for ever.

And me the aforesaid Roger and Agnes, my wife, and Abel and Robert, my sons, warrant acquit and defend for ever against all men the aforesaid rent of 2*s.* for the sustentation of the service of the glorious Virgin in the aforesaid Chapel by the money given into our hands and for the safety of our souls and those of our ancestors.

And our heirs and assigns are held to warrant and defend the aforesaid rent for ever.

In witness of which thing I have placed to this present writing for me and mine my seal so that the aforesaid rent shall be received by William de Acum and Stephen Bland, then the custodians of the aforesaid Chapel, and by any of their successors at the aforesaid terms.

Then witness John de Seleby (then Lord Mayor), J. Blend, J. de Conyngston, Henry le (?Sezevaux), Serton de S., Andrew de Seleby, Stephen Wylet, Stephen Bury, Alan Simpson, and others.

John de Seleby held office in 1252-63, and even if the document was written in the latter year, it proved the chapel was there five years before the "row" in 1268. It was interesting to see "Holgate" thus spelt in view of statements that it used to be "Holdgate." His second bit of evidence was from the Patent Rolls of 1228, in which Henry III. granted protection to "David the Almsgatherer of the Bridge of Ouse and of the Chapel of St. William of York." This was forty years before the "row." Again, in 1223, Bishop Honorius III. wrote a protecting letter to "Our beloved son B; rector of the Chapel on Ouse Bridge." This was forty-five years before. He was inclined to believe the chapel was built shortly after the fall of the wooden bridge in 1154, and was dedicated to St. William in gratitude.

Bridge chapels, Dr. Evelyn explained, were built as supports or staithes for strengthening the bridge; as residences of one or more priests, who usually lived in the crypts, while they also collected alms from passengers for the upkeep of the bridge; or for religious and charitable purposes, the building of a bridge and chapel being regarded as an act of the greatest piety. They were also intended for the guidance and direction, and probably for the security and refreshment, of benighted travellers and navigators, and for that purpose a cresset or beacon was placed on the keeps or towers; a further purpose of their erection was as shrines for pilgrimages.

Dr. Evelyn went on to point out the evidence provided by the architectural styles to be observed in the drawings of the chapel, and showed many very beautiful sketches and pictures by various artists, particularly those by Cave and Halfpenny, but for whom the present generation would have had practically no detailed knowledge of the little chapel on the bridge. The lecturer spoke of the elegant chain moulding of the south door, tho late Norman arch being supported by early English columns. The chapel was 36 feet long by 28 feet wide, and had a wall arcade of rich design, the mouldings being distinctly late Norman (twelfth century), and being supported upon capitals he took to belong to the thirteenth century. There was one corner partitioned off, and he suggested this was to keep the records of the city in when the chapel was used as the council chamber. The Norman

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window above the door had fourteenth-century insertions; so had that in the south-west aisle, and they found thirteenth-century east windows, to which period also belonged a narrow doorway through the wall arcade. The arches of the main arcade were twelfth century, and rested upon thirteenth-century pillars. The door in the wall arcade could scarcely have been made for the convenience of the merchants who once used the chapel as an exchange. In 1235 the bridge was extensively repaired, and he had no doubt the chapel was much re-edified at the same time. The thirteenth-century alterations were probably made just before the "row," so when it was ordered that, in atonement, a chapel was to be built on the site of the conflict, the authorities, being in a bit of a fix because there was a chapel there already, only had to build a chantry at the west end and make a doorway through the screen to it. Thus it seemed the west end of the chapel was of later date than the other part. There were three bells and a clock in the tower, and in 1593 it was directed that one bell should be rung at 4 and 5 A.M. and at 6 and 8 P.M.—a forerunner of the new Daylight Saving Bill. St. William's was not only a chantry, but also a "free" chapel, and was called the "King's free chapel upon Ouse Bridge." In 1545 it shared the fate of the other religious houses in the city and was suppressed. From that date till its demolition in 1810, it served many and varying purposes. In 1555 it was converted into a school by Robert Morris, chaplain, who was permitted to use "the great chamber, or chapel, on Ouse Bridge for his skole to teach children in." Subsequently it became the exchange for the merchants of the city, a record office, and the chamber of the Common Council, while the crypt was adapted as a "kidcote," or prison for felons.

GENERAL.

The Duke of Norfolk, Lord Lieutenant of Sussex, has been nominated President of the Sussex Archæological Society. The membership of the Society is now 789.

Work is in Progress in connection with the strengthening of the western turrets of Salisbury Cathedral, a slight subsidence having recently been noticed. The defects are not of a serious nature.

Chelsea Old Church is to be repaired at a probable cost of 2,710*l.* if the necessary funds can be raised. The roof, the paving, the heating apparatus, are the principal things in need of attention. The work will be entrusted to Mr. W. D. Caröe, F.S.A.

Messrs. A. J. Gale & Son, owing to expiration of lease, have removed their offices from No. 20 to No. 35A Mecklenburgh Square, W.C.

Messrs. Rickman & Burr, surveyors, 8 Montague Street, Russell Square, W.C., have taken into partnership Mr. T. A. Burr (the son of Mr. E. J. Burr). The firm will retain its present title.

The Marylebone Borough Council propose to ask the President of the Royal Institute of British Architects to appoint a competent adviser to report on the suitability of certain sites for a new town hall in Marylebone, in lieu of the present inadequate municipal building.

The Competitive Designs of Messrs. Bigden & Walton, architects, Buxton, have been accepted for new Primitive Methodist chapel and schools in Market Street, Chapel-en-le-Frith. The estimated cost is about 2,000*l.*

Stoke-on-Trent Town Council are maturing a scheme for the extension of the present town hall at a probable cost of 20,000*l.* It is proposed to provide an adequate court-room, a small assembly-room to accommodate about 300 on the ground floor, a number of ante-rooms, and a large assembly-room, to seat at least 3,500 people, with reception-rooms, &c., on the same floor. A general competition will probably be organised for obtaining designs.

The Carnarvonshire Education Committee have received a communication from the Board of Education with reference to the committee's revised scheme in regard to the provision of new schools and the reconstruction and improvement of existing buildings during the year ending March 1910. In cases where improvements were deferred it was suggested that the committee should make some compensation for the delay by supplying a few good and attractive pictures to lighten the appearance of the old premises. The Board were informed that the walls of many of these schools were covered with antiquated and faded maps, and in some cases with even more disfiguring sheets.

A Frankfort Consular Report states that an association has been formed in Germany for the purpose of establishing a national chemical laboratory. A fund of 1,000,000 marks is to be raised for erecting a suitable building with the requisite equipment. The board of directors of the association is requesting the Federal Government to support the new institution by an annual grant of 100,000 marks. The State Government of Prussia has tendered a site for the building free of cost.

The Estimates for the Civil Services and Revenue Departments for 1909-10 have been issued. For the Civil Services the sum of 40,070,171*l.* is required, an increase of 7,981,728*l.* over the total for the past fiscal year. The principal cause of this is the provision of 8,750,000*l.* for old age pensions. The total sum required under Public Works and Buildings is 3,164,784*l.* The more important works for which provision is made include the erection of official residences for the First Lord of the Admiralty and the Senior Naval Lord, 29,000*l.*; the erection of Meteorological Offices, 5,000*l.*; the extension of the National Gallery, 19,000*l.*; works for the protection of the Gallery from fire, 8,500*l.*; and the erection of a Recruiting Station in Great Scotland Yard, 15,000*l.*; the extension of the Patent Office, 50,000*l.*; and the erection of additional Courts of Justice, 16,000*l.*; construction of a new Melting House at the Mint, 5,000*l.*; alterations for the protection from fire of the Sasines Office, General Register House, Edinburgh, 6,000*l.*; and adaptation of the old Royal Institution building at Edinburgh for the Royal Scottish Academy and other purposes, 5,000*l.*

The City Lands Committee have submitted to the Corporation a report on the moneys expended on the new Central Criminal Court. The building was begun in 1900 from designs prepared by the late Mr. E. W. Mountford, F.R.I.B.A., and completed and opened in the spring of 1907. The net cost, after allowing for 55,800*l.* received from the county rate and 701*l.* interest on the site, has been 332,831*l.*—viz., site, 40,000*l.*; temporary cells, 5,320*l.*; builders' contracts, 303,900*l.*; cost of architect's designs and fees, 22,959*l.*; furnishing, 11,764*l.*; insurance, 941*l.*; compensations and redemption, 4,446*l.* Thus 17,168*l.* of the authorised amount has been unexpended. The general upkeep of the building is at present annually 5,000*l.*, which will be exceeded in years when painting, renovation, &c., were required. The cost of the upkeep of the old building was 1,700*l.* a year.

A Public Meeting was held at the Assembly Rooms, Bath, on Saturday, for the purpose of taking steps to avert, if possible, the threatened destruction of the colonnade on one side of Bath Street. Prebendary Boyd, rector of Bath, presided, and the speakers included Professor A. Beresford Pite and Mr. D. S. Maccoll, LL.D. The following resolution was adopted:—"That this meeting of citizens and friends of Bath strongly condemns the proposed destruction of Bath Street, a unique and characteristic example of eighteenth-century architecture and an essential part of the Bath improvement scheme of 1789, and earnestly hopes that means may be devised to avert the threatened mischief." A copy of the resolution was ordered to be sent to the Mayor of Bath and to Mr. Waring, whose plans for the remodelling of the Grand Pump Room Hotel, which he proposes to reopen, involve the destruction of the north side of the street.

The Annual Report of the chief officer of the London Fire Brigade states that the total number of fires, excluding chimney fires, attended by the Brigade during 1908 was 3,238, this number being 82 less than in 1907. Of this total 61 were classed as "serious" and 33 occurred outside the County of London. Fire stations in course of erection and to be erected will be entirely motor stations, the experience gained with the motor appliances at present in use justifying the adoption of this course.

A New Carnegie Library situated in Great Brunswick Street, Dublin, is now nearing completion, and will shortly be handed over to the Corporation by the contractor, Mr. G. Langley. Some time ago Mr. Carnegie promised a sum of not less than 28,000*l.* to provide public libraries in Dublin. Of this sum 4,000*l.* was expended on the Charlemont Mall library, and about 10,000*l.* has been absorbed in the present contract, leaving a balance of 14,000*l.* unexpended. The frontage is 300 feet, with depth of 85 feet. The style selected is Georgian of the eighteenth century, of which some very fine specimens are to be found in Dublin. The materials adopted are Mountcharles sandstone, the strings, cornices, dressings, &c., being of Ballinasloe limestone. The design has been prepared by the city architect, Mr. C. J. MacCarthy.

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The Architect.

THE WEEK.

The compromise that has been accepted with virtual unanimity by both the registrationists and the educationalists in the Royal Institute of British Architects, and that formed the basis of the application for a new or supplemental charter, does not, of course, completely satisfy either party. A compromise never does. Now that the charter has been granted—though we are still waiting for the revised by-laws which will make that charter operative—the registrationists, within and without the Institute, are pushing on to a further effort, and have induced our esteemed contemporary, the *Builder*, to undertake a plébiscite of all architects in the kingdom on the question of registration. This is a step that certainly ought to have been taken by the Institute itself before it came to a conclusion as to the lines on which its constitution should be remodelled. The ruling spirits of the Institute profess to desire—what undoubtedly the majority of its members do wish—that it should represent the whole of the architectural profession, that it should occupy the position in architecture that the Institution of Civil Engineers and the Surveyors' Institution hold in the cognate professions. To obtain this position it should certainly ascertain, on all vital subjects, the feeling of the majority of the architects of the United Kingdom, and adopt their views. Failing action by the Institute, the *Builder*, as the oldest of the professional journals, is fully justified in conducting a plébiscite. The only pity is that this has not been done before the new charter was requested. We trust that this tardiness will not influence any of our readers to ignore the matter, but that they will record their opinion for or against registration.

The Council of the Royal Institute of British Architects would do well to follow the example of the Society of Ordained Surveyors (Edinburgh), from the accounts of whose General Examining Board we find that the amount of twelve guineas was paid in fees to the examiners who judged the work of nine candidates. The examination of students' papers is at the best wearisome and trying work, and entails to the conscientious examiner a great deal of responsibility, influencing, as it does in the case of qualifying professional examinations, the whole of a young man's future career. The number of candidates at the Institute examinations is now so large, and the bulk of work falling upon the examiners is so heavy and has to be got through with so much expedition, that it is only just to candidates and examiners alike that the latter should be paid for their services. We fully believe that the Institute examiners carry out their honorary labours as conscientiously as possible; but, however conscientious a man may be, he cannot help being biassed by the knowledge that he is doing irksome work for nothing, and there can be little doubt that candidates are prejudiced when they are being tested by unpaid examiners. The excuse we have heard made for non-payment of their examiners by the Royal Institute is that adequate reward is not financially possible. But is this a valid excuse? If half the fees paid by the candidates were ear-marked for the payment of an honorarium to each examiner, we know this would be quite appreciable and, we venture to think, appreciated.

The Architectural and Topographical Society and its Hon. Secretary, Mr. Wilfrid Travers, are to be congratulated on the excellence of No. 4 of *The Architectural and Topographical Record*, and particularly on the work of the Hon. Secretary for Ireland, Conchubhar ua Briain, better known to his English friends, and particularly the members of the A.A. Camera and Sketching Club, as Conor O'Brien. The subject of Mr. O'Brien's contribution is the parish of Askeaton, in the barony of Connello Lower, county Limerick, and the buildings thereof, very fully described and illustrated, are the parish church of St. Mary, the Franciscan convent, and Desmond Castle. These are interesting not solely archæologically but architecturally, and give us an admirable insight into the character of Irish Mediæval work. We are particularly struck with the similarity between the form of window-heads and sections of mouldings in the abbey and castle of Askeaton with those of examples at Leiria, in Portugal, and wonder if there is any causal connection. To admirers of the work of Mr. Voysey we commend a study of the chimney-piece in Askeaton Castle.

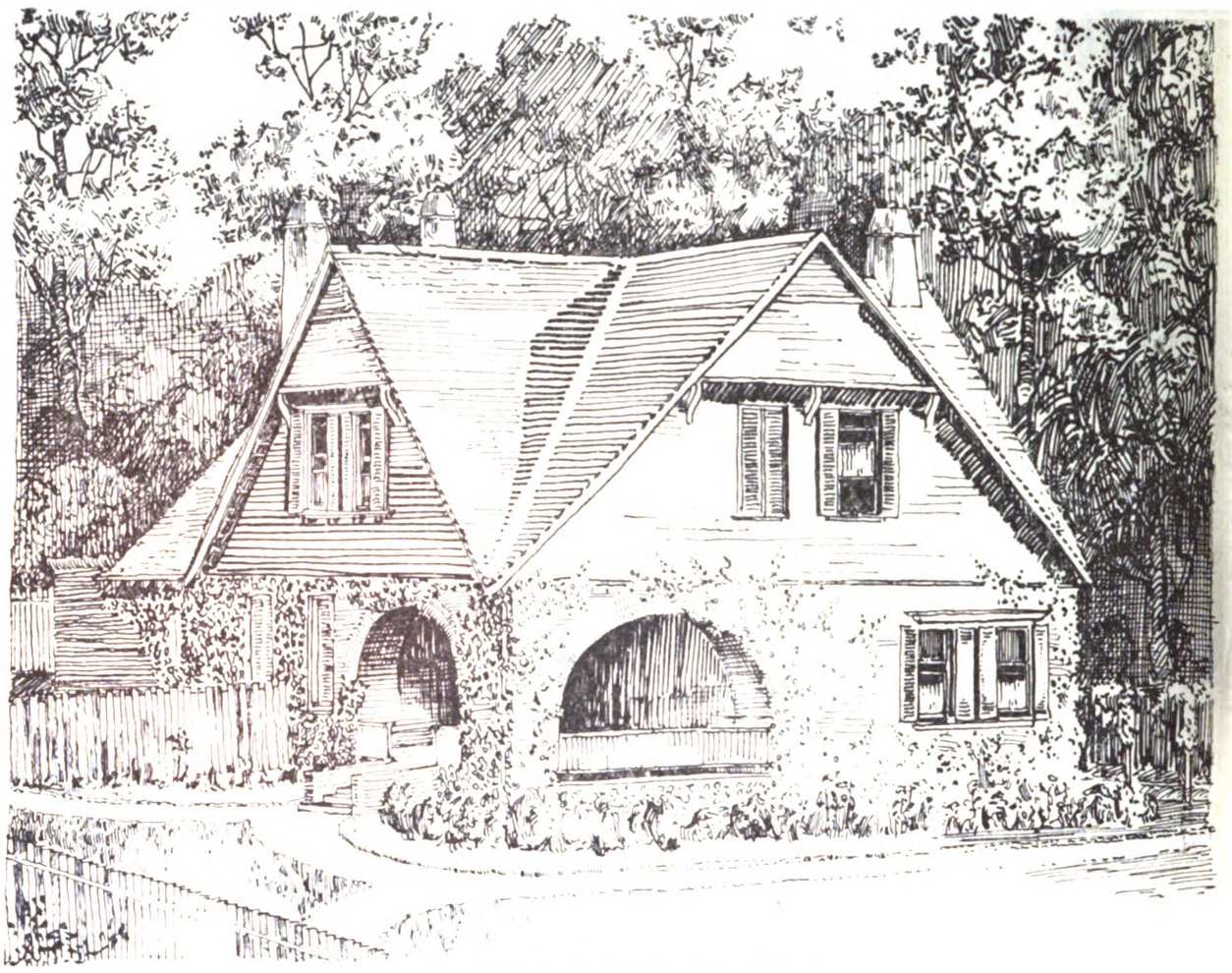
Besides Mr. O'Brien's admirable record, this number contains a description by Mr. Charles E. Lovell of the parish church of St. Mary Magdalene and Longfield Court, in the parish of Longfield, a typical North Kentish village, which, though affording less opportunity to the author, are equally well treated as the remains at Askeaton. The fragments of the screen formerly existing in the church are not only curious but suggestive. In fact, the Society well justifies its title. The records it is making are not merely topographical but also architectural.

We are informed by *The Times* (*Engineering Supplement*) that "two plans are in use for coating metallic pipes with a protecting surface of tar." One to make the pipes hot and plunge them into cold tar, the other to lower the cold pipes into hot tar. Now we understand why pipes that are sold as "Angus Smith treated" are so often unsatisfactory at the present day. The essential point of Dr. Angus Smith's process was that both pipe and tar (or bituminous composition) were each raised to a definite temperature, and it is too bad of *The Times* to ignore the method that has proved satisfactory and to leave it to be understood that there are only "two plans," both of which are inferior. It is careless statements like this that are responsible for the crystallisation, in the minds of young engineers and architects, of an immense amount of ignorance which it requires much future instruction and experience to dissolve and clear away, as was the case with the famous misprint of "black bullock's hair." Humour is often found in the most unlikely places. It is exquisite to be told that if the plan of heating the pipes and plunging them into cold tar is adopted, "there is a risk that they may become fissured." *Punch* has missed a gem this week.

The provinces are frequently more advanced and progressive than the metropolis, and Liverpool is one of the most go-ahead of our great cities, partly, no doubt, from the inherent energy of the Lancashire man, and partly from the intimate association of Liverpool's citizens with the hustlers of the United States. Hence we are not surprised to learn that in Liverpool there is installed a system of fire mains and hydrants from which an ample supply of water is delivered for the extinguishing of fires. The hydrants are fixed normally about 70 yards apart, but in some cases in the business portions of the city they are as close as 30 or 40 yards apart, so that often twenty or more hydrants can easily be concentrated on a fire. As each hydrant delivers from 8,000 to 10,000 gallons of water an hour, it will be gathered that there is an ample supply, and, as a matter of fact, the steam fire engines are needed in only a small proportion of the outbreaks of fire, hose from the hydrants being usually sufficient.

We congratulate the Crittall Manufacturing Company, who are well known to many of our readers, on the success of their libel action, and the justification thereby in the High Court of their policy with respect to trades unionism, a policy at once dignified and equitable. The company made no objection to any of their workmen joining a trade union if they wished, but firmly and successfully resisted any coercion of those who preferred to remain non-unionists. The dismissal of those who attempted coercion was followed by retaliation in the form of a circular which came within the scope of the law of libel. Hence the action in which the company was successful.

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A HOUSE AT KILLARA, N.S.W.

AUSTRALIAN SUBURBAN ARCHITECTURE.

THE most distinctive architecture of Australia is to be found not in the great cities, where there is little differentiation from that in the various capitals of Europe, but in the smaller townships and suburbs that are, at present, cities in the making. The suburbs of the busy Australian capitals are frequently at a considerable distance and separated by open country, railway journeys of ten, twelve, or more miles being part of the daily life of large numbers of business men. Thus the advantages of purer air, gardens and shady trees are obtained, whilst the possibility of ample ground space for sites enables a considerable use to be made of one-storey planning. Indeed, one might say that the typical Australian suburban houses are one-storey buildings with plenty of verandahs, bungalows in fact. Not that the one-storey building is universal, far from it; examples of two-storey and even three-storey houses are not uncommon in the suburbs. The verandah, however, is almost an absolute necessity, for we must remember that the latitude of Melbourne is about the same as that of Lisbon, Seville and Palermo, and shade is a blessing for which to be grateful.

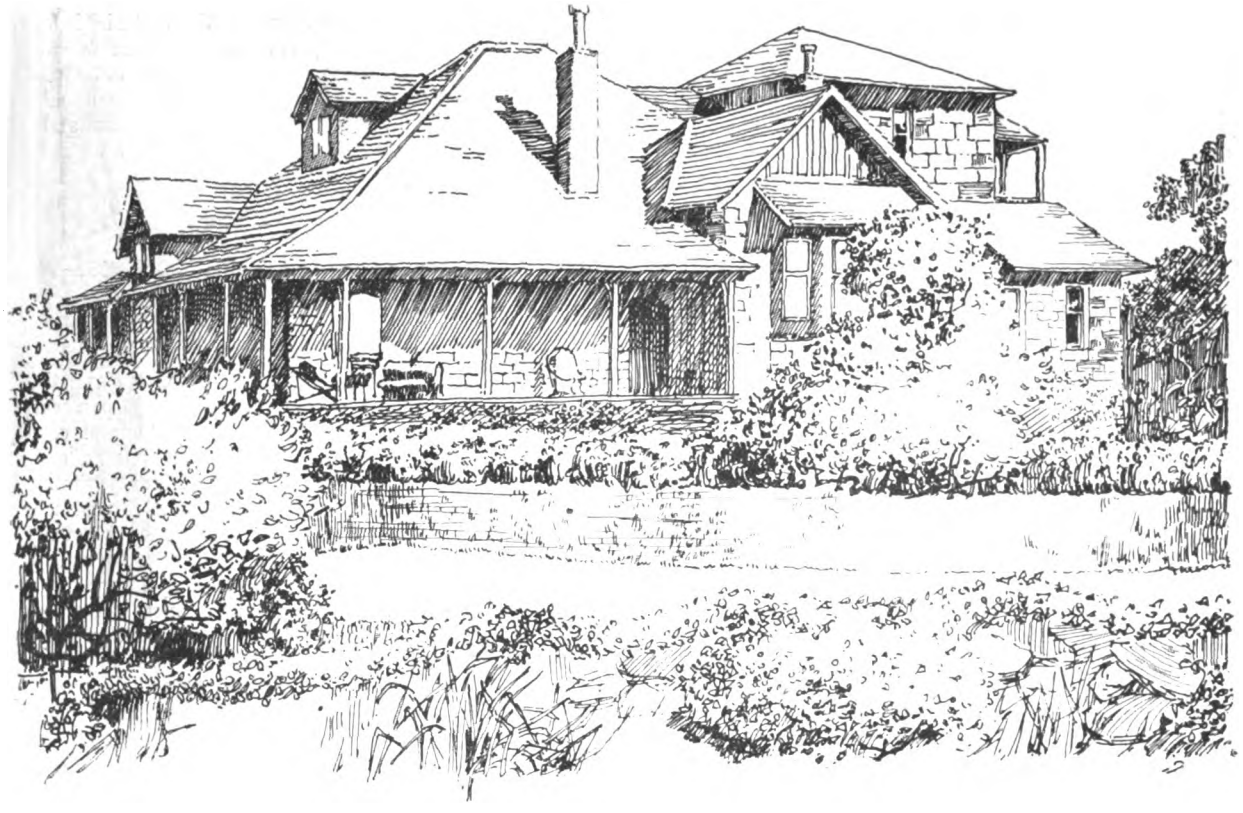
An insight into the character of the planning of Australian houses may be gathered from Mr. HADDON's book* on Australian architecture, and the examples illustrated therein are suggestive for the planning of bungalows, summer and week-end cottages in England. One feature that the author proposes is well worthy of consideration, the substitution of one large common or living room for the number of small reception rooms that has been a dominant element in our own suburban villas. The idea is not new nor peculiar to Australia, but has been largely adopted in summer cottages by the architects of the United States, where the large living room with a small "den" has for many years been quite the usual thing.

Mr. HADDON's plans range from the small workman's cottage, with living room, kitchen and three bedrooms on one floor, to the large country house on one or two storeys, with a full complement of reception rooms and many bedrooms. The planning of houses on one storey only is apt to tempt the designer into the use of long and dark corridors, and Mr. HADDON has in several instances fallen into temptation; indeed, his planning generally leaves much to be desired. Besides houses the author gives a few designs for business premises of various sorts, but these are mostly such as might be expected in a rising township or suburb, and the book is therefore more properly representative of the suburban or country architecture of Australia than of that of its capital cities or of Australian architecture as a whole. And we do not except the plans of a shearing shed and butter factory, for an Australian city usually starts from a pastoral or agricultural foundation, then becomes a village or "city" with one main street and irregularly placed bungalows or shanties, the thickly wooded masses of trees, mainly varieties of eucalyptus or "gums," being cleared for the purpose. In our plate the foreground tree in the top left-hand view is a "stringy bark" and that on the right a "blue gum," both varieties of eucalyptus. As the town grows the main street often becomes a boulevard, with shade trees planted on each side, for which purpose the Moreton Bay fig is frequently used, as in Prince Street, Grafton. Grafton is a fair example of a young Australian city, situated in a fertile district, forty-five miles from the coast, on the river Clarence, which is navigable as far as Grafton for vessels of considerable tonnage. Grafton, although at present a comparatively small town, is literally a city, according to our English definition, for it gives the title to the bishopric of Grafton and Armidale.

The views we give of typical Australian suburban houses are not taken from Mr. HADDON's book, but are sketched from photographs.

* *Australian Architecture.* A Technical Manual for all those engaged in Architectural and Building Work. By Robert J. Haddon, architect, Fellow of the Royal Institute of British Architects, Fellow of the Royal Victorian Institute of Architects, Fellow of the South Australian Institute of Architects. (Melbourne, Sydney, Adelaide and Brisbane: George Robertson & Co. Propy., Ltd. London: B. T. Batsford. 15*s.* net.)

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A HOUSE AT BENNETT STREET, NEUTRAL BAY, N.S.W.



A HOUSE AT CREMORNE, N.S.W.

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MARBLE.

WHEN an architect for the first time in his experience is in the fortunate position of being able to use marble for his building he is often placed in some difficulty. His knowledge of what marbles are on the market, their qualities and their appearance is perchance limited, and he is liable to make his selection on insufficient data, only to find when it is too late that there are other varieties that he would have preferred to those he has chosen. We are glad, therefore, to welcome the appearance of "a handbook for architects, sculptors, marble quarry owners and workers, and all engaged in the building and decorative industries."* The author says in his preface:—"No apology is needed for the introduction of the work. Marble is perhaps the least known of all the materials employed in a building. Its literature is scanty and not up-to-date, the manner of its selection for use is haphazard rather than methodical, and generally speaking there are few building materials or accessories respecting which knowledge is less readily obtainable." This is no longer strictly correct, for Mr. Renwick has in one volume given us all the literature that is needed, ample and thoroughly up-to-date, so that an architect who desires clear and full information on the subject of marble will here find all that he wishes.

Mr. Renwick does not split hairs in a pedantic manner as to what is or is not, strictly and scientifically speaking, marble, but includes under the term, as architects do generally, "any natural stone that is of less hardness than granite, having a sufficiently close texture to take and retain a polished face and being produced in such quantity as to be available for use for decorative purposes."

The manner in which marble is formed by Nature is well illustrated by the example of the well-known Hopton-Wood stone, the intrusion of volcanic or igneous rock into previously formed beds of limestone resulting in the metamorphosis of the limestone into marble. The widely varying circumstances under which the intrusive rocks have penetrated and the differences in composition of the original rocks before metamorphosis have been the cause of the numerous variations in the colour, composition and, above all, physical structure of marbles which lead the author to his classification into saccharoidal, unicoloured, variegated, fossiliferous, crinoidal, brecciated, laminated, travertines, serpentinous and alabaster. The suitability of a marble for various purposes and its durability or strength are largely determined by the classification under which it properly falls. The characteristics of the several classes and the means of determining their suitability are well described in the book before us.

The methods of quarrying marbles, though interesting, are of minor importance to architects, except in so far that certain processes are more likely than others to lead to the production of unsound blocks. The nature of the machinery employed in the working of marble after it has been won from the quarry is of greater consequence, as it necessarily determines the forms in which marble can most advantageously be worked, and hence the details of the architect's designs.

As in modern times we do not use marble for the reason that the Greeks used it, its excellence as a building stone, but for the beauty of its colouring and surface texture, the list of marbles in ordinary use given by the author, with descriptive notes and instances of their application, mentioning buildings in which they can be seen, will be to architects the most useful part of the book, particularly with the accompaniment of the very excellent and beautifully printed coloured plates of typical specimens of coloured marbles.

Marble being a material peculiarly liable to imperfections and to damage in working, it is desirable not to make the lowest tender an element in selection, as this leads to faking, cramping and stopping to an extent not inherently requisite, but facilitating cheapness. It is highly advisable also that the marble should be worked at home and not abroad, so that the architect may have an opportunity of inspecting, and if necessary refusing, the material before the work is completed ready for fixing. Marble being usually part of the finishing of a building one is tempted to pass for the avoidance of delay material that would have been condemned if it had been inspected at an earlier stage; hence the importance of the architect having the work under control at as early a period as possible.

* *Marble and Marble Working.* By W. G. Renwick. (London: Crosby Lockwood & Son. 15*s*.)

ARCHITECTURE: ITS TRUE PRINCIPLES.—VII.

By R. OWEN ALLSOP.

Unity of Mass.

UNITY and harmony are in some sense correlative terms. A subordination of component parts serving the common weal is implied. In architectural composition this harmony may not be always a matter of size, although as a general rule the essential spirit of gravitation—the mastery of the larger over the smaller—must hold true. Generally, it is impossible to increase the size of any part without giving it real increased importance and making it more dominant. This is but natural, seeing that gravity is a property of inert matter, and it is of inert matter we build. Moreover, seeing that simplicity and dignity go together, it does not seem reasonable to expect that mere work upon the smaller mass will enable it to hold its own in competition with the larger bulk. Would any kind of decorative treatment of one of the small Egyptian pyramids enhance its importance as contrasted against the Great Pyramid? It may, therefore, be taken as a quite safe rule founded on natural law, that bulk and importance are practically the same in architectural composition. If we increase the mass its importance increases in direct ratio. We cannot help but be more impressed by the aspect of the Matterhorn than by a mole-hill. From these considerations we may establish a rule that if any feature in major massing is obtruse and destructive of unity it is too large and must be reduced. The requirements of due domination and subordination in building masses are the harmonious relation of parts, and this is as much a matter of size, as weight is concerned with gravity.

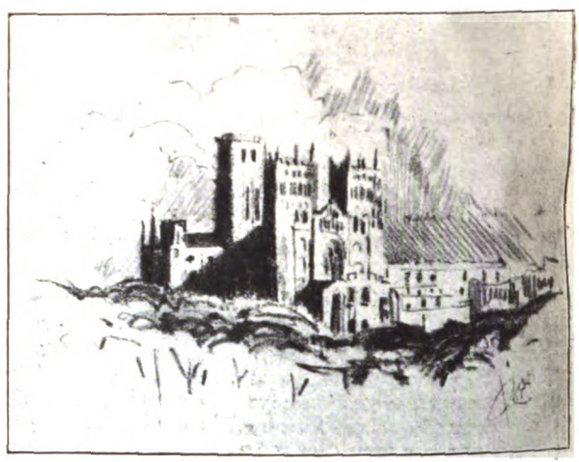


Fig. 16.—DURHAM.

Unity, therefore, in architectural composition results from due weight being given to every feature relative to its importance, as harmony in the house results from the absence of aggressive individuals; and just as the "strong" man may band together a nation, so the dominant feature of a whole architectural composition will preserve the unity. It is worth noticing that any levelling down of features of a design does not give an effect of harmony but of anarchy. The binding power of the dominant feature—be it merely a large roof or a plain chimney-shaft—is only observed if obliterated from a design (or by hiding it in a perspective view), and many a large group of institution buildings has been saved from being a nonentity by its water tower. Ruskin has advised architects to have one large thing and a lot of little things, and

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has drawn attention to the general poverty of effect of four pinnacles on a square tower without some central feature to which they may refer. He instances a king and his train of courtiers. It is worth noting that the king must be such actually. If there be two such the position is as hopeless as two actual kings on one throne. The consideration introduces important facts as to the



Fig. 17.—SOUTHWELL MINSTER.

arrangement of masses in composition. It may be asserted that (for harmony) two entities necessitate a third, actual or implied. Let us imagine two towers built independently and placed side by side, not, however, actually joined. No arrangement of these two objects alone can form them into one entity.

If placed close they war one with other. The further they are separated the less they affect each other. At what might be a reasonable distance for two towers in a building they remain independent, individual units. Placed almost touching they look ridiculous—at the best like two hounds in leash striving to get apart. Two objects require a third for unity—harmony. It may be merely

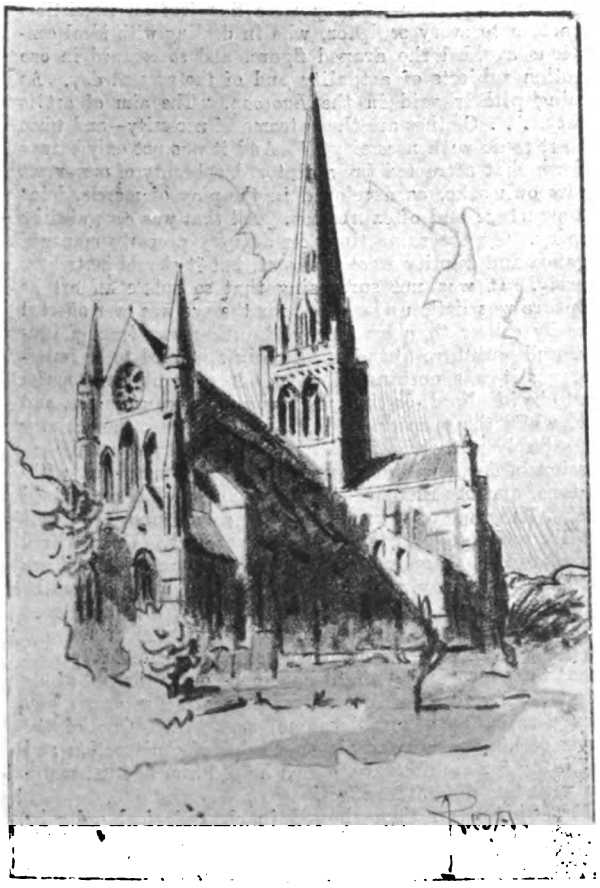


Fig. 18.—CHICHESTER.

a bond of sympathy—something spiritual—but that third part, whether spiritual, abstract or concrete, is required before the two individual entities can be subordinate to one harmonious whole. In matter of fact architecture a very little will connect the two—a wall, a gable, a screen, but no effect is produced unless the connecting object be of itself an entity that is not merely a wall. And we are therefore led to conclude that whereas with two objects the greater in bulk must be the important and the less subordinate, if we add a third part of equal bulk to the heretofore dominant, the smaller part may be rendered dominant over the two of the greater bulk. But it is an essential point in this that the smaller be placed between the two. More correctly the two should be placed on either side of the one; for the twin towers of a cathedral western front are referable to the central nave, and not the nave to the side towers. Generally we may deduce a rule that an object may be rendered important by flanking it, and further that the centre must be always dominant of the wings. The end gable and wall of a cathedral nave is of itself an inferior mass to that of the combined twin towers, but the effect on the beholder is plain enough, the towers refer to, support and add dignity to, the central feature—they are in the nature of servants. And it is remarkable of this arrangement of centre and wings that

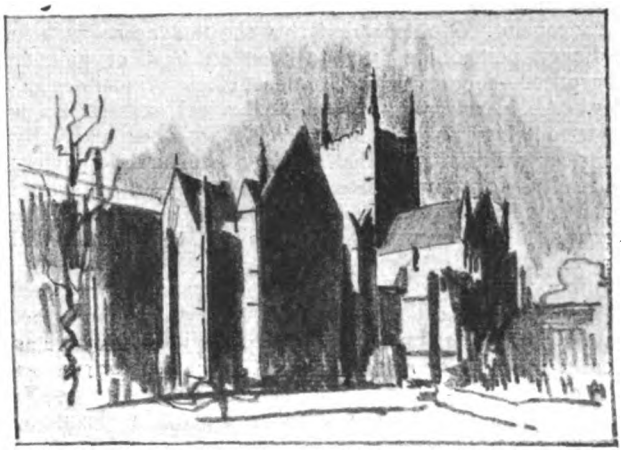


Fig. 19.—ROCHESTER.

no measure of size, no added work or ornament to the two flanks, can ever diminish the effect of the central object. It is as it were that the glory of the servants only increases that of the object served.

These considerations show that a composition—a façade, say—composed of two wings without a central feature is bad; a mere wall or colonnade connects the two, but only as by a chain. The eye always seeks a centre, just as we look for a centre of interest in a picture or a definite theme or motive in literature and music.

Every circle must be considered to harmonise with every other circle, however large or small, and however relatively placed. For most complete accord it would appear that they would need to be concentric. Every square must be in harmony with all other squares, however varied in size. In like manner every sphere and every cube are in harmony, contrasting in the one case by size and in the other by size and relative angular position. Like forms evidently harmonise by accord. Therefore we may say of Durham Cathedral that it presents in the mass more of unity, or harmony, than, for example, Southwell Minster. On a similar line of reasoning, Chichester—as also Salisbury—presents harmonious main masses on account of the accordance in form. For the reason that we criticise Southwell, we might say of the masses presented in fig. 19 that there is no harmony either of accord or by contrast, the ultimate effect being the broken and picturesque merely—"parasitical sublimity." The effect of these masses at Rochester is certainly that of dual personality, and not unity. It seems suggested that a contrast must be by design, for there is no indication that pure harmony has

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been the aim in the main massing of Southwell; while the great parts of St. Paul's Cathedral are plainly intended to give effect by contrast of form, the spiny sharpness of rectangularity (in perspective) with the dome *viâ* the drum. Were there no drum and dome at St. Paul's, an artist, sketching in sharp perspective, would doubtless introduce soft, "bossy," domical cloud masses as contrast. Wren has given us such effect as a permanency—the rounded dome, and a drum as intermediary—or a modulation; for a dome arising baldly from a rectangular mass must be adjudged offensive, by too violent or inharmonious contrast. To test this point it is only necessary to make a rough sketch — in perspective, always—of such a composition.

It will be observed that in the few examples here introduced the comparison is made in perspective. It is distressing to watch a designer arranging main masses in elevation, and also to remember the "no perspective" (!) law of the architectural competition. It is very easy to see, and we commonly and too frequently do see, an elevation introducing, say, centre and wings, plainly designed on the principles of the decorator or fret-worker—artists in the flat—two-dimension design; but it is sufficiently evident that the labour is in vain, the perspective—the real, true, and only possible effect of three-dimension (solid) design—upsetting the whole arrangement. No doubt but that the tameness—even in ordinary perspective, not to mention that of piquant sharpness—so general, is the result of elevational designing. An elevation is but an algebraical expression, as it were. One effect is imaginary, the other real. By courtesy we may allow that a cube has eight solid angles; in reality—for the purposes of the architect—it has, when on a large scale, two inoffensive obtuse angles and one very striking, immensely pugnacious, dominant solid angle.

A natural result of elevational design is to overcrowd "work," as in a cornice, where that which shows as, say, a dozen lines on elevation, appears in perspective as possibly twenty or more lines, if the margins of narrow and other shadows may be so designated. It seems sufficiently plain that, if the effect was good in elevation, something would be out of harmony in perspective. Not necessarily, perhaps, but the supposition is justifiable.

(To be continued.)

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

A MEETING of the Institute of Architects was held on Monday, March 29, at Conduit Street, W., Mr. Ernest George, President, in the chair.

The Secretary announced the decease of Mr. Alfred Henry Paget, elected Associate in 1870 and Fellow in 1892. Mr. Paget was a past president of the Leicester and Leicestershire Society of Architects, and represented that Society on the Council of the Institute during the years 1892-3.

Mr. M. H. Spielmann delivered a lecture, illustrated by a long series of lantern slides, entitled:—

British Sculpture.

He said his aim throughout would be to show the good in things without dwelling unnecessarily on what was indifferent and bad. His lecture would be an object-lesson rather than one on theory, and an endeavour to point out the remarkable position to which in latter days British sculpture had attained. He was therefore concerned with the aims of the school which had arisen in Great Britain within the memory of some of those whom he was addressing, and he would place before them certain facts in relation to the art which had been overlooked by the public. Since 1875 or thereabouts a great change had come over British sculpture, a change so revolutionary that it had given a new direction to the aims and ambitions of the artist, and had raised the character of the art to a level beyond expectation. Sculptors awoke to an appreciation of plastic and glyptic beauty, but they were without a past of their own to inspire them; there was no national tradition, and they had to commence at the very beginning. Lord Leighton, Alfred Gilbert and, in a lesser degree, Onslow Ford, were the influences of that new conception of sculpture. It was difficult to realise how bad it was sixty years ago. Men had begun to rebel against what they saw, and asked if it was art. But the ignorance of sculpture was confined to no class; indeed it was found, unhappily, in the highest official class—the Government circle—where appreciation was to be so earnestly desired. Ruskin had said:—"The only way for a nation to obtain good art was to enjoy it." The safe way, continued the lecturer, to obtain bad sculpture was to appoint a Minister of Fine Arts from among politicians, for nearly all patronage of that kind went to encourage bad art. They would remember the scorn which was levelled at Mr. Norman Shaw's New Scotland Yard at the time of building, one of the finest modern architectural works. The most mischievous ignorance was that shown by committees formed to consider the erection of public statues. They crippled and baulked the efforts of the artist by their irritating interference, and the lecturer went so far as to suggest that Stevens, Barry and Wilkins were driven into their graves by the treatment they had been subjected to at the hands of committees. People should remember that they ought to do nothing which would disturb the delicate organisation of the artist who was at the mercy of his inspiration, which was the flower of his artistic emotion and the very essence of his work. The committee of a musical festival did not interfere with the composer, and sculpture was no less a matter of harmony and science. Besides knowledge there was taste, and taste must be trained for fear it was corrupted by the false and meretricious in art, which was more dangerous than the merely incompetent. Bad taste was worse than no taste at all, for no taste could be educated, but bad taste was vicious already. Bad taste might be clever and tricky, and they saw the reflection of it in the popularity of much Italian work exposed in salerooms. Chief among the characteristics of the modern British school was the effort towards such realism and picturesqueness of treatment as did not detract from the dignity of the conception. The public, of course, welcomed any approach to what was pictorial, but sculpture primarily should represent ideas and not things. Michel Angelo had said, "The nearer painting is to sculpture, the better it is; the nearer sculpture is to painting, the worse it is." The present aim of sculpture was to give life without undue realism, a suggestion of reality shrouded in poetry and grace; yet there must be symbols of the ideas to be personified. Those symbols were loved for their beauty and significance, for they were of the essence of sculpture, the types of humanity and the representations in human form of poetic conceptions. They were therefore an irresistible attraction to every sculptor, who in dealing with ideal conceptions avoided the draped figure, and so escaped in one direction subjects of actuality and of the present day. As Lessing pithily said in the *Laocoon*, "The aim of art is beauty. . . . Clothes are the outcome of necessity—and what has art to do with necessity?" And it was not only beauty of form that attracted the sculptor, but beauty of movement for its own sake, as developed in the play of muscle, joint and structure and of expression. All that was concealed by drapery. At the same time, in drapery properly managed elegance and dignity were inherent, but it should be treated severely. It was not surprising that so subtle an art as sculpture was little understood, for the eye was ever affected more by colour than by form. Painting was frankly illusive, and sculpture to the unthinking appeared to be imitative, yet it was nothing of the kind. A sculptured model had to be idealised, or the result would be commonplace, and thus, while the painter could take any theme, the sculptor was severely and chastely restricted. Sculpture was the expression of form without colour, without atmosphere, without tone, and the introduction of colour therefore condemned itself. The more a statue looked like a real man, the less it was like sculpture and the more like waxwork. Until Alfred Stevens did so, scarcely anyone thought of instilling real life and blood into clay and marble. And what life it was he realised! He was no copyist, but entirely personal. Stevens was in the right sense unconscious of his greatness; and had not the accident of an open competition made his genius patent to the world, he might have gone on to the end of his days teaching, designing fenders, pots and fire grates and other details, with an occasional portrait. One of the secrets of his success was his knowledge of construction and his feeling for architecture, which helped him to treat sculpture with fine decorative effect.

Mr. Spielmann then showed in chronological order by lantern views some of the work of sculptors of the British school. The first slide was an illustration of Stevens's sketch model for the Wellington Memorial in St. Paul's. The lecturer explained how the composition would be thrown

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out of scale by the addition of the horse and figure. Thomas Woolner, who maintained that elevation which brought him applause for his "Virgilia lamenting the Banishment of Coriolanus," did not attempt a truly realistic subject till towards the end of his career, and then failed of complete success. Baron Marochetti tried to introduce a more modern feeling, and his "Richard Cœur de Lion" at Westminster evoked great enthusiasm. Sir Edgar Boehm was on the whole more successful, but unhappily his best-known work in London, the "Wellington Memorial," was cold and empty, though possibly correct enough. Foley, who at first was all for "the unities" and "a pure style," as he claimed in his later years, threw his previous contentions to the winds when his epoch-making "General Outram" reminded the public that monuments need not be staid to dulness. Then came Armstead, the crowning merit of whose work was its unornamental character, its unusual dignity, bigness and sense of style. George Lawson, too, had a genuine sense of style, and just escaped general recognition as a fine sculptor. He belonged to the Scottish school. His "Motherless" was a group admirably Scottish in sentiment, full of pathos and free in handling, yet almost too pictorial for sculpture. His best work was full of distinction and free from trick or trifles. When Mr. Brock went to London in 1866 he entered the studio of Foley; but he soon felt the foreign current, and, brilliantly rebelling against his friend and teacher, he was courageous enough to modify his style when it was already formed and his career well assured; and, so developed, he had left his master very far behind. The ideal work that marked the transition was "The Moment of Peril"—a fine scholarly group, soon to be surpassed in technical quality and refinement of taste. How great was the change might be seen in "The Genius of Poetry"—graceful and reposeful where the other was violent in action and passionate, and sculpturesque where that was pictorial, or at least anecdotal. But a higher point was reached in "Eve," so touching in attitude and sentiment—a fair, shamed woman, purposely not endowed with that conventional perfection of beauty commonly attributed to the First Mother—more exquisite in feeling than in person, with her head bowed with the weight of remorse. In portraiture Mr. Brock had similarly excelled. Sir Charles Lawes-Wittewronge had spent his life in producing a very few works of high ambition. He was a champion of the architectonic note in sculpture, and was always strong and healthy in his work with good robust character. Mr. Hamo Thornycroft with "Teucer" reached the high-water mark of his early career. In the great national memorial to Mr. Gladstone in the Strand they had the *magnum opus* of Mr. Thornycroft in elaborateness, if not in quality. Mr. Havard Thomas obtained his following by his ideal work "The Slave Girl" and "Lycidas." Onslow Ford, who was lost to English art before he had passed the middle age, as a skilful portraitist whose heads were speaking likenesses, always showed the least common aspect of the sitter, and few in this country had excelled him either in skill or taste. In 1877 Lord Leighton produced his "Athlete struggling with a Python." No work of modern times made a greater stir on its appearance than that group, modelled by a painter, which would have done honour to the ancients. Great, however, as was the sensation made by Leighton's sculpture, and great as was his place in British art, the master seemed to have no direct follower or imitator among the younger men. Mr. John Swan had specialised a particular class of subject, for the most part studies of animals, mainly the *felidæ*. Mr. Harry Dixon was no less enthusiastic as a student of animal life. In Mr. Alfred Gilbert they had an artist who stood as one who had preached in his work a great movement, and in less than a decade effected as much as any other the salvation of the British school, and had influenced quite as much as Dalou or Professor Lantéri many of the young sculptors of the country. Harry Bates, in the short life during which he laboured, did splendid service to English sculpture and sculptors. In striking contrast with Bates was Sir George Frampton, in whom they had one of the most versatile and original artists of the day, thoroughly in the "new movement" which he had done so much to direct. Mr. Alfred Drury sought the graceful, the placid and the harmonious, and in his view of art cared little for vigour, passion, or anatomical display. Mr. Pomeroy was one of the most brilliant of the younger men. His individuality and mastery might fairly well be seen in the work, the commission for which he won, for the centenary "Statue of Robert Burns" for Paisley. Mr. Albert Toft's most elevated and sympathetic work was "Mother and Child. Professor Edward Lanteri had produced many admirable works on his own account. Mr. Goscombe John, as a student, established a reputation for feeling in his work, but he soon matured into something far higher and more admirable in the austere figure of St. John the Baptist. Mr. Bertram MacKennal's pediment for the offices of the Local Government Board in Parliament Street was, so far as the lecturer knew, the best work of its kind in England. Mr. Fehr was a sculptor from whom they might expect more and better work than they had yet had. Mr. Colton showed a Parisian flavour in some of his work, but he was endowed with so strong an individuality and possessed such a true power of design and sense of style that they might regard him as among the ablest leaders of the younger men. There were many other sculptors who were making a name—Mr. David McGill, Mr. Macgillivray of the Royal Scottish Academy, Mr. Derwent Wood, Mr. Garbe, and Mr. Albert H. Hodge. The highly original work of the last-named required, said Mr. Spielmann, a lecture to itself. It would have been observed, said the lecturer, that several of the most admirable sculptors had been trained as painters—Alfred Stevens, Mr. Swan, and Lord Leighton. But, excluding Alfred Stevens, none of all the sculptors who had been mentioned surpassed in power their greatest artist, George F. Watts, who as a sculptor claimed all their respect and enthusiasm. The half-a-dozen pieces of sculpture of Mr. Watts placed him very high indeed among the world's finest sculptors of the nineteenth century—high among the sculptors of all times. In conclusion, the lecturer asked, Did not the work of the grand old man—who in his eighty-seventh year was working upon one of the masterpieces of his life, the statue of Tennyson, set up in Lincoln—mark for them the true standard and point out the way for the younger sculptors?

Mr. W. GOSCOMBE JOHN, R.A., who proposed a vote of thanks to the lecturer, said sculptors would be delighted with the remarks they had heard from Mr. Spielmann. It was uncommon to hear anybody lecture about sculpture, and more uncommon still to hear anyone who understood it. Mr. Spielmann had gone to the problem with sympathy and knowledge, and the kind of knowledge very rarely met with outside the technical ranks. Most arts, said the speaker, were difficult to talk about among the uninitiated, and perhaps the most difficult of all were architecture and sculpture. There were so many things connected with the technical part, and to the outsider it was almost impossible to know what was the result of pure technique and what was the result of sentiment, and hence criticism was often unreasonable and at fault. There were many points in the lecture which started a train of thought. One of the most interesting was the origin of all that had taken place during the last thirty years, and they felt that Lord Leighton was perhaps the man who had most to do with the improvement through his "Athlete struggling with a Python."

Mr. W. COLTON, A.R.A., seconded the vote of thanks, and remarked that sculptors as a whole were greatly in want of spokesmen. He felt we were a very diffident race, and that sculpture in England was really in need of a great many spokesmen. It had been struggling for some years to become a school of sculpture, if he might say so, and perhaps it had hardly arrived yet at the time when it could walk without a nurse. He felt that Mr. Spielmann was the only spokesman they had to-day who really loved sculpture for sculpture's sake, and who was not led away by eccentricities. A mist seemed to have come over their intentions, and there was a curious craze at the moment for mutilation in sculpture. It was extraordinary, and they saw it in good exhibitions where many exhibits were a portion of the human figure—arms almost alone, heads split into sections, every possible mutilation. All these fractions of figures were really supposed to be very artistic and very fine; of course, they were simply eccentricities and were not fine work in any way. They were a cheap way of doing sculpture and a form in which anybody could succeed, so that he felt they were in need of spokesmen like the lecturer to properly point out the beauties of their art. They must try to put under foot unfriendly criticism, for if sculpture was to succeed it must be described in a friendly spirit.

Mr. H. H. STATHAM supported the motion, and said sculpture was the art for which he had the greatest passion, and he considered it the most intellectual of all the arts. He was old enough in regard to the progress of English sculpture to remember the whole rows of busts with realistic effects which were to be seen at the Royal Academy, but how different it was now. He was afraid that sculpture never could be a popular art, because it was essentially an abstract one. Mr. Spielmann had referred to the fountain near the Serpentine as an admirable piece of work, but the speaker thought its quality was not always appreciated, for he had

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sought opinions upon it and had been told that it was a queer and ugly thing. It seemed to him that the great object of sculpture in its highest representation was to present some abstract thought in an abstract way, and sculptors used the figure not merely as an imitation of nature, but to express an abstract idea. In regard to the difficulty of dealing with dress, it had occurred to him that completely costumed figures could be dealt with better in bronze than in marble, as the material seemed to lend itself much better to the purpose. Then he had been struck, too, with the way in which the French very often got over the difficulty in costume of men by simply representing the bust on the head of a stele, surrounding it with abstract figures symbolic of traits in the man's character.

Mr. GOSCOMBE JOHN said all sculptors were agreed that bust portraits offered the best means of avoiding the difficulties of treating men's dress in sculpture, but English committees generally controlled the commissions for such work, and they would have the whole man—frock coat, boots and everything—and that was the reason why so many of our monuments were uninteresting.

ILLUSTRATIONS.

ITALIAN HOSPITAL, QUEEN SQUARE, W.C.

THE hospital was opened by His Excellency the Italian Ambassador on behalf of the King of ITALY, who presented Madame ORTELLI with a gold medal surrounded with diamonds (specially designed) in commemoration of the event. The façade was designed to be executed in Portland stone and red brick. The dome which surmounts the semicircular staircase in Devonshire Street is covered with lead. The basement is devoted to the servants' department, kitchen, larders, store-rooms, servants' hall, linen-room, heating chamber, washhouse, post-mortem room, and a vaulted mortuary under the roadway. The ground floor consists of entrance hall, board-room, secretary's, house surgeon's and porter's rooms, operating room, with accident ward adjoining, semicircular staircase with patients' lift in the centre. The out-patients' department is shut off from the hospital, and consists of waiting room, with separate entrance and exit, physician's, surgeon's and registrar's rooms, dressing room and pharmacy. The first floor is devoted to male patients, and consists of a ward for fourteen patients, smaller ward for four, and four single wards for special cases, with two detached sanitary blocks containing bathroom, lavatories, water-closet and slop-sinks. The staircase is detached from the wards by cross-ventilated lobbies. Opposite the staircase is the nurses' duty-room, fitted with hot closet, sink, cupboard and flap table, with food lift outside. The second floor is devoted to female patients, with a ward for eight, smaller ward for four, two single wards for special cases, children's ward and an isolated ward disconnected by a corridor open to the air. Sanitary blocks and duty-room, lifts, &c., the same as on the first floor. The top floor is arranged for the nursing sisters, and contains dormitory, sitting, dining, sick, workrooms and detached sanitary block. Two outside unenclosed lifts are provided to every floor for coals, dust, soiled linen, &c. One of the roofs is used as an airing ground for patients, with a covered shelter. The chapel is at the top of the staircase, under the dome. The staircase and floors are fire-resisting throughout. The ward floors are of oak in narrow widths, grooved and tongued, secret nailed and wax polished. The building is warmed throughout and lighted by electricity. This hospital is the cheapest erected in London. It has fifty beds costing 300*l.* per bed. The work has been executed by Messrs. HOLLOWAY BROS., of Belvedere Road, from the designs of Mr. THOMAS W. CUTLER, F.R.I.B.A.

VICTORIA STATION, S.-E. AND C. RAILWAY.—PRINCIPAL FRONTAGE, FACING FORECOURT—WILTON ROAD FRONTAGE.

THE accompanying illustration shows the principal frontage facing the station forecourt, and forms part of the new works now carried out at this station by the South-Eastern and Chatham Railway Company's managing committee. The works comprise a frontage of 165 feet to the station yard and 200 feet to the Wilton Road. Part of the site was once occupied by a canal basin, consequently a reinforced concrete raft 6 feet thick was constructed under the main portion of the building—that is, to the whole of the station yard frontage and extending along the Wilton Road for a distance of 80 feet. The new accommodation includes a restaurant on the first floor 160 feet by 38 feet, and one in the basement measuring 100 feet by 56 feet. The two frontages are faced with Portland stone; the plinth is in Cornish granite fine axed. The roof is covered with Welsh green slates laid in graduated courses. The buildings have been executed under the control and supervision of Mr. PERCY C. TEMPEST, the engineer to the managing committee, and Mr. W. J. ANCELL, architect, of Staple Inn. The elevations have been designed and detailed by Mr. ALFRED W. BLOMFIELD. Messrs. HIGGS & HILL were the contractors for the work. The sub-contractors were as follows:—Stone carving, including figures, HY. CHAS. FEHR; awning roofs and signs, Messrs. PREST, TEALE & Co.; staircase window, E. J. PREST; constructional steelwork, Messrs. M. T. SHAW & Co.; electric lighting and fittings, Messrs. STRODE & Co.; sanitary fittings, Messrs. ADAMSEZ & Co.; marble wall decorations, Messrs. H. J. JENKINS & SON; wood block flooring, the Zeta Wood Block Flooring Co., Messrs. ARTHUR JEFFERISS & Co.; lead glazing, Messrs. JAMES & Co.; mosaic floors and wall lining, Messrs. DIESPEKER & Co.; floor tiling in kitchens, Messrs. CANDY & Co.; wall tiling, Messrs. DOULTON & Co., Rust's Vitreous Mosaic Co.; fibrous plaster, Messrs. MARSHALL & Co.; gates, The Bromsgrove Guild; ironmongery, Messrs. COLLEDGE & BRIDGEN; metal panels, Messrs. JONES & WILLIS; lifts, Messrs. WAYGOOD & Co.

ST. GABRIEL'S COLLEGE, CAMBERWELL.—DETAIL OF MAIN FRONT.

THE view shown is the centre part only of a long main front. This part of the building was completed in 1901. The materials are Portland stone, red brick, and rough-cast. The latter is somewhat of an innovation in a public building, St. Gabriel's being a training college for women teachers in elementary schools. But it is found in practice, as was anticipated by the architect, that every three years the building looks beautifully fresh with its new coat of colour-wash, and, in London, this is no small gain at a very small cost. The statue of St. Gabriel over the entrance is by Mr. H. C. FEHR. The builders were Messrs. J. GARRETT & SON, Balham Hill, S.W., and the architect Mr. PHILIP ROBSON, of Westminster.

EASTBOURNE INSTITUTE.—EAST ANGLE.

OUR description of this building given on p. 81 (January 29) need only be supplemented by saying that the view given to-day is that of the east wing and one entrance to the art and secondary schools, on the first and second floors. The architect was Mr. PHILIP A. ROBSON, A.R.I.B.A., 9 Bridge Street, Westminster.

AUSTRALIAN CITIES IN THE MAKING.—PRINCE STREET, GRAFTON, N.S.W.

SEE article on "Australian Suburban Architecture," p. 234.

A Meeting of the Notts standing joint committee was held at the County Hall, Nottingham, on Saturday. The county surveyor reported that official sanction had been given for a new police station at Sutton-in-Ashfield, but the plans for Mansfield had been sent back for minor alteration. The Mansfield scheme was estimated to cost 2,500*l.*, and the Sutton-in-Ashfield one 3,000*l.* Mr. Hooley also submitted a detailed report of the expenditure necessary in rebuilding the part of the shire hall recently destroyed by fire. The reconstruction of the block on similar lines would cost about 2,200*l.*, but he considered it unwise, with the ever-increasing demand for office accommodation, that such an opportunity should be lost for increasing office space, and a scheme was submitted which would involve an expenditure of, roughly speaking, 4,000*l.* The matter was referred to a sub-committee.

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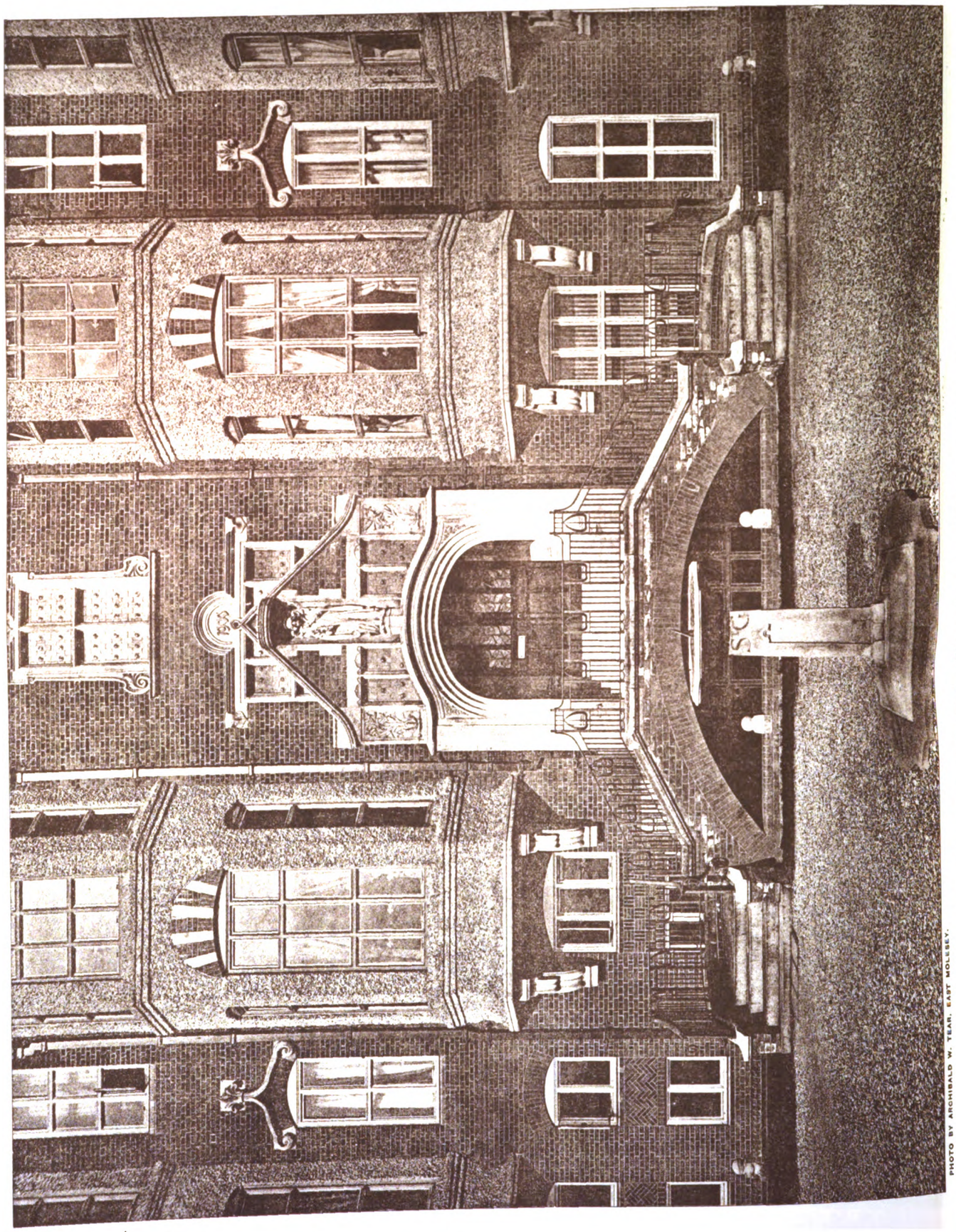


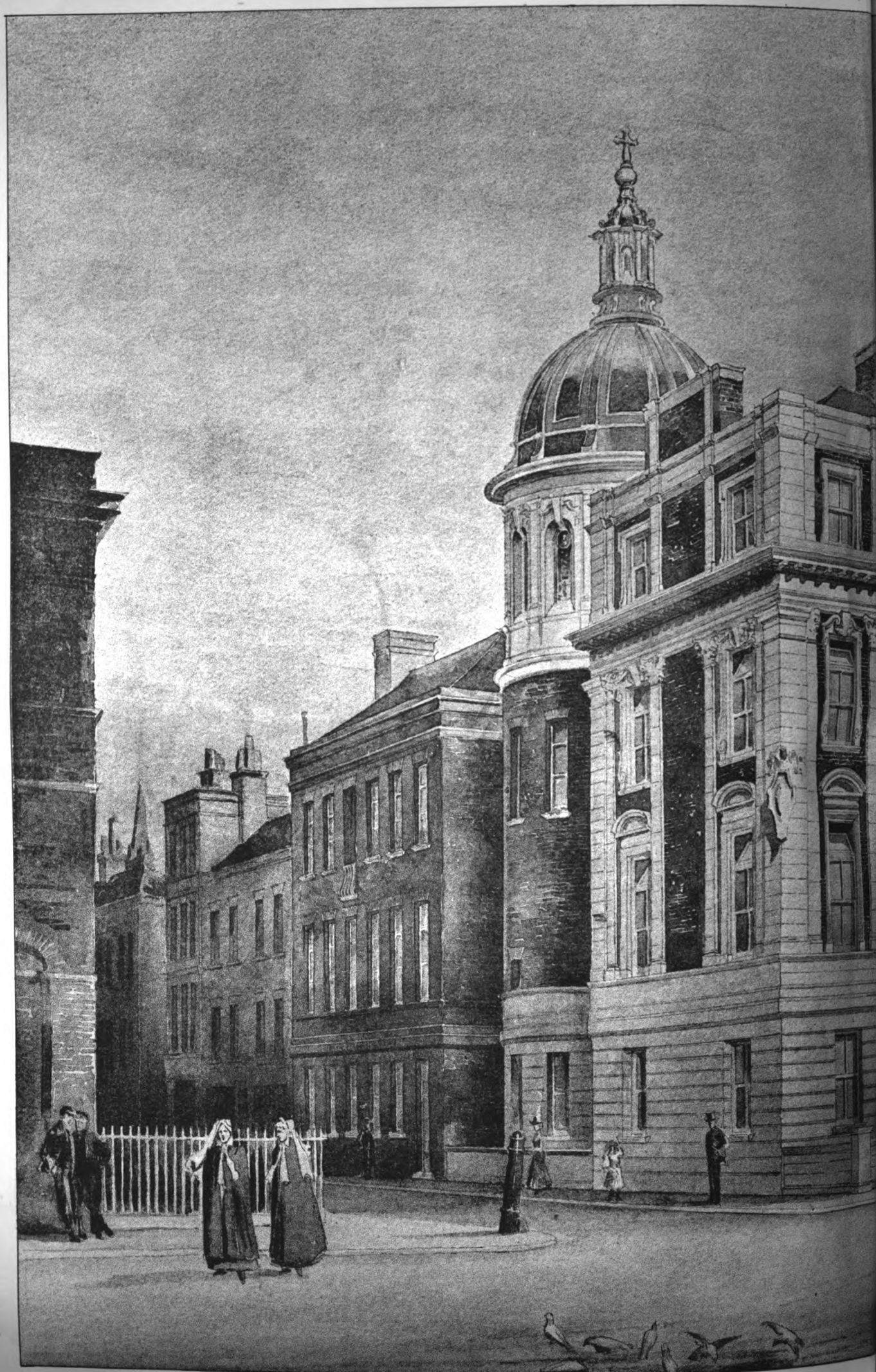
PHOTO BY ARCHIBALD W. TEAR, EAST MOLESEY.

ST. GABRIEL'S COLLEGE, CAMBERWELL: DETAIL OF MAIN FRONT.

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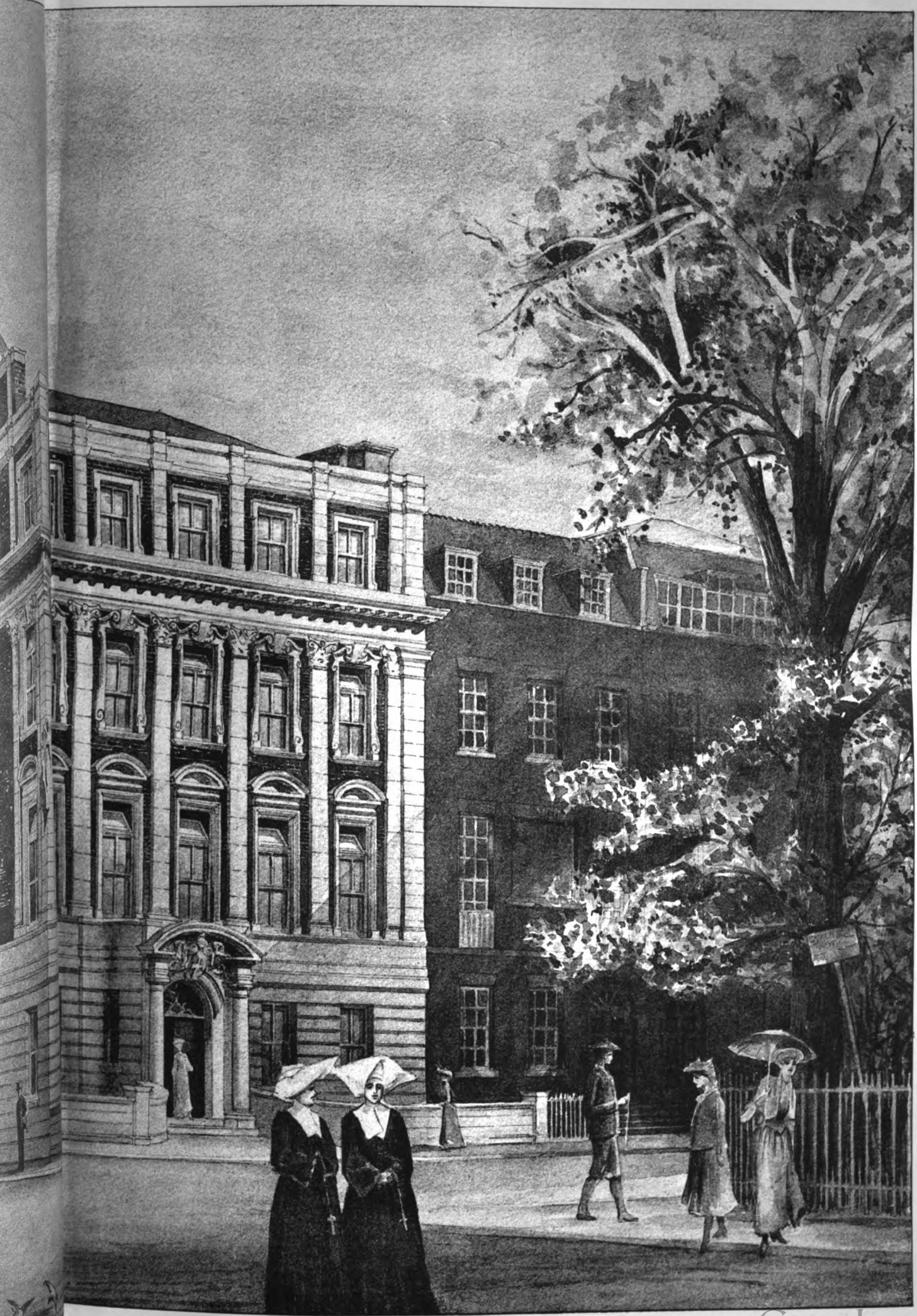
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THOMAS W[illegible] R.A. Architect

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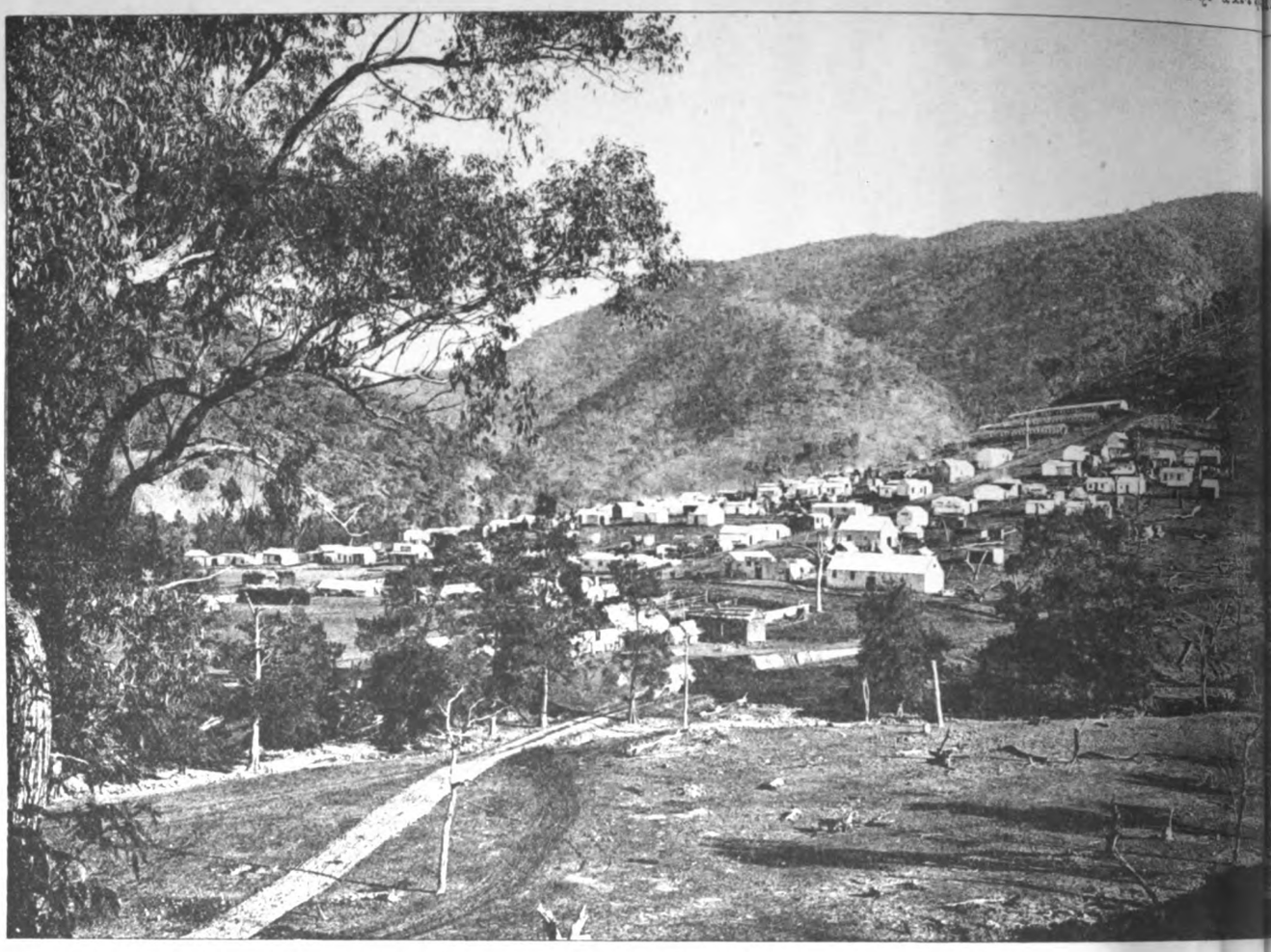
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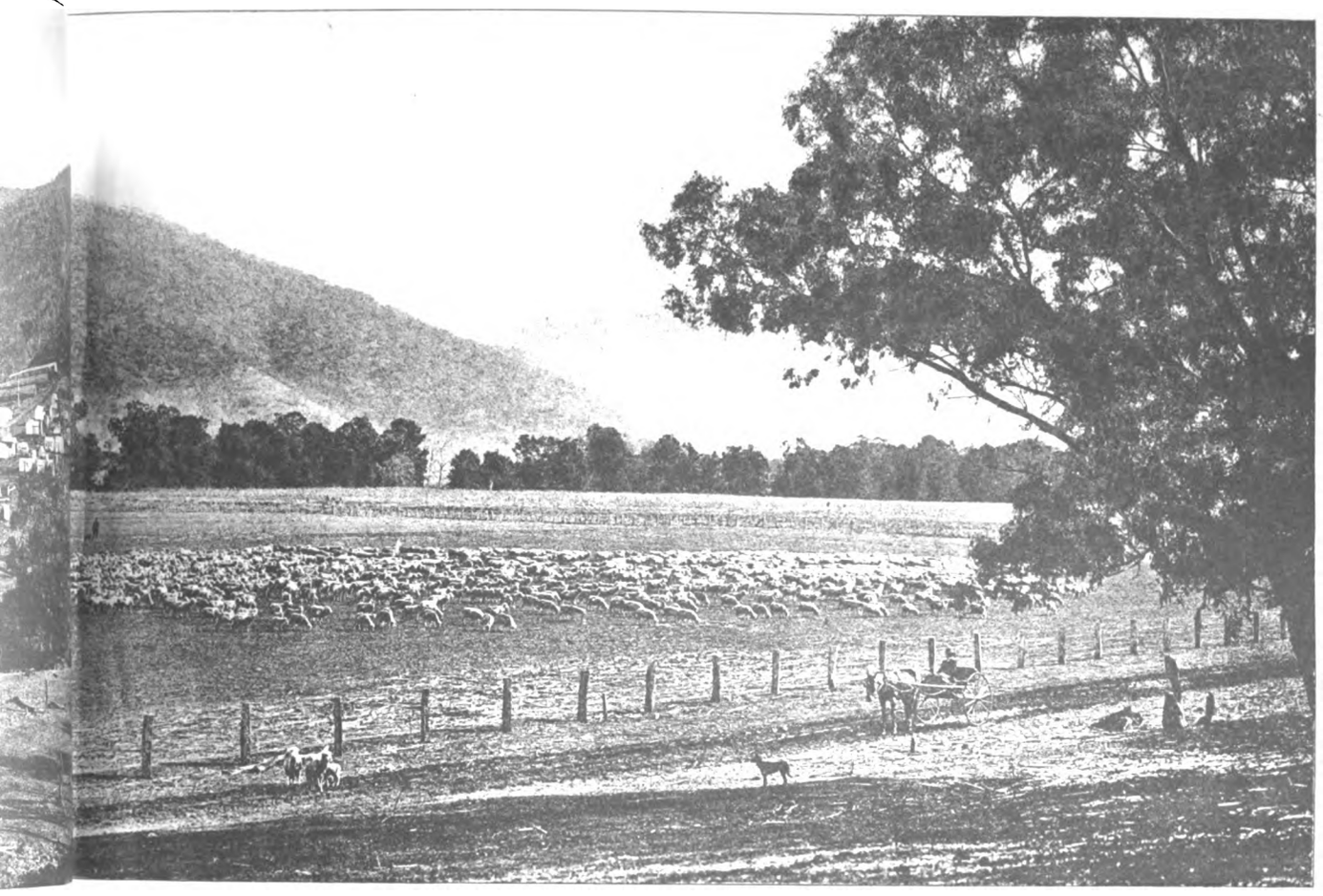


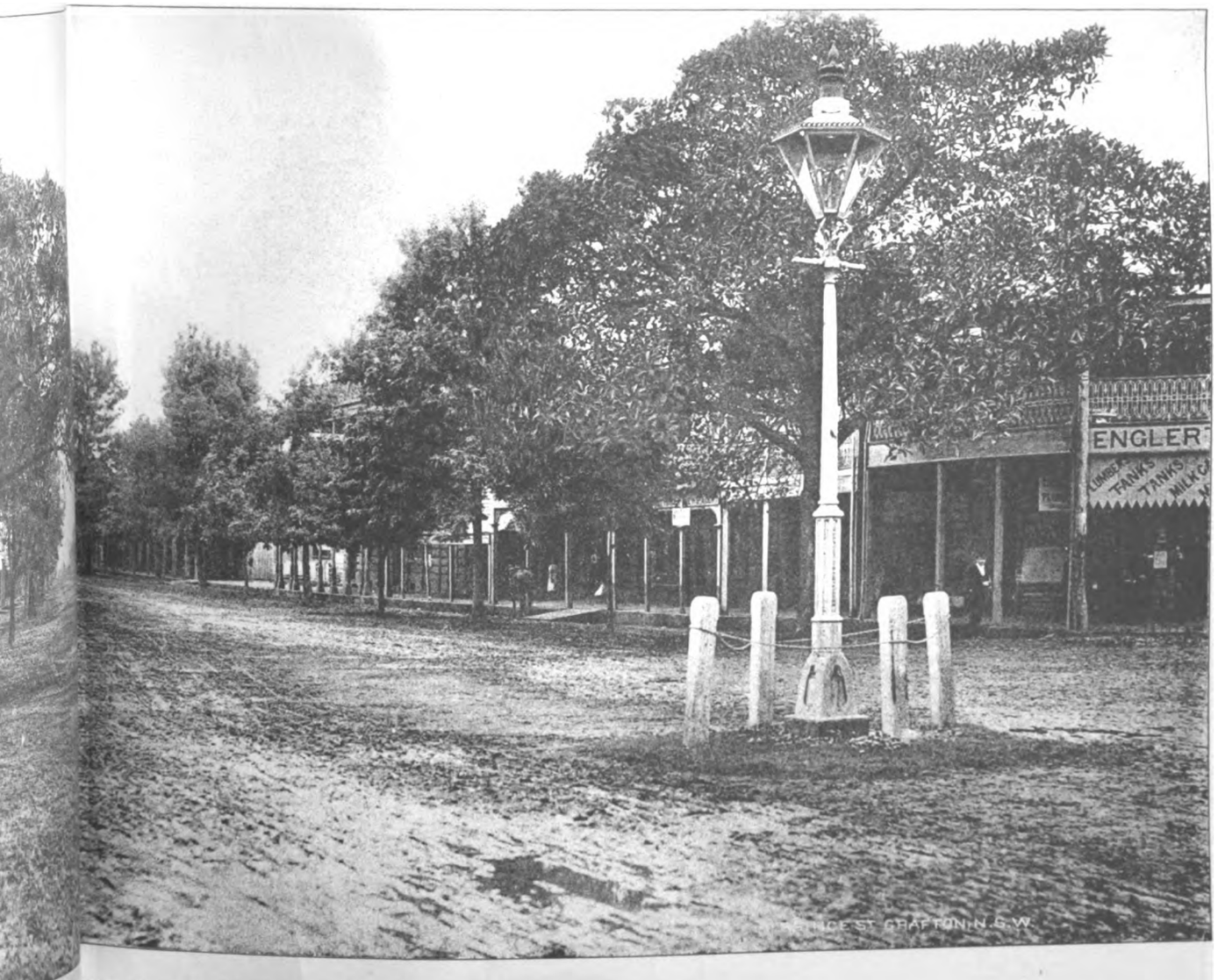


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INCE STREET, GRAFTON, N.S.W.

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EASTBOURNE INSTITUTE: EAST ANGLE.

PHILIP A. ROBSON, A.R.I.B.A., Architect.

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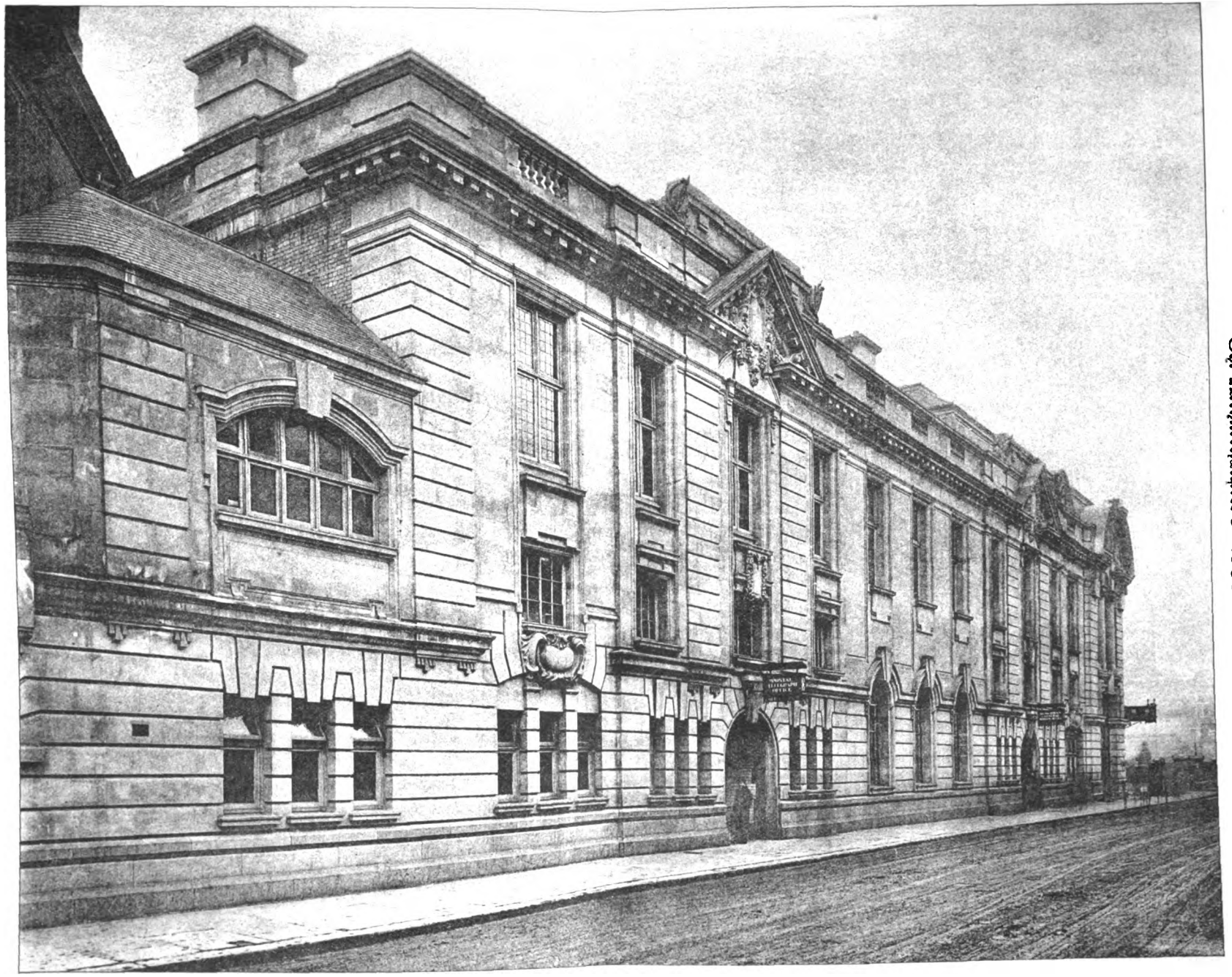
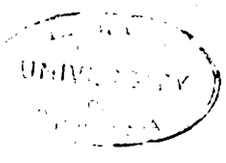


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VICTORIA STATION, S. E. & C. RAILWAY: WILTON ROAD FRONTAGE.

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THE CORROSION OF STEEL REINFORCEMENT IN CONCRETE.*

IT has been said that reinforced concrete should be avoided, as it is a treacherous material to use owing to the fact that the metal corrodes, and being covered by the concrete the extent of the corrosion can never be ascertained, and therefore many well-known engineers up to the present have avoided the use of the material owing to this impression. If they were right in their assumption, and the steel did corrode and there was no remedy for it, then reinforced concrete would soon have had its day, for its weakness in this respect would become generally known and it would naturally be avoided, but, from a series of experiments which the author has recently made and which he describes in this paper, he is in a position to state definitely that no such fears need be entertained. Before describing his own experiments he would in a few words set forth the gist of the information which we already have in relation to this important matter. In America the subject has received a good deal of consideration, and the commonly accepted theory in the United States respecting corrosion of iron in concrete is that stated by Professor S. B. Newbury, which is as follows:—

The rusting of iron consists in oxidation of the metal to the condition of hydrated oxide. It does not take place at ordinary temperatures in dry air, or in moist air free from carbonic oxide. The combined action of moisture and carbonic acid is necessary. Ferrous carbonate is first formed; this is at once oxidised to ferric oxide and the liberated carbon dioxide acts on a fresh portion of metal. Once started the corrosion proceeds rapidly, perhaps on account of galvanic action between the oxide and the metal. Water holding carbonic acid in solution, if free from oxygen, soon acts as an acid and rapidly attacks iron. In lime-water or soda solution the metal remains bright. The action of cement in preventing rust is now apparent. Portland cement contains about 63 per cent. lime. By the action of water it is converted into a crystalline mass of hydrated calcium silicate and calcium hydrate. In hardening it rapidly absorbs carbonic acid and becomes coated on the surface with a film of carbonate, cement mortar thus acting as an efficient protector of iron and preventing the carbonic acid molecules from attacking the metal. The action is therefore not due to the exclusion of the air, and even though the concrete be porous, and not in contact with the metal at all points, it will still filter out and neutralise the acid, and prevent its corrosive effect.

Some very important tests have been carried out by Professor C. L. Norton, of the Massachusetts Institute of Technology, Boston. These were conducted on the following lines. The blocks were made of (*a*) neat Portland cement, (*b*) one part cement and three parts sand, (*c*) one part cement and five parts broken stone, (*d*) one part cement and seven parts well-washed cinders.

The reinforcement of each block consisted of a ¼-inch rod, a piece of soft steel, 6 inches by 1 inch by $\frac{1}{16}$ inch, and a 6 inches by 1 inch piece of expanded metal. The tests were as follows:—One-fourth of the blocks were allowed to remain in air inside a building; one-fourth were placed in a sealed box in an atmosphere of air and steam; one-fourth in a sealed box in an atmosphere of air and carbon dioxide; one-fourth in a sealed box containing an atmosphere of steam, air and carbon dioxide.

Some of the reinforcement was dipped in cement grout previous to insertion in the concrete, but in other cases it was not.

The results of these experiments led Professor Norton to the following conclusions:—

1. That neat Portland cement, even in thin layers, is an effective preventative of rusting.

2. Concrete, to be effective in preventing rusting, must be dense and without voids and cracks. It should be mixed quite wet when applied to the metal.

3. The corrosion found in cinder concrete is mainly due to the iron oxide, or rust, in the cinders, and not to the sulphur.

4. Cinder concrete, if free from voids and well rammed when wet, is about as effective as stone concrete in protecting steel.

5. It is of the utmost importance that the steel be clean when bedded in concrete. Scraping, pickling, a sand-blast and lime should be used, if necessary, to have the metal clean when built into the wall.

These tests extended over a period only of three weeks, which, in the author's opinion, was not long enough.

For years past French engineers have protected many of their iron bridges by coating them with cement wash, two coats being usually applied, and in America cement wash has been largely used for a similar purpose.

M. Breuille, of France, states that from his experiments he came to the conclusion that in all cases the action of the cement in the concrete on the iron reinforcement prevented rust, and that it even removed the rust from iron which was already rusty when embedded in the concrete. The question of the rusting of steel in concrete has received the attention of German engineers and numerous tests have been made, the general conclusion arrived at being that cracks occurring in the concrete do not result in the reinforcement becoming corroded at these points. The method of testing was briefly as follows:—

Beams were prepared which were reinforced by the steel which is generally used in reinforced concrete structures, this steel being placed 1½ inch above the bottom of the beams. The concrete was mixed in the following proportions:—1 : 2 : 4, 10.1 per cent. of water being added. The forms were removed after a set of twenty-four hours; the beams were then stored for three months, some in wet sand, others in the open air, water being poured over them daily. For the next three months the beams were subjected to load tests, and of fifty-eight beams made twenty-six were broken under these tests. The thirty-two beams which had not been broken were then subjected to a rusting test under a load, sheet-iron casing being fixed around the middle third of the beam, through which a mixture of carbon dioxide, oxygen and water vapour passed. The beams were kept in this rusting atmosphere for three days from 7 A.M. to 4 P.M. The steel was then examined, with the following result:—

In twenty-seven out of the thirty-two cases no rusting had occurred. These twenty-seven beams had been subjected to a load causing stresses of 18,000 lb. to 35,000 lb. per square inch in the steel, and the five remaining beams had been subjected to a greater stress, viz. 35,000 lb. to 44,000 lb. per square inch.

Mr. J. M. Braxton, assistant engineer at Key West, Florida, U.S.A., recently reported to the engineer officer in charge of the fortification works on the East Coast of Florida that he had made fifteen sets of two blocks each, the aggregate in five of these sets consisting of three parts of coral sand, common to the beaches of the Florida coast, and five parts of brick crushed to pass through a 1-inch ring; in five others it consisted of three parts of coral sand to five parts of brick crushed to pass through a 2-inch ring; and in the remaining five blocks it consisted of three parts of silica sand and five parts of brick crushed to pass through a 1-inch ring. The blocks were 12 inches by 12 inches by 6 inches. The reinforcement, which in each case was inserted in the middle of the blocks, consisted of twisted steel rods, 8 inches long and ⅝ inch diameter. Some of the rods were dipped in grout, and others were not treated in any way. Half of these blocks were placed in the ocean after a twenty-four hours' set, and half were exposed to the air.

At the expiration of a period of one year and twenty-one days these blocks were broken, and it is interesting to note that the rods in those blocks which had remained in the sea water showed no signs of rusting, but those which had remained in air showed very slight rusting, regardless of the aggregate of which the blocks were made.

Some interesting tests were carried out a short time ago at the National Physical Laboratory, London, at the request of Sir John Brunner, and the following is the official report of these experiments:—

A strong wooden box was made and divided into five partitions, each partition being 12 inches long, 7½ inches wide, and 7½ inches deep. Specimens of mild steel of the following dimensions were prepared: (1) One inch diameter, 8 inches long, turned all over. (2) Eight-inch lengths cut from 1½ inch by 1½ inch bar with the scale left on. The partitions were half filled with good Portland cement concrete, and a specimen of each kind of steel laid on the top, the partitions being then completely filled with concrete. This was done on December 21, 1906. The blocks were covered with water several times per week for a year, and for three months afterwards they were left in the open, exposed to the weather. On April 20 one of the blocks was removed from the box and broken up, and the specimens removed. On examining the specimens carefully no trace of any action by the cement could be detected. The turned specimen was practically as bright as when it was put in, and the scale on the rough specimen was undisturbed. To test the possibility of any slight action, the surface of the turned specimen was polished and etched and examined under the microscope side by side with a specimen of the same material cut from the centre of the bar. No difference in the microstructure of the two specimens could be detected, and the conclusion is that in sixteen months no action has taken place between the metal and the concrete.

* A paper read on Monday, the 5th inst., by Ernest R. Matthews, A.M.Inst.C.E., F.R.S.E., before the Society of Engineers at the Royal United Service Institution.

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While the preceding information is undoubtedly valuable it will be readily seen that the results of the investigations vary considerably.

Professor C. L. Norton found that corrosion took place when cinders were used as the aggregate of the blocks made by him; he also informs us that to dip the metal in cement grout was a sure proof against corrosion, but the metal must be clean before being dipped. This opinion is practically the same as that expressed by Professor S. B. Newbury.

M. Ereuille, of France, found that no corrosion took place when steel was inserted in concrete, but that the reverse occurred. He put rusty bars into concrete blocks, and when these blocks were broken some time after, they were found to be quite bright.

Mr. J. M. Braxton, on the other hand, found that slight rusting occurred when the blocks were placed in air, and that when submerged in sea water no corrosion of the metal occurred, while Sir John Brunner's tests indicate that no corrosion takes place when the blocks are placed in water and air alternately. In the German tests no corrosion occurred when reinforced beams were placed in air and others in wet sand, and afterwards subjected to a test load applied to produce a stress in the steel which did not exceed its elastic limit. The report of the special committee appointed by the Royal Institute of British Architects respecting this important matter should here be quoted. Their report, after dealing with other characteristics of reinforced concrete, goes on to say:—

It is sometimes thought that the metal may perish, but all experience shows that concrete is the best preservative for iron or steel known to us. A bar of iron or steel, slightly rusty, embedded in properly made concrete, may be taken out after some months, or after hundreds of years, brighter than when it was put in. Perhaps I may quote an instance (says Mr. W. J. Locke, Secretary R.I.B.A.); the experience of Mr. Somers Clarke, late Surveyor to St. Paul's Cathedral, who being anxious as to the condition of the great chain tie which binds the dome at its base, caused an opening to be made in the concrete in which it has been embedded for over two hundred years, and found the iron bright and perfect, notwithstanding the fears which had naturally been felt because of the percolation of water from the gallery over it. This is but one of many examples, showing not only that metal reinforcements and concrete have been used by architects for many years back, but that their confidence in the durability of concrete and metal in combination is justified.

The many instances of the anchor chains of suspension bridges being embedded in concrete as a provision against their deterioration through the action of moisture may also be cited as showing the reliance placed on concrete by engineers for the protection of steel from corrosion.

The author, about two and a half years ago, had occasion to pull down part of a concrete sea wall at Bridlington which had been built twenty-five years previously, and found that the iron chains which had been inserted in this wall at the time of its construction were still in a perfect condition, there being no sign of rust in spite of the fact that the sea covered the lower portion of the wall at every tide, and that in some places the chains were within an inch of the outside face of the wall.

The author will now describe the experiments recently made by him.

He set himself the task of discovering something definite on fourteen points, which are as follows:—

1. The effect upon the steel reinforcement of submerging blocks in 3 feet of fresh water, seven days after making them, and keeping the blocks in water for eleven weeks. (Steel untreated.)

2. The effect upon the steel of submerging blocks in 3 feet of fresh water after a forty-eight hours' set, and keeping the blocks in water for eleven weeks and five days. (Steel untreated.)

3. The effect upon the steel when the blocks are kept exposed to the air for twelve weeks. (Steel untreated.)

4. As No. 1, but when the steel is first dipped in cement grout.

5. As No. 2, but when the steel is first dipped in cement grout.

6. As No. 1, but when the steel is first dipped in linseed oil.

7. As No. 2, but when the steel is first dipped in linseed oil.

8. As No. 1, but when the steel is first dipped in turps.

9. As No. 2, but when the steel is first dipped in turps.

10. The effect upon the steel of keeping blocks, after a seven days' set, in water and air for alternate weeks for eleven weeks. (Steel untreated.)

11. The effect upon the steel of keeping blocks in water and air for alternate weeks for eleven weeks and five days after a forty-eight hours' set.

12. The effect upon rusty steel when the blocks are submerged in water for eleven weeks after a seven days' set.

13. The effect upon rusty steel when the block is submerged in water for eleven weeks and five days after a forty-eight hours' set.

14. As No. 13, but exposed to the air for twelve weeks.

The author had twenty concrete blocks made, formed of various aggregates, each being 8 inches cube. In some instances the aggregate consisted of:—Four parts broken bricks, two parts sand, one part Portland cement. In other instances the proportions were:—Three parts ¾-inch gauge slag, one part ⅛ inch and dust slag, one part sand, one part Portland cement; also:—Two parts ¾-inch gauge slag, one part ⅛ inch and dust slag, one part coke breeze, one part Portland cement; also:—Two parts broken stone, two parts ¾-inch slag, one part sand, one part Portland cement; also:—Three parts slag, two parts sand, one part Portland cement.

The analysis of the cement used was as given below:—

Chemical Analysis.

	Per cent.
Insoluble residue	0.82
Silica	20.43
Alumina	9.10
Oxide of iron	1.95
Lime	62.65
Magnesia	1.25
Sulphuric anhydride	1.38
Loss on ignition	1.66
Alkalies and loss	0.76
	100.00

The metal inserted also varied; in some cases it was put in in a rusty condition, in other cases it was clean. Some pieces of steel were dipped in cement grout, others in linseed oil, and others in turps.

The date when each block was made, the aggregate of which it was composed, the condition of the steel reinforcement when inserted, and the tests to which it was subjected, are clearly set out in the following table:—

Test Block in Reinforced Concrete.

Date when Block was made.	No. of Block.	Aggregate.	Steel.	Test to which the Blocks were subjected.
1908 July 20	1	4 parts broken brick 2 parts sand 1 part cement	1 piece rusty 1 piece clean —	Placed in water after 48 hours. — —
,,	2	Ditto	2 pieces rusty	Remained in the open air.
,,	3	Ditto	3 pieces rusty	Placed in sea-water 9 days after being made. Taken out of moulds 48 hours after making. This block was lost, so must not be included in these tests, as in the case with No. 8.
,,	4	3 parts ¾ in. gauge slag 1 part ⅛ in. and dust slag 1 part sand 1 part cement	3 pieces clean steel — — —	Kept in water after a 7 days' set. — — —
,,	5	Ditto	Ditto	Remained in the open air.
,,	6	Ditto	3 pieces dipped in linseed oil	Kept in water after a 7 days' set.
,,	7	Ditto	3 pieces dipped in turps	Ditto.
,,	8	Ditto	3 pieces clean	Placed in sea-water 9 days after being made. Taken out of moulds 48 hours after making.
,,	9	Ditto	Ditto	Placed in water 48 hours after making.
July 22	10	2 parts ¾ in. gauge slag 1 part ⅛ in. and dust slag 1 part coke breeze 1 part cement	— — 2 pieces dipped in linseed oil —	— — Remained in the open air. —
,,	11	Ditto	2 pieces dipped in turps	Ditto.

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Date when Block was made.	No. of Block.	Aggregate.	Steel.	Test to which the Blocks were subjected.
1908 July 22	12	1 part cement	2 pieces clean	In air and water for alternate weeks.
,,	13	Ditto	2 pieces dipped in cement grout	Kept in water after a 7 days' set.
,,	14	Ditto	2 pieces rusty	Ditto.
,,	15	Ditto	3 pieces rusty	Ditto.
,,	16	2 parts broken stone 2 parts ¾ in. slag 1 part sand 1 part cement	2 pieces clean — — —	— — Remained in the open air.
,,	17	Ditto	2 pieces clean	Ditto.
,,	18	Ditto	3 pieces rusty	Ditto.
,,	19	3 parts slag, 2 sand and 1 cement	2 pieces clean steel dipped in cement grout	In air and water for alternate weeks.
,,	20	Ditto	Ditto	Kept in water after a 7 days' set.

Block No. 1.—One piece of steel which was inserted in this block was rusty, it consisted of a short ¾-inch round bar. The block, after a forty-eight hours' test, remained in water until broken on October 13 (eleven weeks and five days). The author was surprised to find that this bar had improved considerably in appearance, and that where it was not actually pitted with oxidation, it had become quite bright, which was certainly not the case when placed within the block; he also found that the pitting had been considerably arrested.

The bright piece of steel which was inserted in this block was in precisely the same condition when taken out on October 13.

Block No. 2.—Two pieces of very badly corroded metal were inserted in this block; these consisted of ¾ inch and ⅝ inch round steel bars, and the block remained in air for twelve weeks. The author found that the steel had considerably improved, so much so that it was scarcely recognisable, most of the rust having disappeared.

Block No. 3.—This block was placed by the author upon the foreshore at Bridlington, but was so covered by the sand that it has not been found.

Block No. 4.—Three pieces of clean steel were inserted in this block, the latter being kept in water after a seven days' set, for eleven weeks. No rusting whatever occurred in these pieces of steel, notwithstanding the fact that the concrete was not particularly dense.

Block No. 5.—Three pieces of practically new steel (same as in No. 4 block) were here inserted, and the block remained in air for twelve weeks. The marks of corrosion which appear on the end of the round bar were there when the bar was inserted. The rusting, however, has considerably diminished, and it will be noticed upon close inspection of the bar that it is disappearing.

Block No. 6.—In this block three pieces of fairly clean steel, which had been previously dipped in linseed oil, were inserted. The block was placed in water seven days after making, and broken after it had remained in water for eleven weeks.

The author does not consider that this method of treating steel is a success, the coating of cement from the concrete being in his opinion a better preservative than oil. The slight marks of corrosion which occur on these bars were there when the steel was inserted.

Block No. 7.—Three pieces of clean steel previously dipped in turps were inserted in this block, the test being the same as in No. 6 block. The author's notes on this test are the same as in the previous case.

Block No. 8.—Placed on foreshore at Bridlington on July 29, 1908, found on November 24, 1908 (sixteen weeks and six days). *No corrosion.*

Block No. 9.—Three pieces of steel, slightly corroded, were inserted in this block, and the latter was placed in water after a forty-eight hours' set, and kept in water for eleven weeks and five days. In one of these pieces of steel new corrosion is visible; this, in the author's opinion, is accounted for by the fact that the piece of steel referred to was very near the surface of the block, and it will be also noted from the foregoing table that the aggregate in this block consists chiefly of small slag, which in the author's opinion is most unsuitable for concrete that is to be in contact with water.

Block No. 10.—In this block two pieces of fairly clean steel were inserted, which had been dipped in linseed oil; the rusting on these bars is very pronounced. This block remained in air for eleven weeks and five days after making; the concrete contained one part coke breeze, but was very dense and of excellent hardness.

The author feels convinced that the linseed oil coating accounted partly for the corrosion, preventing the cement from coming in contact with the steel, and he also considers that coke breeze is not a suitable material to use in concrete which has to come in contact with exposed air.

Block No. 11.—The aggregate was the same in this block, the steel being dipped in turps. The corrosion is very bad, and in the author's opinion is due to a large extent to the coating, as was the case with No. 10. This block was in air for eleven weeks and five days. The concrete was dense and good, although it contained one part of coke breeze.

Block No. 12.—In this block the aggregate was precisely the same as in Blocks 10 and 11, but the steel was clean and not coated in any way. The block was kept in air and water for alternate weeks for twelve weeks, and the steel was found to be in a perfect condition. The edges of the steel were filed before insertion, and were quite bright both before and after testing.

Block No. 13.—The aggregate in this block was the same as in the previous three, the steel bars were dipped in cement grout, and the blocks were kept in water after a seven days' set for eleven weeks. The steel was in an equally good condition when taken out as when inserted, in spite of the fact that the concrete contained one part of coke breeze.

Block No. 14.—Two pieces of rusty steel were inserted in this block, the aggregate being the same as in the previous four blocks. The block was placed in water after a seven days' set and kept in water for eleven weeks. The steel was not coated in any way, and it came out with the rust almost gone. The steel was quite wet when taken out, on account of the porous nature of the concrete.

Block No. 15.—This is practically the same test as in Block No. 14, three pieces of rusty steel were inserted in this case, and the same result obtained.

Block No. 16.—The aggregate in this case was more suitable, consisting of two parts broken stone, two parts ¾ inch slag, one part sand and one part cement. Two pieces of clean steel were inserted. The block was kept in air for twelve weeks. The steel was in perfect condition when taken out, there being no signs of rust.

Block No. 17.—Two pieces of clean steel were inserted in this block, the aggregate and tests being the same as in No. 16, the result also being the same.

Block No. 18.—Three pieces of rusty steel were inserted in this case, the aggregate and tests being the same as in Nos. 16 and 17. The steel was very badly corroded before insertion, but when taken out much of the rust had disappeared, which leaves no doubt in the author's mind as to the preserving properties of cement.

Block No. 19.—Two pieces of clean steel, previously dipped in cement grout, were inserted in this block, the aggregate being the same as in No. 20. The block, after a seven days' set, was kept for alternate weeks in water and air for eleven weeks. Slight indications of rusting occurred, which the author attributes to two causes:—(1) That the concrete was not sufficiently dense. In blocks Nos. 19 and 20 river sand was used, which in the author's opinion is not so suitable for dense concrete as crushed sand or sharp land sand. (2) That where the slight rusting occurred the cement grout appears to have been rubbed off, the bare metal being visible. This might occur in handling these bars if the grout had not properly dried on to the bar.

Block No. 20.—The aggregate in this case consisted of three parts slag, two of sand and one of cement. Two pieces of clean steel were inserted, each being previously dipped in cement grout. These blocks were placed in water after a seven days' set and kept in water for eleven weeks. The edges of the steel bars were filed bright before the bars were inserted. No corrosion occurred, the edges being just as bright when the steel was taken out of the blocks as when it was inserted.

Test No. 21.—This is a somewhat interesting test. A reinforced concrete lintel made by the Chain Concrete Syndicate, of Leeds, ten months ago, became broken in moving and had to be replaced. It has remained in the open yard of the above company ever since. It was broken for the author on October 13, 1908, and the two steel clips, which projected out of the concrete for about 2 inches, were taken out, and the author found that the rust occurred exactly on the line of the concrete face. The preservation of the portion of steel in the concrete was perfect, no rust whatever having occurred, although the lintel has been out in all states of the weather.

Notes in General.—No absolutely bright steel was used by

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the author in these experiments; what is called "new" steel refers to the dark mill colour, a sort of blue.

Again, the concrete used in these blocks was in no way specially prepared; in fact, in some cases it was rather carelessly done, with a purpose—namely, to make the test more severe.

Conclusions arrived at.—The results of the foregoing experiments have led the author to the following conclusions:—

1. That rusty steel embedded in concrete will in a very short time become bright, regardless of whether the concrete is in water or air. This point has, in the author's opinion, been conclusively proved by his experiments.

2. That the application of cement grout to steel is an effectual safeguard against corrosion, but that the greatest care should be taken in the grouting process to see that every portion of the steel is well coated, and that before the steel is embedded in the concrete the cement grout is allowed to become quite dry upon the steel.

3. That if the aggregate used for the concrete is not porous and the concrete is well mixed, the reinforcement being well embedded, no cement coating is needed. This is proved by test No. 21. (Seeing that the application of a coat of cement grout is such an inexpensive procedure, the author makes it a rule in carrying out work of this kind to have all reinforcement coated in this manner.)

4. That no porous materials, such as coke breeze or slag, should be used in connection with reinforced concrete work, if such concrete is intended to be under water or exposed to the air.

5. That linseed oil or turps, or probably any other coating except cement or lime, applied to steel before its insertion in concrete, facilitates rather than prevents the rusting of the metal.

6. That it is of great importance to see that the reinforcing steel is well embedded in the concrete, so that every portion of it is covered with cement.

7. That the best results were obtained when the aggregate consisted chiefly of broken stone or brickbats. Gravel would no doubt answer as well.

The author was surprised that such a good result was obtained with an aggregate composed of brickbats.

8. That river sand, generally speaking, is not satisfactory for reinforced concrete work where such work is required to be watertight.

The author ventures to think that the conclusions which he has arrived at are of great importance, and should ease the minds of those engineers who up to the present time have had considerable doubt regarding this matter; he also hopes that the attention of the Local Government Board will be drawn to these experiments and the conclusions arrived at, and that this will result in the period for repayment of loans for work of this class being considerably extended.

He would express his indebtedness to the Chain Concrete Syndicate, of Leeds, for allowing the tests to be carried out at their works, and more particularly to Mr. A. Mitchell, one of the partners in that firm, for the valuable assistance which he rendered to the author in the carrying out of these tests.

The PRESIDENT proposed a vote of thanks to the author of the paper. The subject of reinforced concrete, he said, was very much to the fore at the present time, and all who engaged in constructive work were interested in it. The attitude taken up by the Government departments, particularly the Local Government Board, and to which the paper referred, had to a certain extent hindered the use of reinforced concrete in carrying out public works for municipal undertakings, but in spite of that hindrance, which he ventured to think was well founded, the use of reinforced concrete was continually extending, and therefore it was highly important that they should have definite facts brought before them in regard to the behaviour of the materials of which it was composed. He thought they would all agree with Mr. Matthews that it was dangerous to use any but the finest materials for aggregates, and the President said he would hesitate about using slag or cinders, because they knew that those materials had a highly corrosive effect. The coating of bars before they were inserted into concrete had been alluded to in the paper, and the author suggested that such treatment might be a source of weakness. The point, he hoped, would be referred to in the discussion, because a coating of cement was a very efficient way of protecting steel from salt water.

Mr. C. F. MARSH said that the most interesting and instructive experiments mentioned in the paper were those carried out by the German engineers, because the beams were tested by loads to produce a stress equal almost to the elastic limit, and yet there were no signs of corrosion. He suggested that another interesting test which could be carried out under conditions similar to the other by Mr. Matthews would be to make a beam of reinforced concrete and subject it to loading until the first visible crack appeared, then to leave the beam under the load between high and low tide, so that the beam would be alternately wet and dry. The coating of steel with linseed oil would destroy cohesion and the practice was not a good one. The tests of Blocks 14 and 18 were very interesting in showing how rust disappeared from steel when it was embedded in properly made concrete. He had noticed the same thing himself that rust on steel did disappear, and in specifications he always permitted the steel to be rusty so long as there was no loose rust when the metal was embedded. There was no doubt that the main thing to preserve steel was to embed it in carefully and properly made concrete, put in in a proper manner and not too dry. In cases of rusting he thought they would find that the concrete when used had been too dry a mixture.

Mr. H. D. SEARLES-WOOD said it was a very good thing to collect together facts concerning concrete experiments, and in the concise form of the lecturer's paper his information formed a valuable reference. There was a great deal of doubt about rusting in the reinforcement of steelwork, and he thought it was probably due to the failure of expanded metal when it was used instead of laths for plaster ceilings. He presumed that the reason for failure in that case was because the metal was only partially covered, and he thought where expanded metal was used as reinforced concrete it might be liable under certain conditions to follow in the same way.

Mr. BERTRAM BLOUNT, F.I.C., said it seemed from the paper that engineers had begun to understand that the changes under different conditions of the materials which they had to use came under the purview of the chemist. Thus it was that chemical protection by alkaline treatment would suffice to arrest corrosion in crevices and gaps in properly constructed reinforced concrete. He agreed with the author that if an aggregate in itself was unduly porous there might be trouble, porous in the sense that it let liquid through and porous in the sense that it gets the cement away from the material, the core of steel, and consequently it followed, as had been proved in reinforced construction, that the concrete must be particularly good and particularly dense and thoroughly in contact with the metallic core used in the reinforcement. He believed that if those simple principles were observed and if the underlying fact was kept in view—i.e. that clean iron was not likely to suffer oxidation under an alkaline medium—all doubts as to reinforced construction would disappear.

Professor H. ADAMS regretted that the experiments quoted by the author were comparatively small in number, and more particularly that so short a time was allowed for the tests. Eleven weeks was almost a microscopical time for convincing results. He questioned, too, the accuracy of some of the chemical descriptions, more especially those accredited to Professor Newbury and Professor C. L. Norton. With regard to the painting of the bars with grout, the speaker said he always had held the opinion that the grout should not be allowed to dry too much before insertion. Iron chains were the most extravagant method of reinforcement, because the metal must necessarily double upon itself; straight bars were economical.

Mr. H. ELLIS HILL, M.I.C.E., assumed that ferro-concrete should be made more or less like other good concretes. With regard to the coating of the steel bars with cement wash, the practice was long established and well known to all engineers who had to do with shipbuilding.

Mr. E. P. WELLS observed that if the experiments carried out by Professor Norton had been for a period of three years different conclusions would have been arrived at. He was of opinion that cement grout should not be put in close contact with a metal to be used in reinforced construction. The speaker disapproved of the use of clinker and cinder in aggregates. He thought that if Mr. Matthews would continue his experiments for twelve months as an absolute minimum, and experiment largely with concrete and with different aggregates all made at the same time and of the same cement, that the results of his tests would be more positive. He quite agreed with the remarks about coating steel rods with turps or boiled oil. With regard to river sand, he had always found it perfectly satisfactory. Its quality depended upon where it came from, and when sharp and clean he had, he said, no hesitation at all in using it, for where the concrete was properly made he had never found percolation.

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Mr. D. B. BUTLER said it seemed to him that, after all, if concrete was well made and not too porous, the reinforcement would be found perfectly good after any length of time. He endorsed, however, Mr. Wells's opinion that eleven weeks was a very short period in which to test materials for reliable data. With regard to the use of coke breeze, slag or coal residue, as it was called in Germany, he believed the Government of that country had forbidden its use in the making of aggregates, for extensive tests of the material had proved it to be unsatisfactory with concrete. The speaker agreed with others that a cement grout coating to a beam, when allowed to dry, prevented cohesion between metal and cement. The better way was to insert the beam in a wet state into the concrete or see that the concrete was thoroughly in contact with the reinforcement. In a case of failure of concrete piles which came under his notice he found that the piles had splintered and split, and on examination it was seen that not more than 20 per cent. of the area of reinforcement was in contact with the concrete, and therefore the whole object of the reinforcement was nullified and hence the failure. Of course, the coating of reinforced beams with oil and turps was several degrees worse than coating with cement grouting.

Mr. MATT. GARBUTT thought the tests undertaken by the author were interesting and useful, but as their buildings must necessarily last out the building lease, they ought to endeavour to ascertain what would happen to reinforced construction after a long term of years. It appeared to him that the element of time and the amount of cover protecting the metal were extremely important factors. The periods of the tests were unfortunately short, nor had the author indicated how much cover his material received. There were, of course, instances known to them where reinforced material had withstood the test of years—the chain in the dome of St. Paul's was a familiar example—but the metal in that instance was embedded some feet. The metal in the sea wall to which the author had referred was also probably deeply embedded. He thought it would be well to ascertain how reinforced metal thinly covered was affected. He had had an opportunity of examining some embedded iron rods which had served on the edge of a swimming-bath for twenty years. The concrete was of very good quality, and some of the rods on extraction were found to be quite without rust; other rods showed distinct rust, due to cracks in the reinforcement, though the apertures were so fine that they could not be detected so long as the rods were not subjected to tensile stress. The question of small cracks under tension was interesting, and though many contended it was not important, it seemed to him that however fine the crack, given sufficient time the reinforced metal would rust.

Mr. R. W. VAWDREY quoted from a paper of the International Navigation Congress held in Russia, in which the permanence of reinforced concrete was fully discussed. At that Congress Mr. W. B. Douglas reported that in the construction of the first Eddystone Lighthouse, which he took down in 1884, a bundle of rods accidentally left in the concrete was found. They were in perfect condition, the lime concrete having withstood exposure to the action of sea water during 150 years or thereabouts. Mr. Colson, another witness at the Congress, had mentioned the instance of a wall about 200 years old, in demolishing which nails in perfectly good condition were found. In both cases the depth of covering would be considerable, which differentiated the two cases from those of a covering of an inch or so. It appeared to be generally agreed by the engineers at the Congress that cement concrete in sea water was liable to serious deterioration, but by the addition of a material such as trass or other volcanic substances that deterioration would be stopped.

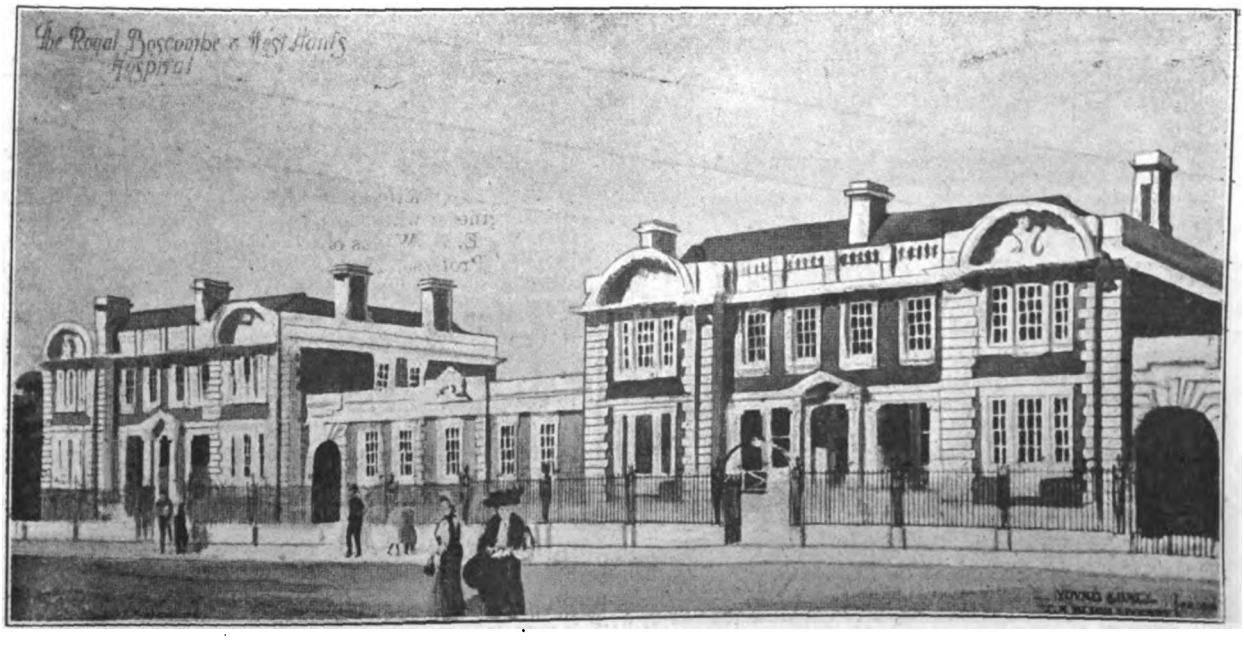
Mr. B. J. BELCHER suggested that "new" steel should be allowed to rust in order to remove the mill "blue," the rust afterwards being cleaned off by wire brushing.

Messrs. T. J. FENWICK, F. J. BACON, A. B. JOSCELYNE, A. S. E. ACKERMANN and Dr. J. S. OWENS supported the vote of thanks to the lecturer, who briefly replied. He contended that in tests extending to eleven weeks some signs of rusting would have occurred; the results, therefore, of his experiments were sufficient to enable them to come to definite conclusions.

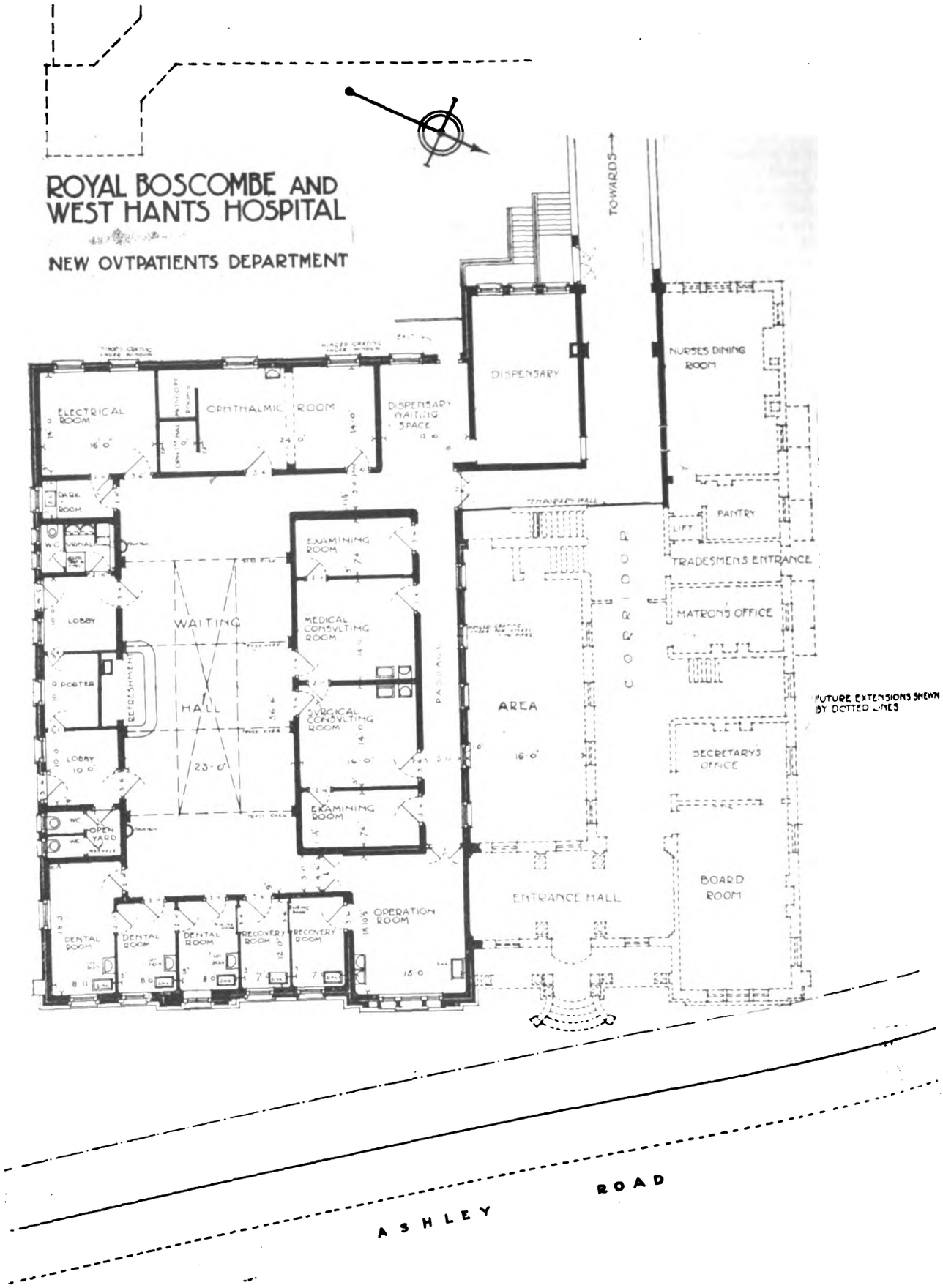
THE ROYAL BOSCOMBE AND WEST HANTS HOSPITAL.

THE building, which was opened by H.R.H. Princess Alexander of Teck on April 3, comprises the whole of a new out-patient department and is part of a larger scheme which, when completed, will contain the hospital administrative offices and accommodation for resident medical officers and nursing staff.

The out-patient department is entirely on the ground floor, and is entered from a side road leading out of the Ashley Road. Two separate entrances are provided, one for male and the other for female out-patients, and between the two is the porter's lodge. The entrance door in each case gives access into a square lobby, and from thence the patients pass into a large waiting hall, 56 feet long by 23 feet wide. Leading out of each of the entrance lobbies are lavatory arrangements for patients. Consulting-rooms are arranged on three sides of the hall; on the north the medical and surgical consulting-rooms, each with its own examining-room, will be found. On the east is the minor operation-room, with two recovery-rooms, and the dental department, which consists of three rooms. On the west is the electrical department and the ophthalmic consulting-room, with two dark-rooms. From the consulting-rooms the patients pass by a separate passage to a small waiting-room adjoining the dispensary, where they are served with their medicine, and from here they pass out to a path returning to the street. The patients thus follow a definite course, and do not retrace their footsteps or cross other patients at any point. On the



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south side of the hall is a refreshment-bar. The out-patient department is connected by a light and airy main corridor with the ward blocks.

The building which yet remains to complete the block will contain the main entrance to the hospital, board-room, secretary's office, matron's office, tradesmen's entrance, pantry, nurses' dining-room—all on the ground floor. On the upper floor the rooms for the resident medical officers, the servants' hall, pantry and kitchen will be found. The buildings as illustrated show the out-patient department in the centre, with the future administration block and the nurses' home on either side, forming a well-balanced façade to the Ashley Road. The architectural style adopted is a somewhat free treatment of the Georgian, adapted to modern requirements, and is carried out in red facing rubbed brick and Portland stone. Generally, the walls are faced with Bridgwater brick, and finished internally with Keene's cement and Hall's sanitary paint over a dado of green glazed brick with white glazed fillings. All angles are rounded, and the fireproof floors are finished with marble terrazzo throughout. The sanitary appliances and fittings are of the most modern and up-to-date pattern and design, supplied by Messrs. Dent & Hellyer, London. The contractors for the building are Messrs. Miller & Son, of Bournemouth. The fireproof floors were laid by Messrs. Mark Fawcett & Co., Messrs. Diespeker were responsible for the marble mosaic, and the hot-water engineering has been carried out by Messrs. Henry Hope & Son, of Birmingham, while the electric lighting and power installation is by Messrs. Henry Fellowes & Co., of Westbourne, Bournemouth. The new buildings have been designed and carried out under the superintendence of Messrs. Young & Hall, F.R.I.B.A., of London, and Mr. G. A. Bligh Livesay, F.R.I.B.A., of Bournemouth, joint architects.

THE SOCIETY OF ORDAINED SURVEYORS

THE Council of the above Society, at the annual meeting on Monday in the rooms, 117 George Street, Edinburgh, submitted its tenth annual report on the work of the past session.

The adjustments of the draft modes of measurement for minor trades have been completed by the sub-committee, and will be submitted to the members for approval at an early special general meeting.

The Council would strongly impress upon members the necessity of complying with the regulations relating to the completion and registration of indentures.

The treasurer's balance-sheet for the year shows the funds of the Society at the close of the financial year amounted to 504*l.* 13*s.* 5*d.*

The General Examining Board met on four occasions during the past session.

Preliminary Examination.—There were as usual two diets of examination held during the year, in April and October. Seven candidates in all were examined, of whom two were for re-examination. Of the seven examined, one passed in one subject and is through the examination, two passed in three subjects and are through the examination, two passed in one subject and failed in two subjects, and two failed in two subjects.

Final Examination.—Two diets of examination were held during the session. Two candidates came forward at the April diet, one for examination and one for re-examination in the first division. The former succeeded in passing. There were no candidates in the second division. At the October diet one candidate came forward for examination in the second division, but was not successful.

Diets of Examination.—In accordance with the rules of the Society the diets for examinations are fixed by the Board. Hitherto two diets have been held in each year for each examination—namely, in April and October. The Board are of opinion that one diet of examination, to be held in April yearly, would in future be sufficient, but before making a change in this direction they would prefer to have an expression of opinion from the members of the Society at the annual meeting.

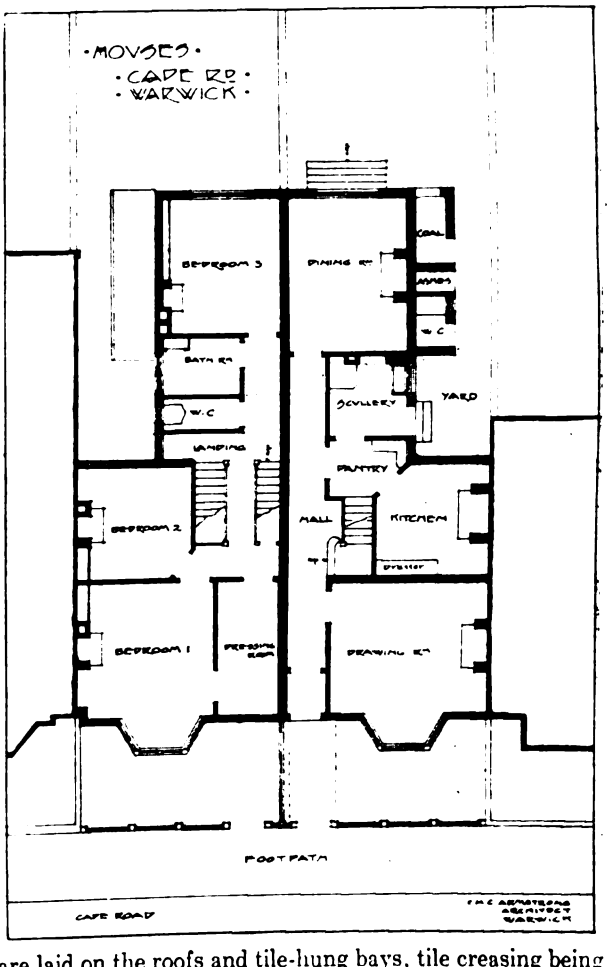
Indentures.—During the year four indentures and two discharges of indentures were registered.

Professor Henry Adams, M.I.C.E., will read a paper on the 14th inst. on "Stresses and Strains in Girder Work," illustrated by indiarubber model and lantern slides, before the Association of Engineers-in-Charge at St. Bride's Institute, E.C.

HOUSES, CAPE ROAD, WARWICK.

THESE two houses have recently been erected in the Cape Road at Warwick, filling an open site between existing buildings, each house having a frontage of 20 feet. Sand-faced 2¼ inch bricks with a wide joint are used on the front elevations and chimney-stacks. Brindled tiles





are laid on the roofs and tile-hung bays, tile creasing being introduced on the stacks and party wall, the latter having a brick on edge coping. The windows are casements with wide wooden bars, and the whole of the woodwork is

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painted white, with the exception of the doors, which are dark green. Each house has two good attic bedrooms in the front roof, and cellaring is provided under the kitchens. The front hall and passage is paved with small red tiles, the scullery and pantry being blue-brick paved. The range and grates were supplied by Messrs. JOHN WARD & CROFT, of Birmingham. Electric bells and town gas are installed throughout. The front fencing and gates are carried out in oak to special details on a brick base. The gardens run back 40 feet, the drainage being taken into a main sewer in the road here. Mr. C. M. C. ARMSTRONG, of Warwick, was the architect, Messrs. T. BAILEY & Co., of Clarendon Avenue, Leamington, carrying out the work under his supervision.

Correspondence

[The Editor will not be responsible for the opinions expressed by Correspondents.]

The Beauty of Bath.

SIR,—In support of the preservation of architectural remains of interest, the late Mr. Street, R.A., whose opinion on such matters was always respected, said in his address (1881) before the Royal Institute of Architects:—"I hope we are all agreed that there is no work in which we can do better service to our art than by sturdily opposing all schemes for the destruction of existing works of architectural art or constructions of historical interest."

A writer in the *Contemporary Review*, July 1884, says:—"The beauty that has been thought beautiful for 200 years is worth examining, for in matters of art time is the final judge. Fashions come and go; to have outlived many fashions, yet always to have been thought admirable, is the highest distinction human nature can obtain." Surely Bath and its architectural beauty belongs not only to England, but to the travelled stranger who visits it from afar and sees in the graceful buildings a beauty that has escaped our own countrymen. It is the duty of citizens to guard the rich possessions they inherit. Other cities, as Stratford-on-Avon, Chester, Norwich, have their own special features, and certainly Bath can be included in the list. The recent meeting on March 27 and the opinions of cultured experts on the preservation of the buildings in Bath Street should act as a deterrent to further destruction. Is it too late to protest?

Public opinion will be against such contemplated spoliation, and I am glad a society has been formed, with the Rector of Bath as President, to ensure proper oversight of this beautiful city.—Yours, &c.,

London: March 31, 1909. S. W. KERSHAW.

Ingress Hall, Kent.

SIR,—Could you or any of your readers kindly inform me whom Alderman Harmer employed as architect to design Ingress Hall, sometimes erroneously called "Ir gress Abbey" (as it never was one), near Greenhithe, in Kent? It was erected in 1833 by Alderman James Harmer from the stones of old London Bridge, and its appearance from the River Thames is very picturesque. It almost looks like the work of Welby Pugin, but perhaps some of your readers can tell me. I heard lately that it was going to be turned into a manufactory, but I hope this is not so.—Yours very truly,

W. F. POTTER.

18 York Grove, Queen's Road, S.E.

GENERAL.

A Figure of Aristotle, by Mr. G. Walker, sculptor, has recently been placed in the niche prepared for it outside the south wall of the Gladstone Memorial Library, Hawarden. It is the gift of the Dean of Lincoln and Mrs. Wickham. The four niches outside St. Deiniol's are intended for the figures of those four great men who were regarded by Mr. Gladstone as his chief masters, viz., Aristotle, St. Augustine, Dante and Bishop Butler. Three are now in position, all of them the work of Mr. Walker. It only remains for that of Bishop Butler to be given to complete the set.

At a Meeting of the general committee of the Liverpool Cathedral held on Monday it was announced that Miss Langton and Mrs. H. B. Gilmour are jointly contributing a sum of money sufficient to provide marble flooring for the Lady chapel. The floor will be laid in squares of green and white marble.

Sir Aston Webb, R.A., has been instructed by the Governors of the Imperial College of Science and Technology to prepare the necessary plans and to obtain tenders for the new building for mining, metallurgy and geology to be erected in Prince Consort Road, and also to prepare plans for the extension of the engineering departments of the City and Guilds of London College in Exhibition Road and Prince Consort Road. The erection of the new mining building is expected to begin almost at once, and steps are being taken in connection with the foundation-stone ceremonial.

The Winchester Town Council have accepted an offer from the Dean and Chapter of Winchester Cathedral to present to the city a stone screen designed and erected in the reign of Charles I. at the entrance to the choir of the cathedral by Inigo Jones. This screen was removed in 1820 to make way for a stone Gothic screen. Inigo Jones's work was stored in the triforium of the south transept, from which it was recently removed owing to its great weight, which added danger to that part of the building. The Council will shortly proceed to consider its re-erection on public property.

The Trustees of the Victoria Memorial, Calcutta, have referred the question of the erection of the hall to a local committee comprising seven citizens of Calcutta, with Mr. Graham, Chairman of the Calcutta Chamber of Commerce, as President. All papers, including the opinions lately expressed by Sir William Emerson, will be placed at the disposal of the committee, who will be asked to pronounce a final verdict.

Provision has been made in the current year's estimates which will enable the directors and trustees of the National Portrait Gallery to open that institution on Sundays throughout the year, as is now done in the case of the National and Tate Galleries.

The Upper Norwood Athenæum will hold its next meeting on April 17 at the Roman Bath, in the Strand, W.C.; a visit will also be paid to the Savoy Chapel, to the R.C. Sardinian Chapel, and the church of St. Clement Danes. A tea will afterwards take place at Anderton's Hotel, Fleet Street, after which a paper will be read on the places visited by Mr. Jonathan Downes, its former hon. secretary. Among the ancient monarchs who are supposed to have visited St. Clement Danes are King Canute and his two sons and successors.

The York City Council on Monday agreed to make application for a loan of 25,000*l.* for the purchase of property necessary for the formation and completion of the new streets from the Pavement to Piccadilly.

The Local Government Board, having considered the report of their inspector on the recent inquiry held by him as to the proposal of the Paddington Borough Council to sell the Queen's Road baths to Messrs. Whiteley, Ltd., for 60,000*l.* and erect baths elsewhere with the proceeds, decline to sanction the arrangement. While the Board do not oppose the sale of the property, they are not satisfied that 60,000*l.* is the highest price that can be obtained, and they suggest a revaluation by a valuer to be named by them.

The First Commissioner of Works was asked on Monday in the House of Commons whether it was his intention to consider schemes for the improvement of the Horse Guards Parade and its surroundings; and, if so, whether the work would be commenced during next autumn. Mr. Harcourt, M.P., in reply, said none of the schemes which have been submitted to him for the so-called improvement of the Horse Guards Parade have commended themselves to him, so therefore he is not proposing to commence any work there during the autumn.

The Finance Committee of the Manchester Corporation state that they raise no objection to the proposed application for borrowing powers for a loan of 20,000*l.* for baths to be erected at Withington. The site is in Burton Road, opposite the Waterloo Hotel. The land surrounding the site is vacant, and it is intended to lay out a new street on the north side. A short flight of steps leads up to the men's second-class swimming-bath, which is 75 feet by 21 feet and has sixty dressing-boxes; and the men's first-class swimming-bath, which is 75 feet by 25 feet and has forty-six dressing-boxes. The women's swimming-bath is 75 feet by 21 feet.

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SCULPTURED PANELS BY DONATELLO.

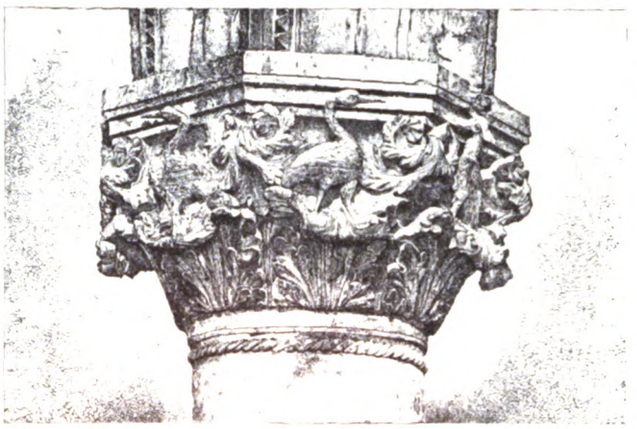
THE WEEK.

We have been favoured with a copy of the correspondence between Mr. F. W. Speaight and the Right Hon. Lewis Harcourt, M.P., His Majesty's First Commissioner of Works, with reference to the former's suggestion for the improvement of the Horse Guards Parade and the alteration of St. James's Park. The essence of the correspondence is that the First Commissioner has "no intention of doing anything to destroy the historic associations or the present beauties of one of the most charming of the London parks," and that as he believes Mr. Speaight's scheme of alterations would have this effect, he is "unable to promise them any favourable consideration." We quite agree with the First Commissioner's opinion, whilst we recognise that Mr. Speaight's proposal would give us an example of park planning in the grand manner of which we have too few examples in England. Mr. Harcourt has had, therefore, to choose between the maintenance of "one of the most charming of London parks" of a particularly English type, and a piece of formal vista planning, excellent of its kind, but of more Continental fashion. It is purely a matter of personal taste as to whether the informal laying out of St. James's Park, as it at present exists, or the formal arrangement proposed by Mr. Speaight is preferable; neither, on any ground, is better, and the First Commissioner is, in our opinion, quite justified in maintaining the *status quo*, and will have the approval of very many Londoners in so doing.

Although we are quite in accord with the protest of the Manchester Society of Architects, recorded in the letter we publish in our correspondence column, this does not prevent us from congratulating Mr. Whitmore, the county architect for Essex, on the failure of the attempt to deprive him of the privilege he has hitherto enjoyed of acting as architect for new county schools on "payment of commission or honorarium therefor." There is all the difference in the world between the position of a county architect or surveyor of the old *régime*, who was generally a professional man in private practice retained at an annual fee for certain regular routine work of inspection, and the more modern type of salaried official, with office and assistants provided and paid for by the County Council or other public authority. The former was remunerated for particular services as architect by a commission or honorarium, this being virtually an agreed fee for specified work. The latter gets his salary, whether his work be large or small. When there is an increase of work, there is an increase of staff which does not always diminish when the urgent need for their services ceases. Added to this is the well-known fact to those who are acquainted with the realities of officialdom, that amongst salaried professional employés, as amongst artisans, less work, and considerably less, is done by those paid by time than by those paid by the piece. We are certain, from an intimate knowledge of the ways of public servants, that the main point put forward by the Manchester Society of Architects is absolutely true, that the ratepayers spend far more for professional services by salaried officials than they would do for those by architects, engineers, or surveyors in private and independent practice. The salary list is not the only cost, as is usually assumed by defenders of the official system. Rent, stationery and office expenses of every kind ought to be, but generally are not, included, and, above all, it is ignored that any given building will nearly always cost more to erect if designed and superintended by salaried officials rather than by private practitioners.

Architects do not always realise their responsibility for the carrying out of the drawings and specifications prepared by them and forming the basis of the contract between their clients and the builders. Messrs. Gough, Trollope & Co. have recently had an unpleasant experience which they have faced in a highly creditable and honourable manner. They were the architects, selected in open competition a few years ago, for a new workhouse infirmary at Leicester, which was erected under their superintendence at a cost of about 120,000*l*. Recently dry rot or other fungoid growths appeared in the ground floor, and Mr. Alderman Sawday, a local architect, being called in to investigate the cause, reported that he found that 5,000 wooden stakes had been placed in the concrete under the floors, and that the fungoid growths proceeded from these. It is quite clear what had happened; the stakes were used by the concretors for working the levels of the concrete and left in. The architects might have thrown the blame on the clerk of works or builders' foreman, but they, wisely perhaps in the present view that lawyers take of an architect's duties, accepted the responsibility and have undertaken to bear the cost, between 1,000*l*. and 1,500*l*., of remedying the mischief. Morally we do not see that the architects were in fault, but moral responsibility and legal responsibility are not always the same thing.

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A CAPITAL FROM THE DOGE'S PALACE, VENICE.

SUNDIALS.

A HUNDRED and fifty years ago a knowledge of the methods and calculations for determining the form and details of sundials was a part of the liberal education of every gentleman—or, at least, of every architect, for whom "dialing," as it was termed, was an important part of his professional equipment; and even at the beginning of the nineteenth century dialing was considered a most necessary art, as the liability of clocks and watches to get out of order, go wrong, and stop was held to render essential the provision of some invariable instrument, as a dial. In these days of Waterbury, Ingersoll, and synchronised clocks every schoolboy has a watch, and we do not often need dials for the correction of our timepieces; but an accurate sundial still has its value for a country house some miles from a railway station, and at least forms an excellent feature or opportunity for detail in the architecture of garden or house. It is well, therefore, that architects to-day should know something about dialing.

Although sundials may be made in spherical or hemispherical form, or indeed in any form, the most usual arrangement is that of a plane, either horizontal or vertical, on which shadows are thrown by a wire or rod or by the upper edge of another plane erected perpendicularly upon the former. The horizontal or vertical plane is necessarily parallel to a plane passing through some great circle of the earth, and the shadow-casting edge must be placed parallel to the earth's axis. In the ancient parlance of dialing, the shadow-casting plane is called the "gnomon," its upper edge the "stile of the dial," and the line on which it is erected the "substile." The angle included between the stile and substile is the "elevation" or "height of the stile," and, the stile being parallel to the earth's axis, its elevation is regulated by the latitude of the spot for which the dial is intended. This is the fundamental principle that the dialist must always bear in mind. It is useless, therefore, for our client to pick up an old sundial in a curiosity shop and set it up in his garden in the expectation that it will tell the time when the sun shines. If the dial was originally calculated for the latitude in which it is to be re-erected it may, properly fixed, be all right; if it was not, it will be all wrong.

Our client's antique dial may be correct as regards latitude but still inaccurate, because it is not fixed as it was originally. Usually dials are fixed with their planes either parallel or perpendicular to the plane of the horizon—in other words, horizontal or vertical; but they were not always so, and were then called "inclining" or "reclining" dials, according as their planes made acute or obtuse angles with the horizon. Again, in the case of vertical dials, it is easiest to make them face directly north or south, and often in old examples we find the dial not parallel to the wall on which it is fixed, but projecting from it at one side, so that it might directly face north or south, although its support did not. The ancient expert dialist would scorn such a clumsy evasion of difficulty and make his calculations for a "declining" dial—that is, one with its plane turned away from the north or south. It is evident that we may have combinations of these variations from the normal, and our antique may have been a "declining-inclining" or a "declining-reclining" dial.

There is one more point of importance with regard to the accuracy or otherwise of an old sundial. One often sees people looking at such an ancient work, and checking its record by a watch carefully set to Greenwich time. Finding the two do not agree, they jeer at the apparent incorrectness of the sundial, forgetting that a sundial gives "solar time," which is sometimes a *little* before and sometimes a little after clock time, the variation being still noted in some of our calendars, which inform us "sun before clock—so much." The sundial's time will also not agree with Greenwich time unless the position of the dial is on the longitude or meridian of Greenwich, but will be local solar time.

One should be careful, therefore, in purchasing an old dial with the idea of re-erecting it, to see that it is marked, as some were, with the latitude and longitude of the place for which it was calculated. If these correspond with those of the spot at which it is to be re-used,

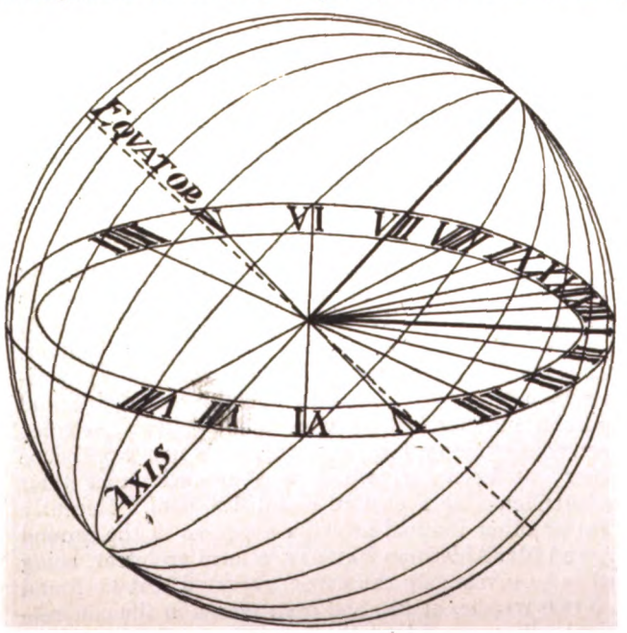


Fig. 1

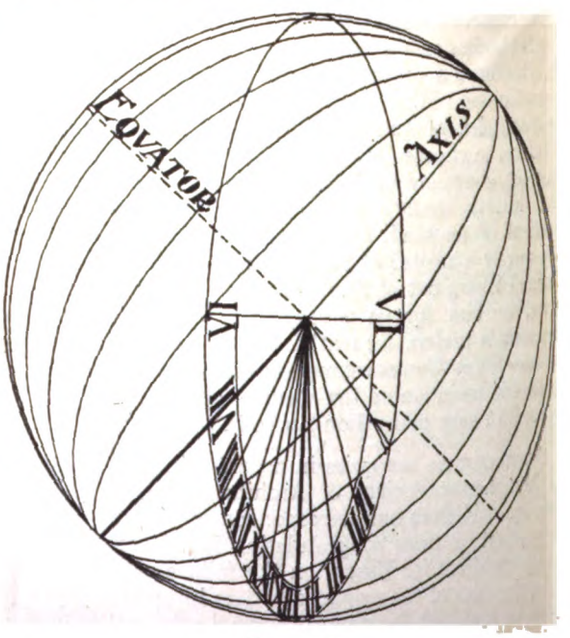


Fig. 2.

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all well and good, but if not it is hardly worth while trying to alter it, and it had better be put inside our client's house as a curiosity. If the latitude is right but not the longitude, the old dial can still be used with correction for the variation in longitude as well as for the difference of solar and clock time. Knowing the latitude, one can easily determine if the dial is inclining or declining, for the angle that the stile of the gnomon makes with the horizon is the same as the number of degrees of latitude for which the dial is calculated. Thus, the latitude of London being 51½ degrees north, a sundial for London would have the stile of its gnomon 51½ degrees above the horizontal plane; and if we found the angle in our antique dial corresponding to the degrees of latitude, we should know that it was a horizontal dial; if it were equal to 90 degrees less the degrees of latitude—that is, the complement of the horizontal angle—we should recognise our dial as an erect or vertical dial. If the angle does not thus correspond, the dial would be inclining or reclining according to circumstances.

Starting from the fact that the shadow-casting edge or stile of the gnomon is parallel to the earth's axis and its angle with the horizontal plane equal to the degrees of latitude, we next proceed to consider how the "hour-lines," or lines along which the gnomon casts its shadow at the different hours of the day, are to be determined.

Three methods were used by the old dialists for this purpose—by the use of a globe, by graphic calculation, and by mathematical calculation. Of these the use of a globe is easiest, mathematical calculation the most accurate, and graphic calculation the most used, for it does not require the possession of a suitable globe and is easier than the mathematical method.

An ordinary terrestrial globe may be used for dialing, but the old dialists seem to have more often employed a special dialing globe, made with twenty-four brass semicircles of plate or wire joined at the poles and having a thin plate of brass within, as shown in figs. 1 and 2, fig. 1 being for horizontal dials and fig. 2 for vertical. The principle, however, is the same whichever form of globe is used. For example, let us suppose that we are going to use an ordinary terrestrial globe with twenty-four meridian semicircles upon it, then, if the globe is elevated to the latitude of the place for which our dial is intended and turned till one of these meridians cuts the horizontal in the north point, where the hour of XII. is supposed to be marked, then the rest of the meridians will cut the horizon at the respective distances of all the other hours from XII. If, as sometimes is the case, to give ample clearance the horizon ring is at some distance from the surface of our globe, it is advisable, in order to minimise inaccuracy, to lay on the horizon a cardboard ring, cut as close as possible, on which to mark the points at which the meridians cut the horizontal line. This method also has another advantage. Having marked our points for the hours on the cardboard ring, we can lift it off, lay it on a sheet of drawing paper, draw lines from the points to the centre of the circle, and we have the hour lines of a horizontal dial for the latitude with which we started. Our work as dialist is now completed. We have settled the angle of our gnomon, and the angles the hour lines make with the substile, and we can now give play to our powers of design. We can make the plane of our dial any size or shape we please—circular, square, octagonal, or any other that we fancy—simply drawing our hour lines to its edge from the centre. We can make the gnomon any shape we please, provided we keep the stile absolutely straight and do not project beyond it.

We assumed that our globe had twenty-four meridian semicircles marked upon it. If it has any other number we must modify our working to bring the meridian lines we use 15 degrees apart, for the sun moves 15 degrees every hour (or rather the earth does so in its revolution).

In cutting our cardboard ring we must arrange for keeping it clear of the brass meridian that supports the globe, either by making our ring in two pieces or cutting notches out of it.

We can use our globe to find, in a similar manner, the hour lines for a vertical dial, but in this case the angle of our gnomon or the elevation of our globe is the complement of that for a horizontal dial.

Up to the present we have only dealt with direct north and south dials; our horizontal dial must therefore be fixed with the substile north and south, and our vertical with its plane facing directly north or south. In placing our dials in position we must not forget that the true north varies from the magnetic north. The amount of variation is given in nautical and some other almanacs and changes year by year.

(To be continued.)

STEELWORK.—IX.

By C. V. Childs, A.M.I.C.E.

THE architect of a building has the choice of various methods, any of which he may employ in dealing with the design for the steelwork. For example, (1) the design may be prepared in his own office; (2) he may employ a consulting engineer; (3) he may place the work unreservedly in the hands of a steelwork contractor; (4) he may ask various steelwork contractors to prepare designs and submit prices in competition. There is still another method, but the less said about it the better, viz. to make use of one steelwork contractor's design to obtain estimates from their competitors.

Dealing with these methods separately, (1) and (2) are the only proper courses to be adopted as far as the architect's clients' interests are concerned. Some architects are quite competent to prepare their own steelwork design; at the same time, in these days, professional men have been obliged to become more and more specialists. An imperfect knowledge is a dangerous thing in steelwork as in all things else; the designer requires to know not only the theory of stresses and strains, &c., but the practical knowledge as well in regard to the methods of general practice at the rolling-mills and at the constructional works; in the latter case, not only in regard to the workshop practice, but also that of the estimating department and the drawing office; in fact, the whole procedure that takes place from the time the material is ordered until it is erected in position, not to mention the adjustment of the variations and alterations that affect the final settlement of the account.

In regard to the second method, the consulting engineer would naturally wish to have considerably more to say were it not for the restraining influences of etiquette and modesty. Now that the steelwork is the all-important part of the structural stability of important buildings, the engineer should have as recognised a status as, for instance, the quantity surveyor, whose profession is also supplementary to that of the architect. Unfortunately the engineer cannot afford to do his work feeless; the delicate problem is how his fees are to be provided. It would be altogether in the interest of the architect's clients if recognition of the engineer's services were properly acknowledged and provision made in the quantities, as in the case of the quantity surveyor.

It is just as expensive for an owner to erect a building requiring thousands of pounds of steelwork without this having been properly designed as for him to erect a building of similar cost without employing an architect. Even contractors, whether for the steelwork or the building itself, have their faults common to humanity where self-interest is concerned. The only other source from which the engineer can look for payment is out of the fees of the architect himself; this seems to be putting a premium on preventing the architect doing his utmost in the interests of his clients. There is yet another aspect of the case—the engineer would wish to avoid cutting the ground from under the quantity surveyor; but until his own position is a recognised one the fees for the quantities are a temptation, if only for the sake of reducing the amount, the only source of payment for which is from the architect's own fees.

From the writer's own experience the time and labour employed in preparing the steelwork plans is fully twice, or even three times, that of taking out the quantities.

A consideration of the other two methods demonstrates the advantages of the services of an independent engineer.

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To leave the design entirely in the hands of the contractor is the better method of the two; the design is certainly not likely to err on the side of weakness if the price is arranged on a tonnage basis or on a schedule of prices per ton for the different classes of work. On the other hand, an all-round lump sum price is a dangerous temptation to reduce the strength of the steelwork, even though accompanied by a set of plans, which may often leave a great deal to the imagination. There are tricks in steelwork, as in other trades; for instance, "7"—R.S.J." on the plans may mean either the British standard 7 inch by 4 inch joist or the foreign section 7 inch by 2¼ inch. Again, sizes of girders may mean anything unless it is stated of what sections they are composed; the same also applies to the stanchions; so that it is possible to prepare plans which, as far as information is concerned, are worthless, and are incapable either of being checked or of the tonnage being estimated therefrom.

There still remains the other method to be considered, viz. that of asking various steel contractors for not only competitive prices, but competitive designs as well. Without considering the large amount of work and expense to which the various firms are put in preparing so many designs, this system has serious faults, and penalises those firms who are the most conscientious in preparing their designs. To make an accurate comparison between a number of competitive designs entails as much or even more work to an independent engineer as preparing a complete set of steelwork plans. It must be remembered that it is the plans rather than the prices that are competitive in such cases. The firm whose designer is willing to take the greater risks, thereby reducing the strength of the steelwork to almost the danger point, has the greater advantage over his more scrupulous competitor. Also, not only the sizes of the members may be affected, but the details of construction; the weakness of the steelwork is liable to be due quite as frequently to the latter cause as to the former. Even a stringent specification to form the basis on which the designs are to be made does not overcome the difficulty; rejections of material cannot be made without seriously interfering with the progress of the building.

The chief duty of an engineer in preparing the design is to provide all the information that the steel contractor would require to enable him to make the detail drawings. This can usually be accomplished by means of the eighth-scale drawings, showing the plan of the steelwork at each floor, the schedule giving the sizes of the stanchions, as well as the bases and grillages and the specification, which should be sufficient to guide the draughtsman in making the detail drawings. It is unnecessary for the designer to supply elaborate detail drawings; these are only required in the case of special construction, such as roof trusses, lattice girders, &c. Many a contractor's draughtsman would bear out the writer in the statement that the more elaborate the details supplied to the contractor are, the less the really important information appears to be given. The designer's energies seem to be expended on the details, to the detriment of more important essentials.

In any case, the contractor has to prepare the shop drawings in accordance with the draughting office routine and with his own shop practice, to which his workmen are accustomed. The contractors should be allowed some little latitude in this respect, as all works are not equipped in exactly the same way, and different firms may use slightly different and equally good methods in matters of minor importance. This should not be taken to mean that the contractor is to have an entirely free hand in the matter of the details; by no manner of means. The contractor should be made to supply to the engineer a photo copy of the working drawings, exactly the same in form as those supplied to his workmen, and no work should be put into the hands of the plater until these details are approved; this really causes no delay. At this stage the material is usually on order from the mills, or, if taken from stock, the material can be got out ready for it to be marked out by the plater. The advantages of this system are that the engineer is checking the actual working drawings and that these can be passed on to the architect, who finds them exceedingly useful in preparing his own large-scale details of the decorations. The engineer can usually signify his approval or otherwise to the contractor by return of post; all he is concerned about is that the details are made in accordance with the specification, that the brackets, &c., are amply strong, and that the work is constructionally sound. For the lengths and the proper fitting together of the work the contractor is responsible; any defect in this respect is at once apparent when the steelwork is erected, and must be made good by the contractor.

The set of the contractor's working drawings are in this case always available for the use of the architect, the engineer or the clerk of the works in regard to any questions that may arise concerning the steelwork.

It is important that the designer should avoid the use of special sections and adhere to those that are usually stocked or can be quickly procured from the rolling-mills, not only in regard to joists, but also to plates and angles. These three shapes are practically all that are necessary in the design of steelwork for buildings. Channels are convenient sections in special cases, but should not be used extensively; in fact, their use can in general be avoided for main members and confined to matters of detail. The drawback to special sections is that not only are they not kept in stock, but delay is caused by having to wait for the rolls to be put in, and this occurs only between long intervals; whereas with stock sections, even if the stock of these runs out, the demand for them necessitates that they appear more frequently on the rolling programme of the mills. The contractor should not be allowed the opportunity of giving as an excuse for delay in delivering the material that he is unable to obtain the sections from the rolling-mills; even with stock sections this is a favourite excuse on his part, though there may be no cause for it; it is human nature, even amongst schoolboys, to put the blame on someone else. This excuse in some cases may be put forward for ulterior objects which may not be beneficial to the design.

Forgings and all blacksmith's work should also be avoided as much as possible, as this class of work is expensive and the fruitful cause of delay in getting out the work; moreover, the steel is to a certain extent injured in the process unless there are facilities for afterwards annealing it.

(To be continued.)

EARLY ENGLISH PORTRAITS.

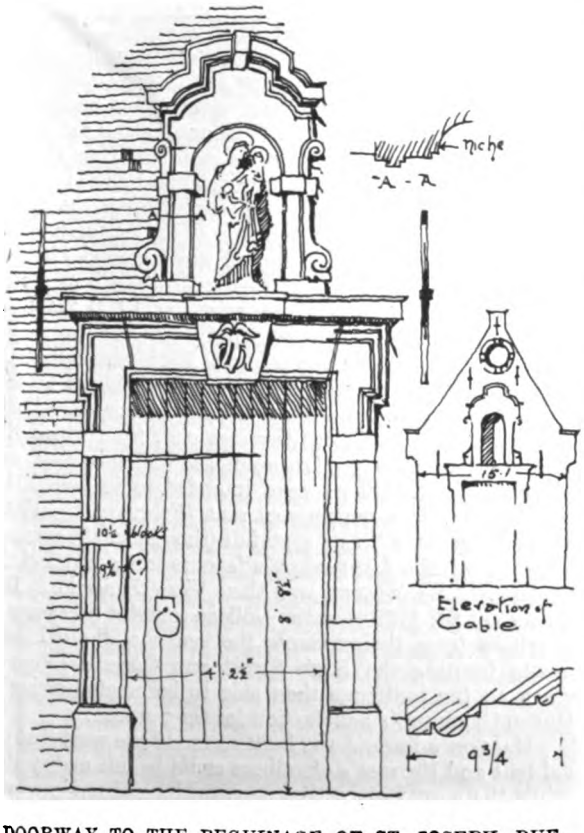
ONE of the objects of the Burlington Fine Arts Club is to hold at least once in the year special exhibitions having for their object "the elucidation of some school, master, or specific art." During the past forty odd years the organisers have laid the art of practically all the world and of all ages under contribution. For instance, in the last seven years there have been exhibitions of English mezzotint portraits 1750-1830; ancient Greek art; pictures, &c., of the School of Siena; works by CHARLES W. FURSE, A.R.A. (1906) and ROBERT BROUGH, A.R.S.A. (1907); early German art, the faïence of Persia and the Nearer East. Last year considerable public attention was aroused by the illuminated manuscripts that were brought together. It is rather surprising that the club has never organised an exhibition of "Early English Portraiture" before. At No. 17 Savile Row there are on view now seventy-five works, of which one of the earliest (entitled *Four Scenes from the Life of St. Ethelreda*) is believed to have been executed about 1425; while the latest belongs to the reign of HENRY VIII. The catalogue, which is an authoritative one, for it has been compiled by Mr. LIONEL CUST and Mr. CHARLES F. BELL, of the Ashmolean Museum, suggests that the St. Ethelreda scenes may have formed the doors of an aumbry, and are said to have formerly belonged to Ely Cathedral. The panels cannot be said to show marked skill, and the one showing St. ETHELREDA superintending the erection of Ely Cathedral is of small interest architecturally. The compilers do not venture to give any opinion as to the painter's name or nationality. Perhaps it might be asked as to whether a work of this sort ought to be classed as portraiture, for it is rather unlikely that the artist was troubled as to the necessity of producing a "likeness," or as to accurate historical detail. It is otherwise with HANS MEMLINC's famous triptych known as *The Virgin and Child, with attendant Saints and Angels, adored by Sir John Donne, his Wife and Daughter*, which has been lent by the Duke of DEVONSHIRE. The date suggested is 1468. Though in this case also there is a predominance of the pictorial both in the landscape background and the architectural setting.

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Royal portraits constitute a large proportion of those exhibited. There are five of Henry VII. and six of Henry VIII. Of particular interest is Holbein's cartoon for part of the wall-painting in the Privy Chamber at Whitehall Palace, which shows the domineering figure of Henry VIII. in the foreground, with his father standing as a servitor behind. This cartoon was the actual one used for transferring the design to the wall and is of the highest importance. Holbein is represented by some fine portraits, including that of his first patron, Sir Thomas More (lent by Mr. Edward Ruth). But most connoisseurs will prefer the miniatures by him. There is some uncertainty as to the authorship of *William West, first Lord De La Warr*; it used to be attributed to Guillim Stretes, but the compilers ascribe it to Holbein. It seems, however, to be unlike the work of the latter. To Stretes is usually attributed the large *Henry Howard, Earl of Surrey*, in which special care has been lavished on the architectural framework in which the nobleman stands; though here also the compilers are unwilling to accept tradition.

Visitors to this exhibition should not overlook the writing room, which contains copies by C. A. Stothard of the paintings in the Great Hall, or Painted Chamber, in Westminster Palace, and drawings made by R. Smirke in 1800 of the wall-paintings formerly in St. Stephen's Chapel at the same Palace. These latter were carried out in the middle of the fourteenth century, and very probably were by Englishmen. The chapel was destroyed by fire in 1834.

The Burlington Fine Arts Club has, according to an introductory note, not met with the success anticipated in organising the collection. It was found impossible to obtain a loan of the portraits in Windsor Castle and Hampton Court. But a valuable series has been got together from other sources. And in any case their absence has made no difference to the prefatory chapters of the catalogue, which give an historical account of Early English portraiture in its various phases of the highest value.



DOORWAY TO THE BEGUINAGE OF ST. JOSEPH, RUE NEUVE DE GAND, BRUGES.
From a Sketch by Banister Fletcher.

QUEEN'S COLLEGE, OXFORD.*

By John R. Magrath, D.D., Provost.

Queen's College, Oxford, was founded by Robert Eglesfield, chaplain to Philippa, wife of Edward III. The patronage of the Queen and her influence with her husband and with the Pope alone enabled Eglesfield to lay the lines of his foundation. He called it after her, and desired that the consort of the reigning king should always be invited to become patroness of the College.

When Eglesfield founded his College, the north-eastern portion of the city was for some reason waste and poorly inhabited, and the site which he secured for it, while corresponding pretty closely with the northern part of where the present buildings stand, extended on the east as far as the city wall, and on the west to the boundary of the parish of St. Peter-in-the-East, where All Souls abuts on the garden of the Warden of New College. Both extremities were coveted by and granted to William of Wykeham, and now form the Warden's garden and the south part of New College garden.

The buildings which were scattered over the site were first put to such uses as they were capable of, and perhaps the earliest building to lodge any of the scholars of the Queen was on or near the site of the present College laboratory. A porter's lodge was soon needed; a handsome Perpendicular gateway, indicated in Loggan's view of the College and pictured in fuller detail in an engraving by Burghers, occupied the site of the gate now opening into Queen's Lane, just opposite the entrance to St. Peter's Churchyard. Over it were rooms, probably originally designed for the Provost, as this was the usual position of the head's apartments in an Oxford College, but celebrated down to their demolition as having been occupied by King Henry V., "Victor Galliæ et sui," the conqueror of France and of himself.

The chapel was near the south-eastern corner of the College. The foundations of its walls and of a magnificent ante-chapel built in 1518 by Robert Langton, Doctor of Laws and Protonotary Apostolic, are under the grass in the middle of the eastern grass-plot in the present front quadrangle. The sill of the great west door of the ante-chapel just reached the western edge of the pathway which leads from the great south gateway through the centre of the quadrangle. A bull for the erection of the chapel was granted at Philippa's request, but care was taken that the vicar of the parish should not suffer from the diversion of his fees and offerings, and to the present day the College makes a quarterly payment to the vicar under the provisions of the bull.

Loggan's print shows the arrangement of the buildings in the old College. The discovery of the foundations of some of them in 1903 testified to his general accuracy. The College at this time was separated from the High Street by a row of small houses, and their yards ran back to the line which then formed the southern boundary of the College. Of the buildings depicted in Loggan's view only those at the north-eastern corner have not been wholly destroyed. Even they suffered considerable modifications to bring them into harmony with the general features which the new College was to assume.

It was, however, the constructor of this building, which occupies the site of the two northern staircases on the eastern side of the back quadrangle, who gave the impulse to the movement for the reconstruction of the College. Joseph Williamson, son of a poor country parson, educated first at St. Bees and then, after a short time spent in London as clerk to a Cumberland M.P., as a town boy at Westminster, entered the College with a recommendation from the celebrated Busby to Provost Langbaine, and rose to be Secretary of State. He never forgot the College, his *Mater alma et cara*, of which he vindicated his claim to be *pientissimus filius*. Besides munificent presents of plate, and influence used with vigour and success to promote its members to posts of

* See Illustrations.

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dignity and emolument in Church and State, he spent over 1,700*l.* on the building just referred to, and bequeathed at his death, besides a library of valuable and interesting books, 6,000*l.* towards the enlargement or reconstruction of the College. His crest, "Out of a ducal crown or a demi-eagle gules winged sable, holding in his beak a trefoil slipped of the third," still remains on the north wall of the building he erected, and his arms are found with those of LANCASTER and EGLESFIELD on the architrave over the passage leading northwards from the front quadrangle. The demi-eagle was substituted at the time he was knighted for his older crest, doubtless to connect him with the eagles which form EGLESFIELD'S blazon, and the new motto then adopted, "Sub umbra alarum tuarum" ("Under the shadow of thy wings"), is also fragrant of his "singularis erga matrem pietas."

The earliest date connected with the present buildings is 1682, which appears in a chronological list of the works of Sir CHRISTOPHER WREN, drawn up in Latin by one of his sons, as the date at which "Capellam collegii Regin: apud Oxon extruxit." Tradition has, however, always assigned the design of the new College to HAWKESMOOR, who had already by 1682 become WREN'S "scholar and domestic clerk." WREN'S contribution to the work may be embodied in a print by BURGHERS representing an approximation to the present façade of the hall and chapel, but with a fine iron gate closing the chapel passage, which has no muniment room over it, the columns and pediment brought forward so as to form a regular portico, and a very fine lantern in place of the present clock tower.

WREN was at work in Oxford on the Ashmolean building about this time, and HAWKESMOOR was closely associated with him from 1679 onwards, so it probably would be difficult for anyone but the architects themselves to determine their exact contributions to their united work. The general plan of the two quadrangles must have been settled early, before 1682 if BURGHERS'S plate really represents WREN'S design of that date. It was a bold conception, as it involved the removal of nineteen-twentieths of the buildings crowded on a part of the proposed site, and the raising of the whole to the level of the highest part—that on the north towards New College. The High Street frontage belonged to the College, with the exception of a tenement at the south-west corner, which was purchased from Magdalen College in 1709, but the inclusion of the eleven tenements of which it consisted in the site of the new College involved a considerable loss to the revenue from rents.

It was the receipt of the books bequeathed by Bishop BARLOW at his death in 1691 which rendered the provision of a new library necessary. Provost HALTON rose to the occasion, and in May 1692 to the north of the then existing College buildings was laid the foundation of the new library, of which the outside was finished in 1694. The library itself is a magnificent room, 123 feet by 30 feet and 55 feet high, with a splendid stucco ceiling by ROBERTS, and stands upon a cloister which was open to the east and closed to the west, where it fronts the College garden. On this side on each side of a doorway in the centre of the building are niches in which, beginning from the north, are statues of Sir JOSEPH WILLIAMSON, Archbishop LAMPLUGH, Bishop BARLOW, EGLESFIELD, EDWARD III., PHILIPPA, CHARLES I., and HENRIETTA MARIA. The bookcases and manuscript-cupboards are adorned with elaborate wood-carving by GRINLING GIBBONS. The elevation towards the garden is a very successful bit of work. When the new library was built HALTON pulled down the old library, which faced the west front of LANGTON'S ante-chapel, and erected a new range of buildings, part of which was appropriated to the Provost and part to chambers for the chaplains, clerks and "famulus." These had to be removed when the new plan was carried out, but the materials inside and outside were made use of in the new building which took their place. The erecting of the library required the obtaining from the city a portion of Queen's College Lane, and this for a length of 20 feet or thereabouts and about 20 inches wide was granted by the city for 1,000 years on a peppercorn rent (September 2, 1692). This seems to have been the first of the acts of liberality shown by the city authorities towards the builders of the new College. Other similar acts followed, as we shall see further on. HALTON kept elaborate accounts of the building of the library. The cost seems to have been 5,247*l.*, including 178*l.* 1*s.* for statuary by VANDERSTEIN and 16*l.* to BURGHERS for two copper-plates of elevations of the building; the ceiling, by ROBERTS, cost 148*l.* 9*s.* 8*d.* Nine hundred pounds of the total seems to have been derived from timber sold at Heckley, over 1,800*l.* was borrowed from the College chest, 600*l.* came from a legacy and a donation of Bishop SMITH, of Carlisle, and about 100*l.* from other benefactors. About 2,000*l.* seems to have been contributed by HALTON himself, who also gave a good many books to the library. Access to the library was given by a staircase constructed in a small annexe which, according to a view of the library taken before the College buildings were completed (probably one of the copper-plates by BURGHERS mentioned above), stood to the south of the library.

In the plans for the reconstruction of the College the line of the library was taken to determine the position of the west block of the new front quadrangle. HALTON may be thus said to have determined by his building the general plan of the reconstructed College.

It seems probable that it is to Provost LANCASTER, in whose time the legacy of 6,000*l.* bequeathed by Sir JOSEPH WILLIAMSON for the purpose accrued to the College, that the general conception of reconstruction is due. It is, at all events, certain that it was during his provostship that the scheme attained the definite character which it preserved practically unmodified through the sixty years during which, in face of what was for the time enormous cost and endless difficulties, it was gradually being realised.

The College seems to have had before it several designs, which have been preserved, but without any indication of date or of the name of the architect. They all contemplated dealing with the whole space occupied by the present quadrangles, and had all the boldness and variety of the Palladian architects. One filled the whole space between the two quadrangles with an enormous elliptical chapel, which would have added another towering dome to the spires of Oxford.

Taking HALTON'S library as determining the north-west corner of the building and the corner occupied by Sir JOSEPH WILLIAMSON'S new rooms as the north-east, the design contemplated two large quadrangles extending from the lane separating the College from New College to the High Street. This involved the removal of the College's southern boundary 70 feet further to the south. For the erection of the north side of the northern quadrangle the city granted a slip of waste ground 176 feet in length, beginning at the east with a width of 4 feet and tapering to a point at the west, for 1,000 years, at a peppercorn rent (March 20, 1706).

On the south side towards the High Street the city granted a slip of ground out of the High Street 60 feet long, and tapering from a breadth of 5 feet or thereabouts at the west to a point at the east end, "on which slip a front of severall public buildings for enlarging and beautifying the College were intended to be built," for 1,000 years, at a peppercorn rent (February 16, 1709). This was granted "as a gratefull (though small) acknowledgment of Mr. LANCASTER'S favours to the city and the citizens." LANCASTER was then Vice-Chancellor. But it was not till 1733 that the College found it necessary to purchase from their tenants the leases of the old tenements fronting the High Street and Queen's Lane, to carry on the buildings then able to be erected owing to Queen CAROLINE'S benefaction for the purpose.

HALTON'S library was built so far to the west that the old hall and Provost's chambers could be left undisturbed while the west wing of the new south quadrangle was in process of erection. The old chapel was not entirely removed till the erection of the east wing of the same quadrangle was taken in hand. The only modification of HALTON'S library which was effected at the time was the

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removal of the staircase building and the incorporation of the staircase itself in the arrangements for access to the new common rooms and to the gallery west of the hall. The conversion of the cloister under the library to a storehouse for books did not take place till towards the end of the first half of the nineteenth century, when MASON'S great benefaction made the upper library much too small for the enormous addition of books to be made in the ten years subsequent to the receipt of the benefactor's money.

The accounts of the workmen's wages begin with November 12, 1709, and they are recorded to have begun the pulling down of the old houses on the following December 5. "The west side of the College great quadrangle" was first proceeded with. The first stone of the west wing was laid by LANCASTER on Queen ANNE'S birthday, February 6, 1710. The hall, "being quite finished," was dined in first, Tuesday, May 24, 1715. The date of the payment for the fitting up of the cellar and buttery is given as July 13, 1713; April 5, 1714, as the date of the taking down the slabs from the hall and chapel and other old buildings; July 14, 1714, the kitchen was begun, and October 19, 1716, was the date of the beginning of the arch between the chapel and hall. The west wing seems to have cost nearly 2,700*l.*, and the chapel, hall, kitchen, larder and pantry over 6,100*l.*

(To be continued.)

COMPETITION FOR NEW COUNTY OFFICES AT READING, BERKS.

THIS competition promises to be of a fairly satisfactory nature. An assessor, Mr. MERVYN MACARTNEY, has been appointed, at the request of the County Council, by the President of the Royal Institute of British Architects, and has assisted in the preparation of the conditions of the competition. The amount to be expended is 16,000*l.*, and premiums of 100*l.*, 75*l.*, and 50*l.* respectively will be paid to the authors of the best three designs as placed by the assessor. The County Council reserves the right to select the design best suited for adoption after receiving the assessor's report—that is, they may ignore his award except as regards payment of the premiums. If the author of either of the premiated designs is appointed architect and carries out the work, his premium will be merged in his commission.

The drawings are to be sent in on June 15 next, and are to comprise plan of each floor, front, back and side elevations, longitudinal and cross sections, all to one-eighth scale; detail of portion of front elevation to ½-inch scale; block plan (scale not prescribed) showing drainage. No perspective allowed. Plans and sections "are to be in pen and ink, and may be coloured." Elevations "must be in ink or pencil, and must be coloured" to show materials. Front elevation must be shaded with shadows projected at forty-five degrees.

The problem before the competitors is not an easy one. The site has a frontage of 64 feet to the main street, with a depth of 93 feet 4 inches, and the net floor area of the offices for which accommodation is required is 12,275 feet super, to which have to be added two committee rooms each of not less than 600 feet super. Light is obtainable on all four sides of the site, but not good light except to the main front; some part of the area of the actual site must therefore be allotted to internal courts or areas. A few rooms in the Assize Court buildings are available for incorporation in the new offices, but rather increase than lessen the difficulties of the problem. Briefly, the restricted nature of the site will necessitate very careful and skilful planning in order to provide satisfactorily the required accommodation, whilst the sum allowed for the cost of the building will entail rigid economy, particularly as the employment and remuneration of the selected architect is contingent on a tender being obtained not exceeding the 16,000*l.* by more than 10 per cent. In our next issue we shall give some further information respecting the site and features of the competition.

ARCHITECTURAL COPYRIGHT.

THE following circular-letter has been addressed to members of the Royal Institute of British Architects, and the requests therein contained will no doubt meet with a response from them, but the subject is of so much importance to architects and the art of architecture generally that we would urge all those who can assist the Institute with evidence to offer the same, even though they may not be members of that body:—

Architectural Copyright.

Dear Sir,—The diplomatic conference between the official delegates of the various countries adherent to the Convention of Berne, which was held at Berlin in October last, resulted in important changes being made to certain Articles of the Convention. The British Foreign Office, in consequence of the action of the R.I.B.A., withdrew its previous opposition and adopted the views of the other signatory countries. Architecture has thus at last been accorded its proper place between the sister arts of painting and sculpture (*vide* Article 2 revised), and is recognised as having the same rights to legal protection.

A committee of the House of Commons has been appointed to examine and report upon the proposed changes before the new Convention is ratified by Parliament, and the Council of the Royal Institute of British Architects has been invited to give evidence before this committee. They have accordingly appointed Mr. John Belcher, R.A., and Mr. John W. Simpson (Vice-President), to represent them.

Members of the Royal Institute are reminded that the desirability of protecting the work of architects in the same way as that of painters and sculptors is protected has been urged for more than thirty years by the representatives of the profession in all civilised countries. The International Congresses of Architects at Paris in 1878, 1889 and 1900, at Brussels in 1897, at Madrid in 1904, London in 1906, and Vienna in 1908, have each passed unanimous resolutions to this effect; and similar resolutions have been adopted by the Congresses of the International Association of Art and Letters held at Paris, Madrid, Neuchâtel, Milan, Barcelona, Antwerp, Berne, Monaco, Turin, Liège, Bucharest, Mayence and elsewhere, from 1878 to the present time.

British architects have always been very tolerant towards artistic plagiarism, which may perhaps be considered as a tribute (sometimes awkwardly expressed) by the copyist to the originator; but that deliberate appropriation of an architect's work which it is desired to prevent cannot be defended, and in no way advances the standard of professional knowledge and attainment.

The view it is desired to maintain is, shortly, that the building commissioned by the employer is but a reproduction (in suitable materials) of the architect's design on paper, just as a bronze or marble statue is but the reproduction of the sculptor's sketches and clay models. Both reproductions require the supervision and skill of their designers to bring them to perfection.

It will be remembered that, under the existing legal precedents, the ownership of the architect's sketches, notes, drawings and calculations from which the building is erected is vested in the employer; while the corresponding documents and models of the painter and sculptor are protected.

All members of the Institute who have had reason to complain of the unauthorised reproduction of their drawings, or of their executed work, whether as regards plan arrangement, elevation, or otherwise, are requested to communicate short particulars to the undersigned without delay. Such communications will, if so desired, be treated as confidential.

Expressions of opinion from the Councils of allied societies would, if sent at once, be of great value; and any observations which they wish to make upon the desirability of architects retaining the copyright of their drawings when compulsorily deposited with local authorities (in regard to the execution of architectural work by such authorities) would be opportune at the present moment.—I am, dear Sir, yours truly,

IAN MACALISTER, Secretary.

Mr. John Murray, F.R.I.B.A., Suffolk Street, Pall Mall East, has been nominated by the Local Government Board to value the freehold site of Queen's Road Baths and Washhouses, Bayswater, which the Paddington Borough Council propose to sell, and provide with the proceeds new and improved baths and washhouses elsewhere in the borough. The Council received an offer of 60,000*l.* for the property, and a question arose as to whether this represented its full market value.

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NOTES AND COMMENTS.

THE necessity for carefulness on the part of architects in drawing up and arranging contracts with builders on behalf of clients is shown by the result of an action in the Horsham County Court, MYSON *v.* BUCK and BURNAND. EDWARD MYSON, the plaintiff, was a bricklayer employed under contract to do certain work to the premises of Mrs. BURNAND, under the direction of her architect, Mr. W. BUCK. Mr. BUCK seems to have drawn up the contract as between MYSON and himself, and MYSON appears to have been actually paid throughout by Mrs. BURNAND or her agent, Mr. CHURCH, on the certificate of Mr. BUCK or a request to Mrs. BURNAND to pay for certified work. But when a dispute arose as to the payment for extras, Mr. BUCK, the architect, was adjudged to be liable, and he alone. The moral is that if an architect, to save trouble to his client or himself, enters in his own name into a contract with a builder, he cannot afterwards plead that he was acting as agent, but must accept the responsibility for payment of the whole contract amount as well as extras, if his client from any cause fails to pay.

THE Housing of the Working Classes Acts are amongst those that require to be administered with great discretion, not with unrestrained zeal. On the one hand they may lead to the erection of houses that the intended tenants will not occupy except when they mean to pay no rent. This results in heavy charges on the rates to meet the losses on the municipal house property and in depreciation of privately owned house property which has to pay the rates. Throughout the country the experience seems to be general, and housing by municipal authorities is shown to be impracticable. The London County Council has practically abandoned the provision of housing accommodation, and municipal authorities throughout the country are following suit. The Estates Committee of the Sheffield Corporation has adopted the report of its Chairman, Councillor KELLEY, which not only advocates the cessation of building, but the disposal of much land that has been acquired and held vacant with a view to future building operations.

ANOTHER side of the working of these Acts which undue zeal has been shown to render oppressive to the community has been illustrated at Birmingham, where the Housing Committee of the Corporation has been taken to task, and appears to be conscious of its fault of too zealous dealing with small house property belonging to private owners. The requisitions made by order of medical officers of health generally are often not only harsh but unreasonable, and to our personal knowledge call for the carrying out of work quite unnecessary, and contributing in no way to either the health or the comfort of the inhabitants. No doubt there is much small house property, or was at the time the Acts were passed, of an insanitary nature, but it does not pay as well as it did, and for their own protection owners of such property usually find it advisable to make their houses decent and liveable. The fact seems to be that the working of the Acts has directly or indirectly fulfilled their object to a very large extent. There is therefore not enough work now to be done to occupy the energies of the staff of officials brought into being for the carrying out of the Acts, and to justify their existence they have to discover nuisances where none really exist. Our sympathies are with the holders of house property in Birmingham which, though not up to Edgbaston standard, is quite suitable for the tenants that inhabit it, and not at all likely to be rendered more healthy or more comfortable if meddled with by the Housing Committee of the Corporation.

THE case of NUSSEY *v.* The Provincial Bill Posting Company, Ltd., and JOHN EDWARD EDDISON is one of some interest. The plaintiff NUSSEY was owner of one plot and the defendant EDDISON of two adjoining plots on a high-class building estate at Leeds, and, as frequently happens with such estates, there were restrictive covenants binding each purchaser not to do certain things which might prejudice the character of the estate. The character of the fencing to be put up was prescribed, and no noisy, offensive, or dangerous trade was to be carried on. The defendant EDDISON agreed to lease the right of advertising on his plots to the Bill Posting Company, and the company erected for the purpose of displaying advertisements a hoarding 156 feet long and 15 feet high. Mr. Justice NEVILLE, on an application for a mandatory injunction to pull down the hoarding, held that it was a fence other than a fence provided for by the covenants, and also a building for carrying on an offensive trade, and he therefore granted the injunction. The case was taken to the Court of Appeal and decided in favour of the original plaintiff NUSSEY by the Master of the Rolls, Lord Justice FLETCHER MOULTON, and Lord Justice BUCKLEY, all of whom agreed that the hoarding was a fence contravening the covenant, but Lord Justice FLETCHER MOULTON disagreed with the opinion of his two colleagues that it was a "building" within the meaning of the covenant, or that bill-posting was an "offensive" trade.

DR. ASHBY, the director of the British School at Rome, lectured recently on "Prehistoric Antiquities of Malta," of which not a few have been already discovered, and the investigation of which will form part of the director's programme when he goes to Malta this May. Dolmens, hypæthral sanctuaries and burial-places have been found, the latter containing a large number of skeletons and fragments of prehistoric pottery.

ILLUSTRATIONS.

LIVING ARCHITECTS.—NO. 4, SIR ASTON WEBB, R.A.

WE recommence this week our portrait studies of contemporary architects. Sir ASTON WEBB, R.A., F.S.A., acted as President of the Royal Institute, 1902-4, and was awarded the Royal Gold Medal in 1905. He was elected an Associate of the Royal Academy in 1899 and an Academician in 1903.

NO. 5, MR. T. E. COLLCUTT, F.R.I.B.A.

MR. THOMAS EDWARD COLLCUTT, F.R.I.B.A., was President of the Royal Institute of British Architects in 1906-8 and received the Royal Gold Medal in 1902.

OXFORD COLLEGE SERIES.—QUEEN'S—FRONT QUAD.

SEE article on page 253 by the Rev. JOHN R. MAGRATH, D.D., Provost.

STOCKPORT TOWN HALL.—THE COUNCIL CHAMBER.

THE town hall, which was opened by the PRINCE of WALES last year, stands in Wellington Road South. All the principal rooms communicate with one centre known as the "Council ante-room." The Council chamber is placed on the south side of it, and is 46 feet long by 33 feet wide and 37 feet high, with an enriched dome. On plan the room is a parallelogram, with further space for the public. The walls are treated with Austrian wainscot oak up to a height of 7 feet 6 inches. The mayor's daïs and table are carved after the GRINLING GIBBONS style. The floor is in oak. The electroliers were specially designed, and are executed in gilded cast bronze. The authorised expenditure on the entire building was 100,000*l*. The contract was carried out by Mr. JOSIAH BRIGGS, of Stockport. The architect was Sir A. BRUMWELL THOMAS.

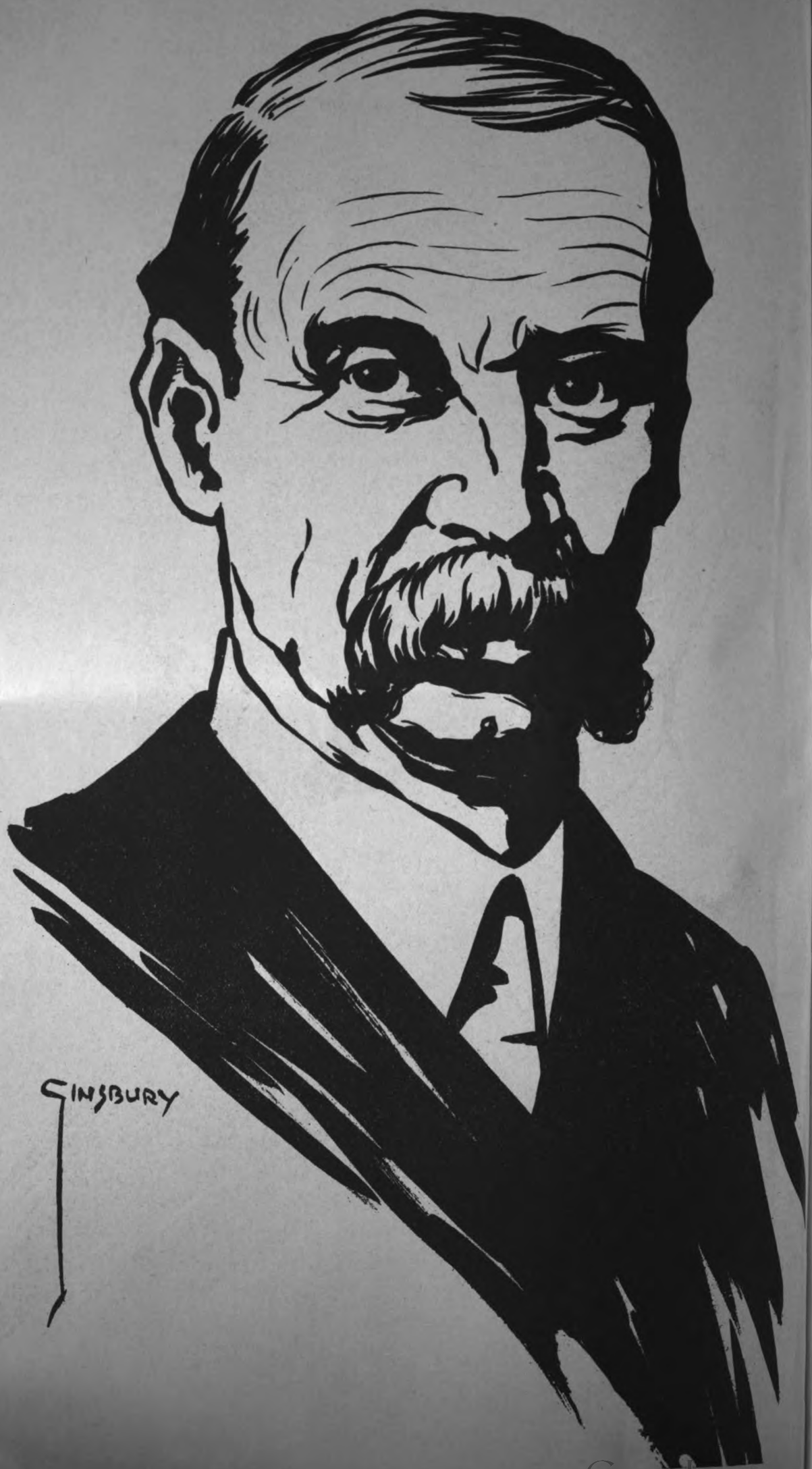
THE CENTRAL STATION HOTEL, GLASGOW.—THE LOUNGE.

THE walls are panelled with Austrian oak and the floor is laid with various coloured marbles. The columns supporting the dome are of Pavonazzo marble. The peculiar elliptical shape was the outcome of the plan of the station offices which occupy the ground floor. The enriched plaster work of ceiling and dome was executed by the Bromsgrove Guild, Bromsgrove. The contractors for the oak work were Messrs. P. & W. ANDERSON, Glasgow, and the marble work was executed by Messrs. GALBRAITH & WINTON, Glasgow. The glass work of dome was executed by Messrs. OSCAR PATERSON & Co., Glasgow. Mr. JAMES MILLER, A.R.S.A., F.R.I.B.A., is the architect of the hotel.

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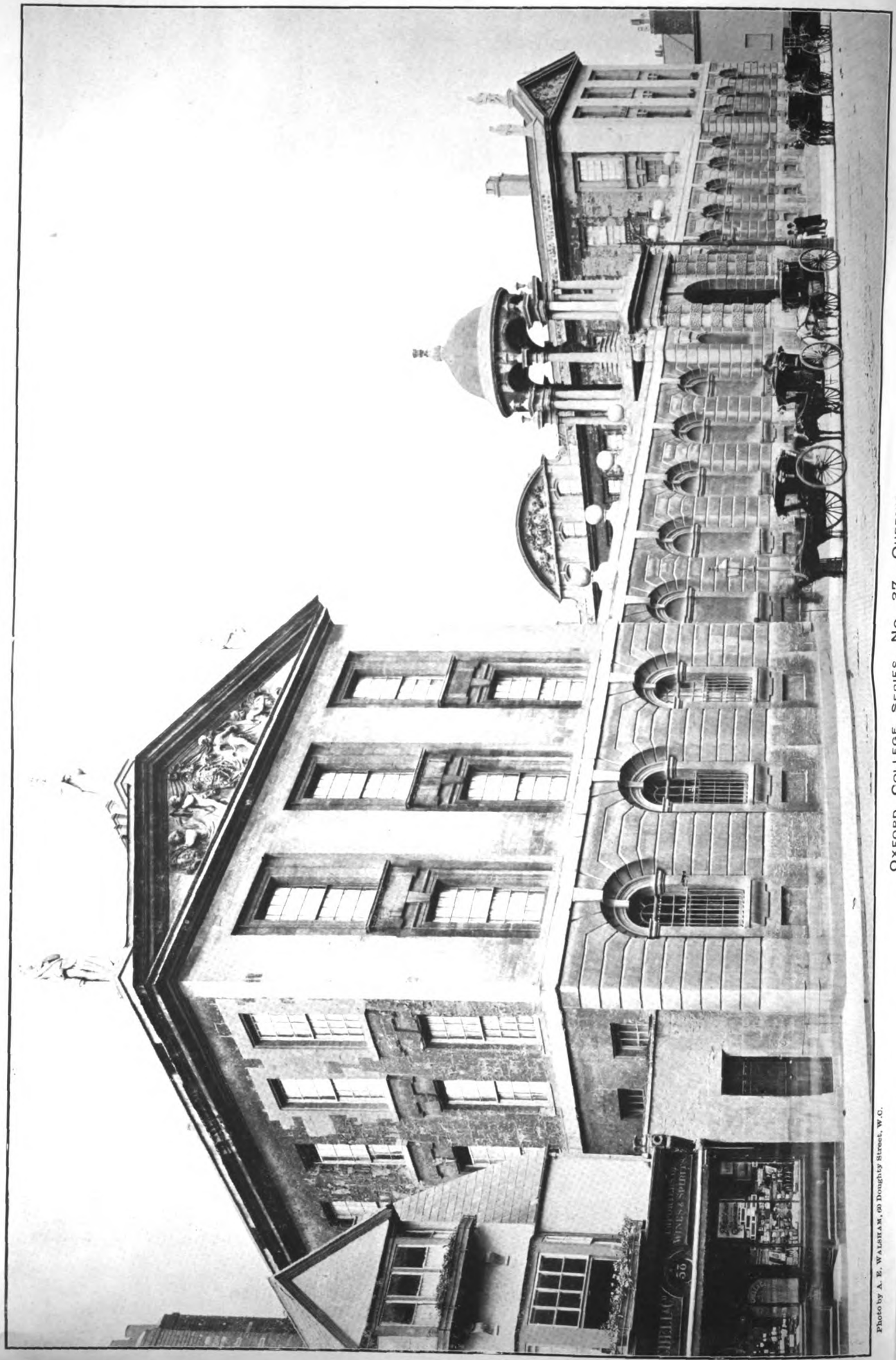
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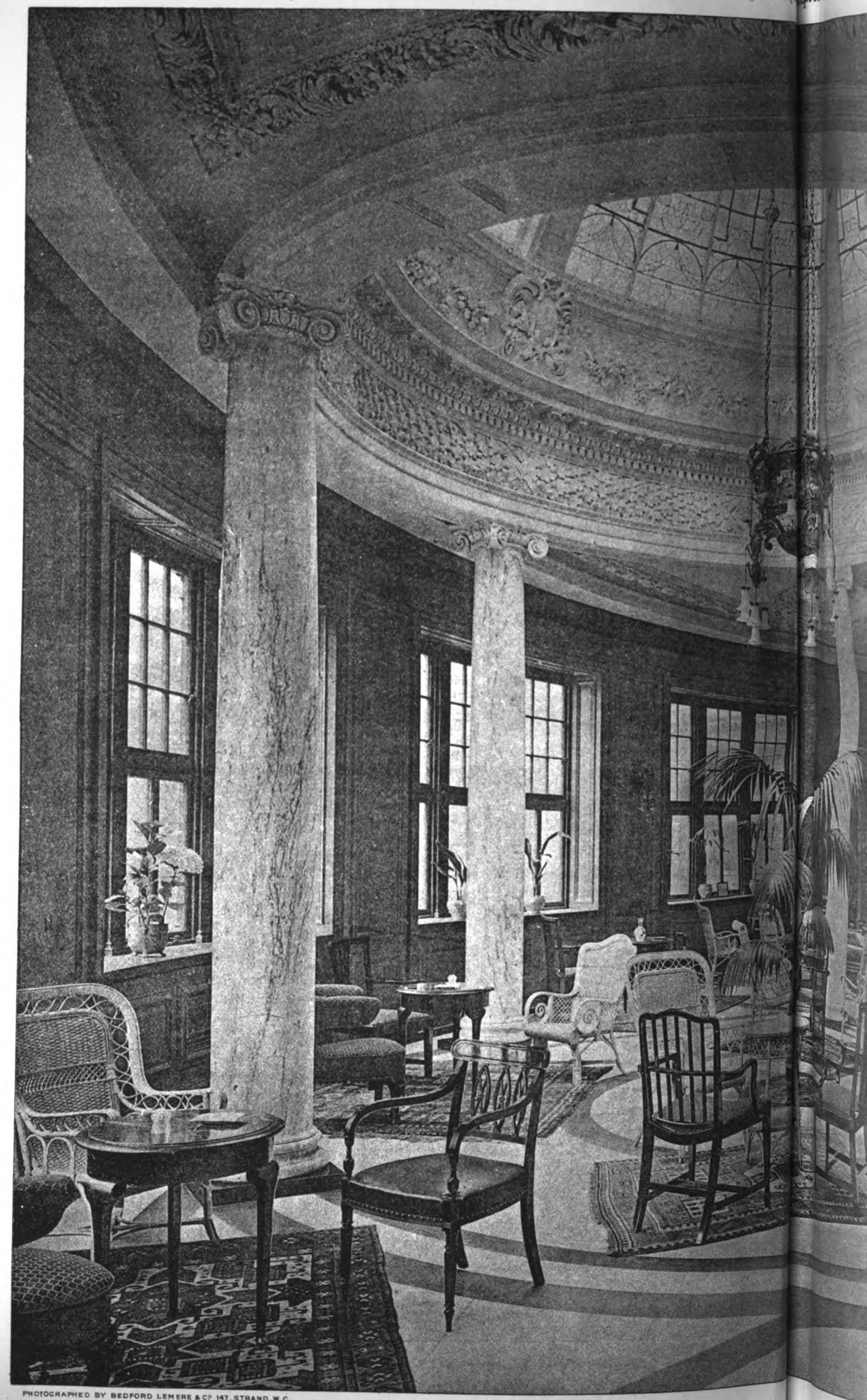


OXFORD COLLEGE SERIES. No. 37.—QUEEN'S.

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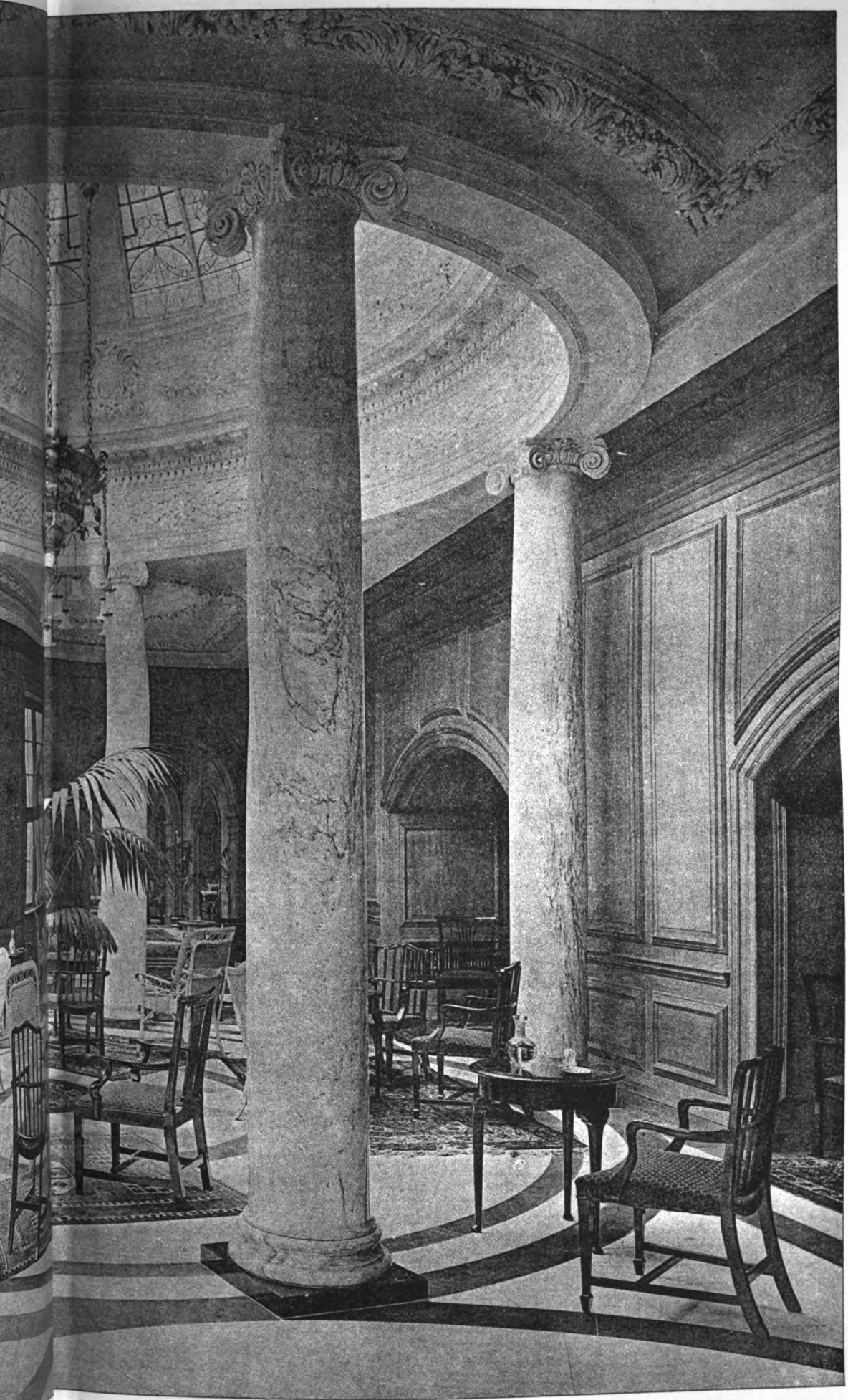
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THE CENTRAL STATION H[OTEL], GLASGOW: THE

JAMES MILL[ER], R.S.A., Architect.

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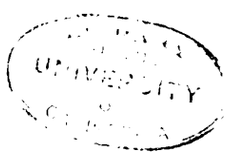
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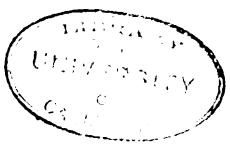
GLASGOW: THE LOUNGE.

CENTRAL STATION ... Architect.

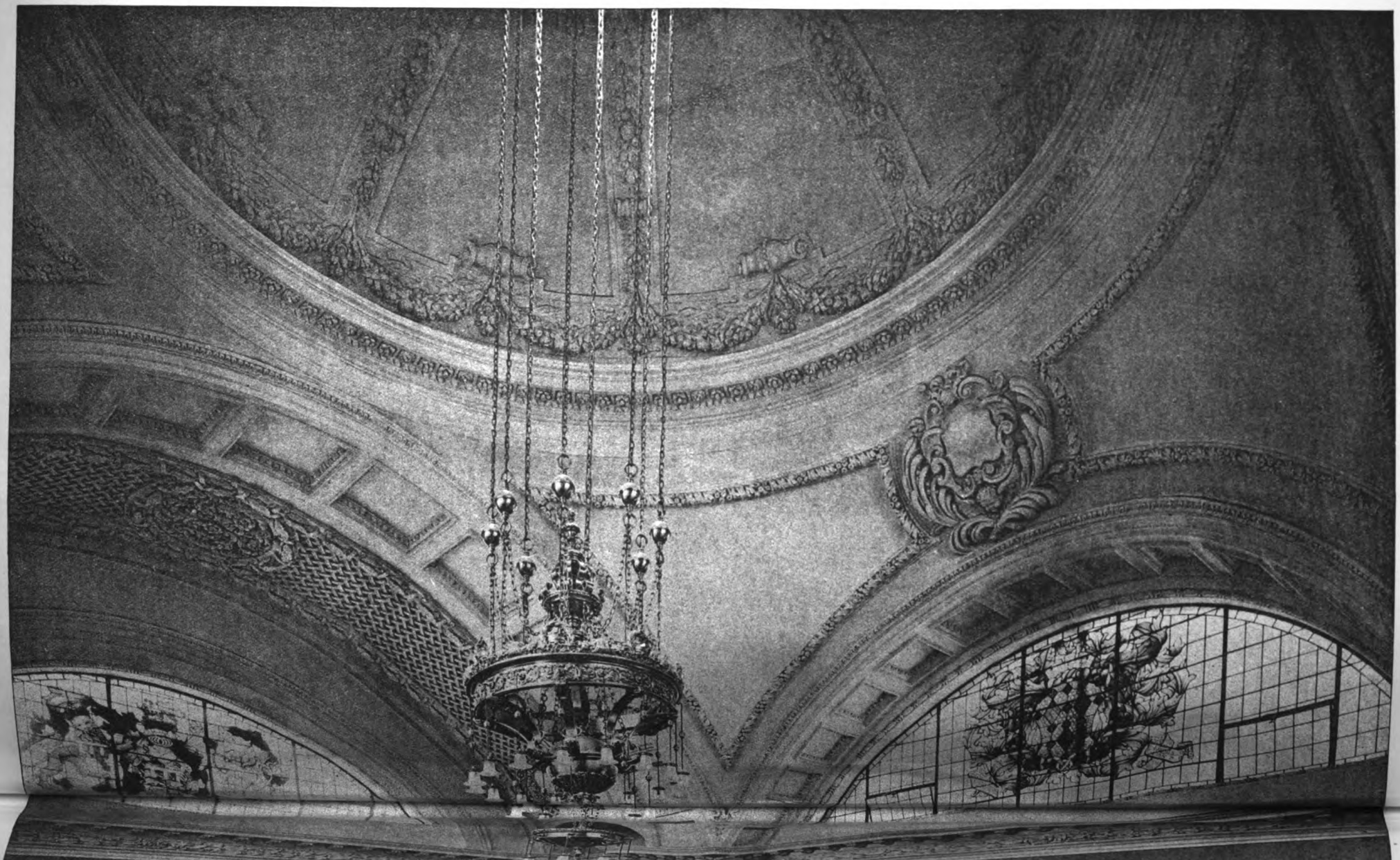
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STOCKPORT TOWN HALL: THE COUNCIL CHAMBER.

SIR A. BRUMWELL THOMAS, F.R.I.B.A., Architect.

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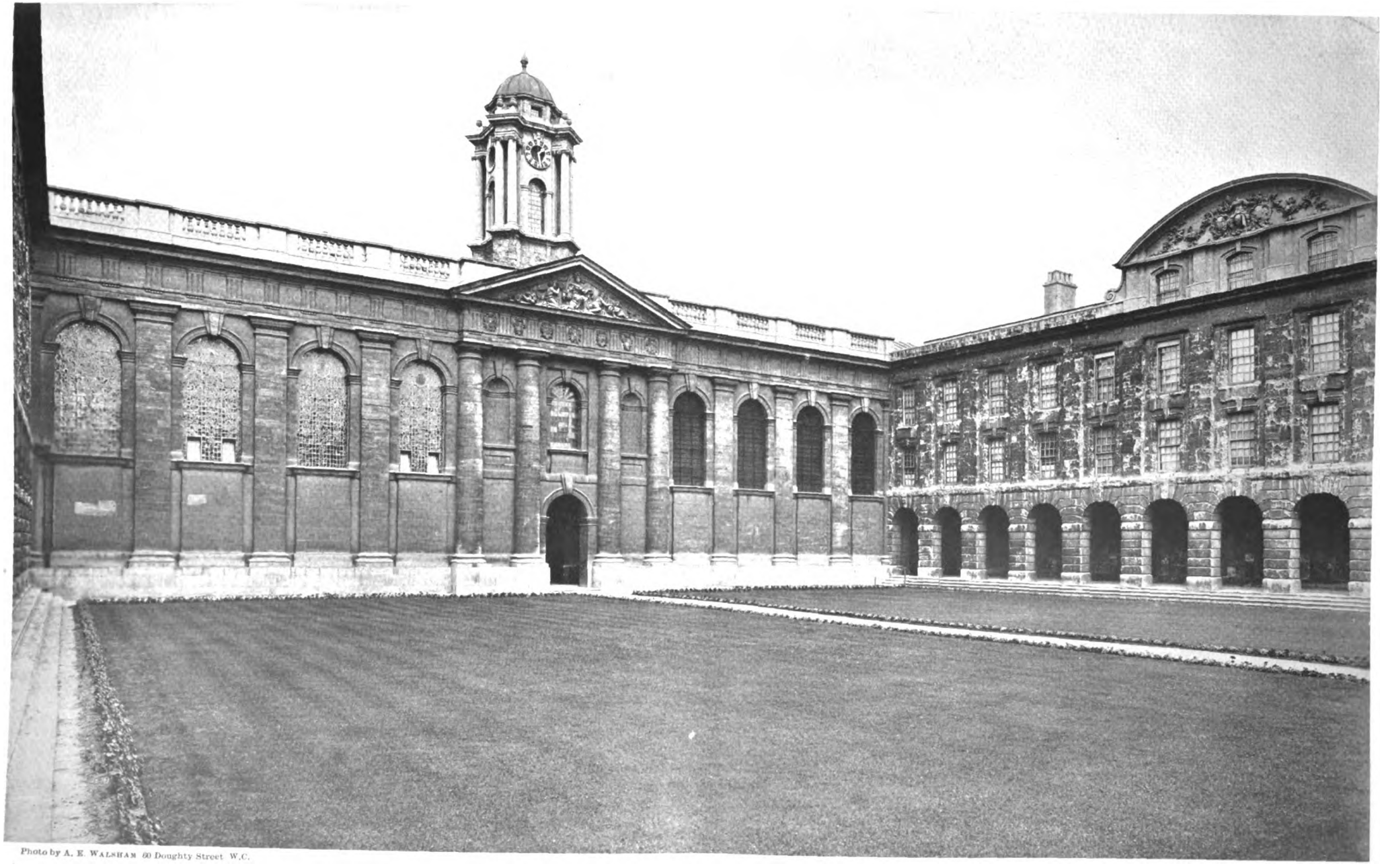
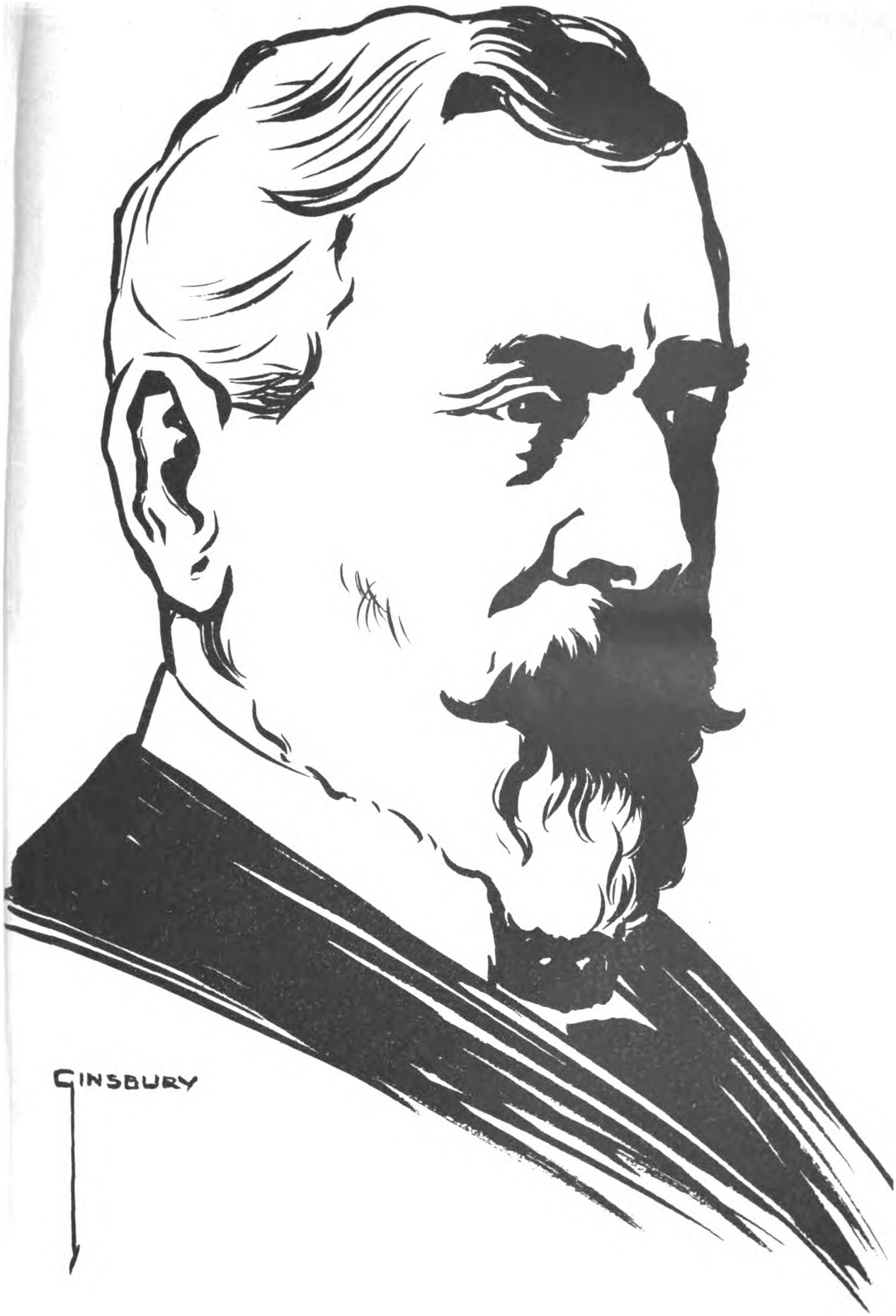


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OXFORD COLLEGE SERIES. No. 38.—QUEEN'S: FRONT QUAD.

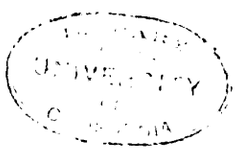
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LIVING ARCHITECTS. No. 5: MR. T. E. COLLCUTT, F.R.I.B.A.



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DECORATIVE IRONWORK.

MR. STARKIE GARDNER delivered a lecture on the 7th inst. at Carpenters' Hall, dealing with the above subject. He commenced by observing that the woodworkers' and the metal-workers' crafts are sisters; but there has always been an incompatibility of temper—the fault lying with the metal-worker who has uniformly been the aggressor. The antagonism is not at all personal, but just in the nature of things. There are many purposes for which wood or metal can be used indifferently, and the smith began very early to encroach on the domain of the sister craft. The carpenter loves the smoothness, the texture, and the colour of his woods so much that if he must use any of the smith's productions he mortices them away out of sight, regarding their presence as a blot and an intrusion. On the other hand, the smith merely regards the wood as something of no importance, to light his fires with, and at best to fix his scrolls or diapers upon; he so covers the surface that the wood really does not count. Thus he has made all sorts of things, bedsteads and casements, screens, palings and gates of iron, where they were formerly made of wood. But this is only a foreshadowing of what has been done by the engineer, for the list includes joists, railway stations, bridges, jetties, ships and winter gardens. Then the carpenter's stronghold was attacked, and entire buildings are made of iron. The carpenter may, indeed, be excused if he thinks to himself that for ages the world has got on very well without the engineer, whose presence only makes his own struggle for life harder than it would be.

The smith probably had a good start in mediæval times, when metal-working was the relaxation of saints and kings. No other material except ivory was so richly worked. In those days iron was produced in small blooms, weighing but a few hundredweights. The smith cut off pieces and beat and hammered them out while hot into the shapes he required, and then welded them together to form his hinge or handle; the front face was chiselled and scored with lines forming geometric patterns. Grilles of iron, introduced in the eleventh century, were of similarly rich and involved scroll or geometric patterns. In the days of Edward I. stamps and dies were introduced which could be impressed on the hot iron by blows of the hammer. The effect was that of rich moulding in relief, somewhat resembling cast iron, but retaining the properties of wrought iron. Though the possibility of heating iron till it liquefied and could be poured into moulds was familiar to the Greeks, it remained unknown in Western Europe till the time of Edward III. The richly worked surfaces of the iron in relief, and the intricate designs into which it was wrought had a magnificent appearance when gilded and laid over blue or scarlet backgrounds. After this advance smithing presents little further interest for a time.

About a century later vertical iron palisading, known as railing, was originated in England. Its first use was as a protection for the costly royal tombs. The monuments of Edward the Black Prince and of Henry IV. at Canterbury were palisaded with vertical bars united at the top by heavy and enriched battlemented cornices. Six tall and massive standards confer strength and dignity, and with their turret-like tops and buttresses, represent the great mystic candle-holders of the catafalque. Soon the vertical bars were carried upwards and sharpened into points. Smiths elaborated these spikes and standards, adding to the latter crests and bannerets. These were the precursors of the endless series of vertical railings which became peculiarly characteristic of the architectural ironwork of this country. But the smiths were in demand for sterner duties, and their entire energies became directed to supplying munitions of war.

The withdrawal of the smith from competition was the carpenter's opportunity, and the monopoly he gained remained unchallenged till the reign of Queen Anne. Even the traditions of smithcraft seem to have been completely forgotten, for when a door or screen had to be in iron for security the smith not only took his designs from the joiner, but actually pieced his forgings together with tenon and mortise. There is an excellent example of this work in the screen to the chantry of Henry V. Edward IV. intended to be commemorated by a great metal monument with a rich grille; but no English smith could make the latter, so it was ordered abroad, and is now at Windsor. This remains, though no longer gilded, the most marvellous specimen of iron joinery in Europe. Henry VIII. was more fortunate, for his intention was fully realised. Torregiano made the gilded metal effigies, and the grille was made in London. It was of brass, because no smith in England could have executed it in iron.

No revival of smithing accompanied the introduction of Renaissance architecture into England. Elsewhere, especially in Germany and Spain, smiths were employed on magnificently decorative and costly works, while here only the most homely requisites were wanted. Foreign craftsmen had been attracted to England in great numbers to the discouragement of native talent. Nor did the introduction of Palladian architecture by Inigo Jones improve the outlook, for it does not appear that he ever designed or made use of decorative ironwork. That associated with Wren's buildings, under the Stuarts, is of the plainest description, for smithing seems the one craft in which he showed no interest or concern at all.

No real revival took place until the accession of William and Mary, and when it came it was entirely due to one man. It is rarely granted to an individual, however great his personality and artistic power, to leave his own lasting and comprehensive impress on art. But this fell to the lot of Jean Tijou, a worker in iron, and magnificent designer and craftsman. His work can be recognised by its quality, and with certainty owing to an elaborate book of his designs, and also through the building accounts of Hampton Court and St. Paul's. Practically nothing is known about him. Presumably he was one of the French Protestants who fled to Holland in 1685, on the revocation of the Edict of Nantes, and came to England three years later with, or not much later than, William and Mary. His book of designs was "sold by the author in London" without other address, and his daughter married the well-placed artist Laguerre in St. Martin's-in-the-Fields.

We first hear of Tijou through his bill, entered in 1690, among the accounts for the rebuilding of Hampton Court, for six richly wrought-iron vanes and a wrought-iron balcony, "in finely wrought leaves and scroll-work," overhanging the river. This specimen of Tijou's skill must have been continually under the Queen's notice, and he seems to have quickly gained her goodwill. Schemes and designs for works in iron of unprecedented richness were presented to her and accepted, apparently, without intermediary or estimates. These form the subject of most of the plates in the costly book of designs, engraved on copper by the best artists of the day, published by him in 1693. The garden screen, the most superb ever made, was completed and charged for in 1690, "for the circle of the Fountain Garden at Hampton Court." Another of his bills, for 1,115*l.* 12*s.* 6*d.*, comprised the three rich and still perfectly preserved gates, filling the archways of the east front of the palace. He had commissions for work of no less richness from the owners of Chatsworth, Burleigh, and Wimpole, while the work for St. Paul's, likely to extend over many years, was just commencing. This great prosperity was short-lived. In December, 1694, the Queen died, and all work was at once abandoned. It was not resumed until the destruction of Whitehall by fire, four years later, decided the King to make Hampton Court his principal residence. Of the unexecuted works designed for the Queen, one only, the King's staircase balustrade, was required from Tijou. The alterations necessitated a railing 1,400 feet long to the east front of the palace, the cost of which, and perhaps the design as well, were got out by Talman, who estimated the weight at nearly 46 tons, and the cost at 5*d.* per lb. Tijou, unfortunately, took the contract and rendered the bill for 3,675*l.*; whilst on Talman's figures it should only have been for 2,194*l.* 18*s.* 6*d.* Probably the difference was never certified for payment. The King died in 1702, and Anne, who did not care for Hampton Court, was deaf to appeals. The Royal patronage and with it that of the Court was withdrawn. Tijou removed his works from Hampton Court, and worked for St. Paul's till 1711, but here he was subject to competition, and his total payment extending over twenty years, did not exceed 4,000*l.* He retired abroad, leaving his wife a power of attorney, to collect the balance due on the St. Paul's work; and this was paid in 1712. The tradition extant in his family is that he died broken-hearted.

Whether, as a foreigner, Tijou's memory should be commemorated in London is for others to decide; but we must be fair to it. The statue on the exterior of the new Victoria and Albert Museum, selected to represent smithing, is of a person named Huntingdon Shaw, from Nottingham, who was perhaps not a smith at all, and about whom very little is known. The scanty information might be equally well interpreted as pointing him out to be a stone carver or contractor at Hampton Court. If Tijou, who spent his working life in England, and of whom we have a portrait, is not to be commemorated, his honours should not be appro-

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priated without reason by a dubious smith. There are many other smiths, his contemporaries, who have a right, Tijou being passed over, to occupy the position. Three of his assistants achieved fame in different parts of the country. The work of each is perfectly distinctive and easily recognised; but all agree in making a lavish use of acanthus and rosettes, in the manner of Tijou, though all equally fail when aspiring to higher flights, such as masks.

Thomas Robinson, who carried on works at Hyde Park Corner, is first heard of as a competitor of Tijou's for the work at St. Paul's, where he executed some beautiful ironwork between 1699 and 1711. His gates are designed in different proportions to those of Tijou and his school—being more lofty and transparent. His use of acanthus and other embossing was always sparing, and its execution and drawing poor.

During the time of Tijou and his immediate successors, and while Wren lived, designing the work had been as essentially a part of the smith's work as its actual production. If the more daring flights of some occasionally lay the artists open to criticism, their work is always grand and impressive, and as expressive of the best English Art as contemporary architecture and painting. The essentially English treatment of Robinson and his school is most refined, and never approaches the commonplace or vulgar in design. This school was rapidly developing along the best lines when in 1728 Gibbs, in his book of architecture, claimed the designing of ironwork to be within the architect's domain and banished craftsmen's designs from architecture as effectually as Kent had banished it from the gardens. Owing to this, the great smiths who followed Tijou left no equally important successors. The gates and window grilles to the Radcliffe Library, the screen to the forecourt at the Horse Guards, and grilles to the Mansion House and Bank of England, are examples of architecturally designed ironwork. Little by little the craftsmen were left nothing to design, until finally the Brothers Adam designed the entire decoration, and also the contents of the houses they built. Thus the "maitre ornemaniste," or professional craftsman-designer, the very originators of all applied design, were finally squeezed out of existence. It seems probable enough that the almost utter collapse of all Art in the country within a few decades in the Early Victorian days may be traced to the suppression of the artist craftsman. It must be conceded that no one should be more qualified to design for the applied arts than the properly trained masters of the crafts concerned in them; and also that not every born designer, now or in the past, is able or wishful to practise architecture.

NOTES ON BOOKS.

"Introduction to the Chemistry and Physics of Building Materials." By Alan E. Munby, M.A. (Cantab.), A.R.I.B.A., &c. (London: Archibald Constable & Co., Ltd. 6s. net.)

VITRUVIUS says "architectura est scientia pluribus disciplinis et variis eruditionibus ornata," and the truth of his assertion holds good to-day; therefore the chemistry and physics of building materials are by no means subjects that are outside the architect's province. Hence a book dealing with them, and written by an architect who is also a chemist, should be welcomed. All architects ought to have learnt something of chemistry and physics before they left school, and had they done so the first part, comprising ten chapters out of the twenty-six in the volume, would have been superfluous; but as these branches of knowledge have often been overlooked by schoolmasters, who seem to think that an architect is only a man who draws palaces and cathedrals, too many young architectural students will find it advantageous to have something of the fundamentals of physics, chemistry and geology explained. As the book before us is professedly an "introduction," one ought not, perhaps, to be too exacting on the author, but we think his book would have been more valuable to architects and architectural students if he had omitted much that is included and is to be found in any decent text-book on building materials, and in the place thereof had given us the chemical tests that are useful in determining the nature and quality of building material. For example, Mr. Munby's account of the gum-resins used in varnish is less full than that in the usual text-books, and does not tell us how we can distinguish a true "copal" varnish from "hard oak." He does not even include in his reference to the adulteration of paint the simple test with a bright silver coin for determining whether a sample of white lead is "genuine" or "best." By revising his second edition on the lines we have suggested we think that Mr. Munby will increase considerably the usefulness of a book that is much needed by architectural students.

"A Complete Guide to Heraldry." By Arthur Charles Fox-Davies, of Lincoln's Inn, Barrister at Law. (London and Edinburgh: T. C. & E. C. Jack. 1909. 10s. 6d. net.)

While in so many and such varied forms of excellence books on this fascinating and inexhaustible subject have appeared from time to time, each presumably seeking to further public interest in and study of it, it is certain that there is even yet a place open to all of them, and this latest fine volume is, if the last, certainly not the least. Exception might perhaps be taken to the word "complete" in its relative sense, inasmuch as, with the numerous similar books of all ages and sizes lying before us, there is even yet much to be done before the last word on this subject has been spoken or written. This is not a dry-as-dust book, but one that turns hard facts into interesting data. Sixty years ago heraldry, if studied at all, was taken up by the very few; to-day it affords much interest and delight to very many; even those who do not follow it up seriously find pleasure even in the casual application of its pictorial side, though only the savant can know what such people lose by leaving out the historical one. We have but to reflect for a moment to feel assured that much of the vulgarity, combined with ignorance of all historical design, in the coach-painting and the hatchments of the long ago, often excellent as handicraft, but of poor art as they were, was caused by the very paucity or non-existence of such books as the one under review. When folk are guided into wrong paths, or find their way to them through the lack of guidance altogether, they deserve as much sympathy as blame. If there be any side of the subject rather scantily dealt with, perhaps the long and vast connection of it with ancient glass might be selected, but every book has its strong and weak points, and in this one the strong certainly predominate.

Changing fashions are not unknown even amongst heralds. We well remember the *canton* being dogmatically instructed to be drawn as fully a quarter of the shield by a high authority, who well knew that the former was clearly in evidence in early days upon more than one monument to his own family then, and still, existing.

With nearly 650 pages of matter and some 800 drawings, many in colour, before us, we cannot refrain from touching in detail upon a few of them. The first illustration, appropriately the arms of our own well-beloved Sovereign, in correct blazonry, sets a high standard of excellence, which is well sustained all through the course of the book. The Union Jack and its historical development are made clear and interesting, both by illustration and letterpress, as is also that old form of pride the vexed question of the "seize quartiers"; deeply interesting, too, is the contribution towards the account of the "pallium" in the arms of the Arch-See of York. However elaborate in line, good heraldry in the main was simple as to the number and character of its charges, and, as a rule, sparse in the variety of its tinctures, and in the best evidences and examples fairly simple in "motif"; as a contrast the coat of Gaveston was well suited to the popinjay who assumed it. One is pleased to endorse the remarks on the heraldic treatment of the Pelican; we have seen her "au naturel" in an ancient religious picture, but never so when applied to coat armour. This fact recalls a chat on this very point with Charles Boutell in the long ago. "Marshalling" has been specially well done, as has also the elucidation of the methods of production of that complex subject, the proper arrangement and portrayal of the pedigree. One item of special interest, if only as indicative of the labour and original research both qualitative and quantitative of the author (see page 79) regarding the "fur" slipper of Cinderella, is worthy of mention. We had never even heard of this version till told it by an English pedestrian while sojourning some years ago at Beauvais. The nettles in the coat of Mallerby are also a rare contribution in canting heraldry. The tabard of Sir William Dugdale, which we saw and handled many years since in the house of a descendant of his, is well illustrated.

There are even yet in much modern heraldry ignoble forms requiring revision. We are reminded of many Austrian eagles displayed in that country irreverently pointed at by our travelling companion, and profanely described as "the rooster." The well-described and illustrated chapter on crowns and coronets merits special commendation.

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Without indulging in invidious comparisons, this latest of many fine volumes by Mr. Fox-Davies, fully illustrated and well printed as it is on good paper (a factor in these days), procurable, too, at a price within the reach of any earnest student, reflects nothing but credit on author and publisher alike.

"A Classified Catalogue of the Works on Architecture and the Allied Arts in the Principal Libraries of Manchester and Salford." (Manchester: At the University Press. London: B. T. Batsford. 3s. 6d. net.)

The two editors of this catalogue, Mr. H. Guppy, M.A., and Mr. Guthrie Vine, M.A., librarian and sub-librarian respectively to the John Rylands Library, are fully entitled to regard their handiwork with considerable complacency. They have done something that ought to have been done elsewhere and which will, we hope, be the forerunner of similar undertakings in other cities, including those nearer the metropolis. In 1904 the Joint Architectural Committee, which is composed of representatives of the University of Manchester, the Manchester education committee and the Manchester Society of Architects, appointed a sub-committee to take steps for the issue of a catalogue giving the architectural books in the local public libraries. It was felt that insufficient advantage has been taken of the fine collection that is scattered about the city owing to the difficulty the students meet with in placing his hands upon a book that is not included in the library at which he first applies. The sub-committee first obtained from the various libraries a list of their books dealing with the art. These were next passed on to the editors, who found that considerable revision was necessary. In constructing the catalogue they elected to arrange the entries in a logical or classified order, and then to supply alphabetical lists of the authors and of the particular subjects dealt with. The decimal system of classification, originated by Dr. Dewey, an American, has been utilised, though with some modifications. A concise explanation of its working is given in the introduction. The first 190 pages are composed of the classified list; in it the first heading is "Building Construction" and the last "Architectural Design and Decoration." But this rather unusual order need not bewilder the inquirer, for the prefatory seven pages, headed "Scheme of Classification," will enable him to quickly discover the page giving the books he desires. Then follows an alphabetical author list, and finally a subject index. The compilers have in many ways done a useful service, one of which, and that not the least, is the discovery of what the co-operating libraries have not got. When this omission is important an asterisk is prefixed to the title, so that the authorities may know what works they ought to obtain. The Classified Catalogue will, we have no doubt, have a far more than local use, and it should be an encouragement to librarians to render a similar service to students of other subjects besides the Mistress Art.

"The Chadwick Lectures." Session 1907-8. University of London. By W. D. Scott-Moncrieff. (London: St. Bride's Press, Ltd.)

Sir Edwin Chadwick, K.C.B., after serving on various Commissions in the middle of last century which dealt with existing social conditions, made sanitary reform the work of his life. Anxious that his ideals should not die with him, he left an annual income of about 885*l.* to be devoted to the promotion of sanitary science. The establishment of the Chadwick Lectures at London University is part of that scheme; and the booklet now under notice is made up of four lectures delivered in May last and entitled "The Engineering Aspect of Recent Advances in connection with Sewering." Mr. Scott-Moncrieff has gathered together a large amount of information concerning a subject that is of vital importance. The lectures embody the almost continuous work of seventeen years in originating and developing the science of biolysis, and have all the weight of the author's reputation as a sanitary engineer in the highest meaning of that title.

"Text-book of Petrology." By F. H. Hatch, Ph.D. Fifth edition. (London: Swan Sonnenschein & Co., Ltd.)

In a recent note we referred to the importance of expert knowledge for enabling an architect to distinguish between good and bad granite, and to recognise the accordance or divergence of sample and bulk. This expert knowledge is based on petrology, for chemical composition of stones is not in itself sufficient for their determination. A text-book of petrology is therefore valuable to architects who desire to become experts in granite, and Dr. Hatch's book is an excellent guide to the structure and classification of igneous rocks, whether plutonic, hypabyssal or volcanic. Whilst the author professedly deals principally with igneous rocks, the description of constituent minerals embraces those found in the sedimentary rocks, hence it is useful as an introduction to the further study of these more widely used building stones. The appearance of a fifth edition is sufficient evidence that Dr. Hatch's text-book is of recognised value.

"Illuminating and Missal Painting on Paper and Vellum." By Philip Whithard. (London: Crosby Lockwood & Son. 4s. net.)

Save as a means of embellishing testimonial addresses and delineating achievements of arms it might be supposed that the subject of this little book is a lost art, but the beauty and charm of Mediæval work must not infrequently tempt many an artist to emulation of that work as a recreation if not as a remunerative employment, inspiring a wish that he knew something of the technique. For the technique of illuminating is not that of ordinary body colour painting, and Mr. Whithard has evidently studied carefully the instructions that have been left for us by the ancient artists, and, having put those instructions into practice, has learnt what he now imparts—the right technique for illuminating and missal painting. To the young architectural draughtsman the chapters on writing, with the descriptions of the ancient scripts and the pen forms by which they were executed, are alone worth the price of the book. There is much, too, in the advice and hints given on painting that are of wider usefulness than in the limited field for which they are primarily intended by the author.

AN INTRODUCTION TO THE STUDY OF STAINED GLASS.*

IN a lecture on "The Education and Character of the Architect," by the late Professor Donaldson, the following passage occurs:—

"For my part I cannot consent to restrict the pursuits, the acquirements, the knowledge, the talents of an architect to the narrowed limits of the immediate branches of professional science. This may do for the mere mechanic, but by such a rule the architect as an artist and a man of science cannot, ought not, to be measured. Regard him as a man of science. Is his attention to be merely turned to the choice of this or that timber, the selection of this or that metal or stone? Would I not rather let his mind be more amply developed by diving into the mysteries which regulate matter in general, and by observing the geological structure of the globe and the relative value of each stratum? Shall he not with the aid of chemistry deeply study the stupendous influence of heat, upon which in its largest scope depends the very existence of this sphere? And in the same manner, through every division of physics, shall he as an artist limit, as some have done, his knowledge of architecture to a delineation of the Classic orders, and not rather master all the styles of all ages and countries; profoundly investigate the elements of beauty, fitness and proportion in each; and perchance create a new style or design a new order? Shall he not appreciate the brilliant aids which sculpture and painting afford to buildings, and by the study of colour produce graceful combinations of harmonious tints in the adoption of various toned marbles and the delightful illusions of stained glass?"

It is precisely upon the perfect adjustment of science and art that all crafts depend, and it is this theme I propose to develop this evening. I should prefer therefore to call this paper—

An Introduction to the Study of Stained Glass,

with

I. A description of the manufacture of glass from the raw material, and

II. An account of the various processes undergone in the making of a stained-glass window, concluding with slides.

The question that had first to be solved in my mind, before attempting to formulate some ideas for this paper, was this, What do students of architecture want to know about the subject of glass? Students of architecture, I understand from an eminent architect of very ancient days, "should have that perfect knowledge of each art and science which is not even acquired by the professors of any one in par-

* A paper read by Mr. James Ballantine before the Edinburgh Architectural Society.

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ticular." I am glad, however, to note that that good and great man Vitruvius maintains "that although it is required of the architect to be generally well informed, it is manifest he cannot hope to excel in each art." My aim, therefore, will be to add to your already replete store-house something that may enable you to feel more qualified for a profession that seems to demand knowledge exact, specific, and progressive.

The historic and æsthetic aspects of stained glass have been considered so often, beginning with Pliny's record that glass was first discovered more than three thousand years ago, together with ample proof of a history as ancient as pottery or bricks, that I want instead to treat the whole field of glass from an intimate individual point of view and to show examples that will illustrate the points emphasised.

I. *Manufacture of Glass.*

Two or three hundred years ago the chemists held that every substance could be converted into glass by intense heat, and that all the chemist's art and all the force of fire could not carry the change of any natural body beyond its vitrifaction. One old writer says:—"It was a merry saying of a very great artist in the business of glass, that their profession would be the last in the world, for that when God should consume the universe with fire all things therein would be turned to glass."

An old definition of glass was "a concrete juice," and the most modern term, used to describe its exact structure observed by delicate instruments, is "congealed liquid," because the passage from a molten liquid condition to a solid is gradual and continuous, no change whatever taking place.

Chemical analysis of all ingredients must be made for the production of the best varieties of glass, and the variation in the colour, &c., cannot be accounted for or controlled unless steps are taken to keep the materials as constant as possible. Briefly put, the principal constituents of glass are sand, with some salt of soda or potash, but when technically stated the raw materials are grouped, as Mr. Walter Rosenhain points out, into sources of silica, sources of alkalies, sources of bases other than alkalies.

The chief source of silica is sand, which is found in France, Germany, Belgium, and England in various states of composition and degrees of purity. The sand from Fontainebleau and Lippe is delivered commercially with a guaranteed silica content of 99-98 per cent., the impurities being iron, alumina, lime, and alkali; while from Belgium and England—in Bedfordshire and Lynn—with a somewhat lower standard of purity, quite suitable sand is obtained. Sandstone and flint are other sources, but the expense of crushing, &c., makes them prohibitive, although in the old days flint was largely used and we still hear of "flint glass."

Originally the alkali constituents of glass were derived from the ashes of plants and seaweed or kelp, but the necessary alkalies are now introduced in the form of sulphate of soda or salt-cake, and for special glass carbonate of soda or soda ash.

The other bases are calcium oxide, or lime and lead oxide, arsenic, manganese, aluminium, and carbon.

These then are the raw materials of glass, and we must now look for a little at the structure of the vessels into which these materials are put. The greatest care has to be taken not only with the materials and making of the crucibles or pots for holding the molten glass prior to blowing, but also with the construction of the furnace for melting the glass.

The pots must be made to last a long time and in such a way that they are not acted on by what is called the "frit"—*i.e.* the raw material. They are made from the most refractory clays, and great care is taken in their building up, the process of drying sometimes lasting a whole year and always many months.

The glass-melting furnace is also made of refractory material, Dinas bricks being much used. The introduction of gas heating into the glass industry has altered the entire method of procedure, and now glass tanks above the furnace are used capable of holding 120 to 180 tons of glass in the case of bottle glass, and 500 to 600 tons of glass for windows.

In coloured glass of pure quality these tanks are of little use and pots are employed, holding about a cwt. of glass metal, which can readily be removed by the blowers with their pipes. The raw mixture having been introduced into the tank or pot furnace, we must now pass over the extremely complicated chemical reactions that take place between the silicates, the alkalies, and the other ingredients. Many interesting processes—viz. the making of bottles, all hollow-ware, rolled glass, pressed glass, wired plate-glass, &c.—must also be omitted in order that we may proceed to the making of sheet glass as being the stage nearest to that of antique glass, which is so largely used in stained glass windows.

Groups of three workmen carry out the various operations connected with the blowing of glass—a pipe-warmer, a gatherer, and a blower. The pipe-warmer's duty is to see that the blowing pipe is of the right temperature, free from dust or obstruction, and to place the pipe in the furnace so that the next workman, the gatherer, may be able at once to begin collecting the molten glass on the end of the pipe. Three separate gatherings are made, each time more glass being acquired, and then the pipe, with its adhering mass, is removed from the furnace and passed to the third and chief workman, the blower. The blower stands on a sort of platform in order that he may have freedom to swing the pipe like a pendulum, more depending upon this than upon the actual blowing. From a bulb shape the mass becomes cylindrical, closed at the lower end. This end is opened either by heating until it gradually softens and bursts open or by touching the end with hot glass and cutting a hole with a special implement. By spinning the blow pipe with the glass attached rapidly, the cylinder, which is now somewhat like a "muff," as it is indeed called, becomes more opened out and can now be detached from the pipe by a piece of cold iron. It is then laid on a wooden rack and allowed to cool slightly before being opened out into a sheet for use. This is usually done by drawing a glazier's diamond down inside and placing the split cylinder on a stone slab in a special kiln. The heat causes the glass to spread out, and this spreading is accelerated by the use of a wooden tool which brings the glass close to the stone slab. The sheet is then carried into the annealing chamber where it is gradually moved down through a funnel heated at one end and cold at the other, so that when the sheet emerges it is ready for use.

The making of crown glass is interesting, and the glass produced has special inherent qualities. After the gathering on the blower's pipe has assumed the proper shape and size, another workman attaches to the mass of glass a pointed iron rod called a pointel, pontil, or punty, which is taken by the blower, after the blow pipe has been detached, and the opening widened by softening and revolving in front of a furnace, until the mass assumes a circular shape about 4 feet in diameter, when it is detached from the pontil, leaving the well-known "bull's eye" mark, and allowed to cool and anneal as before described.

What are termed "defects" in sheet glass for windows are of the greatest service in antique glasses, and all can be produced at will. Bubbles, blisters, threads, all of which give quality to antiques, from white to colours, are the result of the process the raw material undergoes. Numerous inventions are being experimented with whereby the mechanical production may supersede the older method, but this only applies to cases where large quantities are required.

Throughout the process of glass blowing at each stage there are many details we must again pass over in order to arrive at coloured glass and from this proceeding to a stained-glass window.

The methods employed in the making of coloured glass are the same as those used for sheet glass, the colouring material being mixed with great care and melted in the glass pots together with the other ingredients.

A mere statement of the oxides with which silica forms coloured oxides will be sufficient.

Iron has two oxides, the protoxide, colouring glass green, the peroxide, yellow.

Copper, again, has two oxides, one of which produces green and the other red.

Silver is never mixed with glass materials and fused with them because it does not readily unite with oxygen, and when it does so it loses its oxygen again at a high temperature. The high temperature necessary for the making of glass would reduce the oxide of silver to a metallic or black state. Silver is used for coating the surface of glass, the temperature of the muffle kiln, in which stained glass is fired, being so low that a beautiful yellow colour is the result.

Gold has similar tendencies, but can be utilised more effectively than silver, having a useful function to perform in the making of flashed ruby glass and gold pink.

Cadmium in the form of sulphides of cadmium produces rich yellow colour.

Chromium with iron makes blue, and with copper, green.

Aluminium is used for opal glass, opalescence being obtained by using arsenic and tin.

Oxide of cobalt makes an intensely blue colour.

Manganese dioxide gives a range of colour from purple to violet.

You will see, therefore, that the range is unlimited, the

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various materials being used in conjunction with one another where possible to produce the colour required. For a long time, as the demand for better glass continued, all so-called defects were eliminated, with the result that stained-glass windows had to be composed of flat red and blue, until glass-makers were induced to reproduce the qualities of ancient glass with all the added knowledge of chemistry and modern methods.

As a modern chemist has said:—"It is probably not too much to claim that the modern workers in coloured glass have materials at their disposal which are at least as suitable for the purpose as those that were available in the best days of the ancient art."

Texture can be given in several ways, and by manipulation a sheet may have varying thickness and may even have other things introduced if need be. All this, however, can only take place during the process of making when molten, and I would warn you against believing a story I myself was told by a celebrated painter who was describing the methods of an equally celebrated glass-stainer.

This stained-glass man was depicted sitting in his studio working with glass, introducing here and there, where heavy colour was required, great lumps of stuff, thus enriching the quality of his work. I would remind you that the temperature of a glass-melting furnace is about 1,600° C. or 2,900° F., and that glass cannot be handled like clay, so I fear this tale is somewhat apocryphal and not to be credited.

The most interesting property of glass, and the one that concerns us most, is its transparency, for, with a few exceptions, its employment is due to its capability of transmitting light.

There are in use in laboratories very delicate instruments for showing that even the best and purest glass, owing to its absorption of light, cannot be said to be perfectly transparent, and when we remember that light is turned back by reflection at the surface of entry and again by reflection at the surface of exit from the glass, it is not difficult to realise that the transmitted beam is correspondingly weakened.

This partial transparency, however, introduces the scientific difficulty of light waves, and when we go beyond the range of ordinary visual light impressions of colour altogether change, and we can therefore dismiss the matter as being beyond the present scope.

The durability of glass under the action of the atmosphere or light has been carefully investigated and the chemical stability of glass surface put to severe tests. Glasses have been classified into groups according to chemical tests in laboratories, but it has been found in practice that certain so-called unstable kinds have given very satisfactory results. This is due to the fact that experiments where small quantities are used always give exaggerated results.

Glass found in windows of old churches has undoubtedly undergone a change, due to exposure to the action of the air, moisture and light. Its surface has become rough and, in the case of so-called "whites," light has caused the glass containing manganese (itself used to prevent the impurities in sand from affecting the colour) to assume a purple or brown tinge.

The probable explanation of the roughness and dimness of glass surface is that glass, being a mechanical mixture of different silicates, some of the silica present becomes hydrated and so dissolved out.

The chief physical, or rather mechanical, properties of glass are strength and hardness, and we must disregard as beyond our sphere properties such as elasticity and thermal endurance, expansion and conductivity, also electrical properties, and proceed to the account of the making of a stained-glass window.

II.—*Stained Glass.*

Mr. Christopher Whall says:—

"The art of stained glass, though reaching to very high and great things, is in its methods and processes a simple or at least a very limited one. There are but few things to do, while at the same time the principles of it touch the whole field of art, and it is impossible to treat of it without discussing these great matters and the laws which guide decorative art generally."

In the making of a stained-glass window there are six main stages: coloured design, cartoon, cutline, before painting, after painting, and leading, each stage having important sub-divisions.

The cartoon has to be drawn full-size from the scale design with all lead lines shown. From it, the cutline is next made by tracing on paper the centre of lead lines, to which the glass is cut. Each piece of glass as it is cut is attached to a large plate of glass with beeswax, and in this way an idea of the colour is obtained. The greatest care must be taken here to ensure the success of the colour-scheme, and several pieces may have to be cut for the one place before the right effect is obtained. The glass is then knocked off and entrusted to the glass painter, who proceeds to trace the outlines, from the cartoon, on to the glass, with an opaque brown pigment.

The pieces are then fired, which causes the colour to impregnate the glass and thus become incorporated with it.

The muffle kiln, in which the glass is fired, consists of an iron box with sliding shelves enclosed in an oven of brick work. The shelves are covered with powdered chalk, upon which the pieces of glass are laid, painted side up. The fire is underneath and the flames surround the box. After about seven or eight hours of burning at 1,300° F., the fire is drawn, and the glass allowed to cool gradually.

After firing, portions of the window are stuck up with beeswax on a glass easel, blackened to represent the lead lines, and the painter proceeds to translate or interpret the cartoon, by painting in two ways—matting and stippling the surface of each piece of glass with another specially prepared oxide of iron pigment.

The painter of a stained-glass window must be an expert draughtsman, and, as has been said, "is, in fact, to the designer what the pianist or violinist is to the composer of the sonata."

The portions are then taken off the easel and fired again, after which the painter works up, remodels, and finishes the painting of the whole window. The glass is fired for the third and last time, the silver for yellow stain where required being added on the back of the glass. The window is now ready for the lead worker, who builds all the pieces together with lead, soldering the joints, and generally completing the window.

Such is a brief outline of the processes, and instead of elaborating it, I am going to invite you to come and see a window actually in course of construction. In this way you will be able to acquire far more information than if you listened to a more detailed description minus the materials involved.

May I be allowed to conclude my account of the processes undergone and the methods employed in the making of a stained-glass window with a word regarding the detail of the stone or wood of the mullion and sash made for the reception of the window? Too little space is often allowed for the outside glass, the leaded work, and the iron saddle-bars, for when outside glass is used it goes into the groove, the leaded glass being glazed daylight size and the saddle bars fixed inside. The face of inside of stone jamb or wooden frame should never be less than 2⅜ inches; outside glass, stained glass, and bars take up ⅜ inch each, ⅝ inch outside and inside being left clear.

As Mr. Holiday points out in his book "Stained Glass as an Art":—

"Stained glass is strictly a technical art. The glazing of the open window space and the subduing of the light are purely practical matters, and the artist, having to deal with pieces of coloured glass, has to consider how these can be treated so as to be beautiful to the eye and interesting to the intelligence. The sole object is to glaze an aperture in the wall of a building for the purpose of admitting light and excluding weather. The glass, lead, and iron are primarily means to the end, and the question whether they shall be so treated as to constitute a work of art is a secondary one.

"A simple desire for beauty might sufficiently account for the introduction of artistic forms and colour into glazed windows, but practical considerations may have led to the same result."

Taine, in his "Philosophy of Art," writes of the Middle Ages as follows:—

"If one considers the stained-glass windows, or the images in the cathedrals, or the rude paintings, it appears as if the human race had become degenerate, and its blood had been impoverished; pale saints, distorted martyrs, virgins with flat chests, feet too long, and bony hands, hermits withered and unsubstantial, Christs that look like crushed and bleeding earthworms, processions of figures that are wan and stiffened and sad, upon whom are stamped all the deformities of misery and all the shrinking timidity of the oppressed."

Another writer sees the survival of the great classical tradition, "both in type of features and treatment of drapery, but nature becomes more and more deserted, symbolism more and more predominant, till at length the human form is totally misconceived, the drapery becomes a convention which has no connection with the limbs or body

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it covers, even the eye and nose begin to present difficulties which can only be faced by a more or less symbolic rendering."

With the Renaissance came Donatello, Leonardo da Vinci, Michel Angelo, the Della Robbia family, all working from models and arranging their drapery as they desired, thus setting for us the standard of what drawing should be. In the series of slides I want to show the development from the crude statement to the elaborate working out of a definite conception capable of satisfying the eye by its beauty and the head by its soundness.

RIVER POLLUTION.

A DISCUSSION on River Pollution, its ethics, æsthetics and hygiene, formed the business of a sessional meeting of the Royal Sanitary Institute on April 7. Sir Francis Sharp Powell, Bart., M.P., vice-president, occupied the chair.

Mr. W. D. Scott-Moncrieff in opening the discussion offered the following propositions:—First, that river pollution was originally compulsory and forced upon our urban populations by legislation, and that the principal reasons for enforcing pollution were connected with questions of public health; second, that the Rivers Pollution Prevention Acts subsequently passed to prevent the pollution of rivers were also based upon regard for the public health, complicated with rights of property on rivers and canals; third, that a great deal of the legislation referred to was framed upon expectations and suppositions that have turned out, for the most part, illusory, and that many of the arguments used by the promoters of existing sanitary legislation are now proved to have been misleading; fourth, that the æsthetic element can now be shown to be the principal argument that is available as a justification for the enforcement of existing statutes; fifth, that in justice to the ratepayers of many of our great towns, the whole subject requires to be reconsidered in the light of more advanced knowledge based upon actual and dearly bought experience. Dealing with the first proposition, the speaker pointed out that previous to the passing of the first Public Health Act in 1848, there were practically no sewers in England at all, so that the pollution of rivers must have been upon a very limited scale, and would have remained so, in spite of the increase in population, if the construction and use of sewers had never been made compulsory by Acts of Parliament. The report of the Health of Towns Commission which appeared in 1844 revealed "such an astonishing amount of decomposing organic matter and filth of all kinds in the cities, that it aroused British sanitarians to a strong movement for the amelioration of these conditions, and led to the filth theory of disease."

The Town Improvement Clauses Act passed in 1847 gave local authorities powers to cause their sewers to empty themselves into the sea, or any public river; but the first Public Health Act which was passed in the following year, provided under section 145, that nothing in the Act was to be construed so as to authorise the local authority without previous consent in writing to use, injure or interfere with any water course or stream in which the owners of certain property, or the proprietors of canals or navigation might be interested. The difficulties encountered by local authorities at the time, said Mr. Moncrieff, must frequently have been in the nature of a dilemma, for when the General Board of Health was expiring in 1854, they found among their conclusions that "it was far less injurious to the public health to have the refuse of towns in water in the nearest river, than underneath or beneath dwellings." The next point to be considered was as to how far the public health was really implicated by river pollution, and if it could be shown to be a practically negligible quantity it followed that the whole of the legislation dealing with river pollution had been promoted and passed upon grounds that were illusory as regards the main argument, and, seeing that the law with regard to the proprietary rights had never been interfered with, all that was left, as a justification for the existence and enforcement of the Rivers Pollution Acts was, unless in exceptional cases, the plea of amenity. In other words, the æsthetic argument pure and simple was all that was left. Bearing directly on this question they had the evidence of Dr. Thresh, the medical officer of health for the county of Essex, given before the Royal Commission on Sewage Disposal in 1898. He then stated that, at the time he was associated with the Manchester and Salford Sanitary Association, he made an investigation as to one of the most squalid districts with a view to discovering some connection between the filthy condition of the river, which was "vile in the extreme," and the high death-rate. Taking the figures for ten years, "he could not find the slightest indication of any ill effect from the polluted river going through the borough." It might be said that the absence of any evidence to a contrary effect through the entire literature of the subject would be fairly conclusive when confirmed by the experience of Dr. Thresh in his evidence, but more than the investigation at Manchester was available in support of the contention that foul streams were not a danger to health, and this was to be found in the attitude of those who were experts in all matters connected with public health, not to mention the Local Government Board and the members of the Royal Commission on Sewage Disposal. At the Birmingham sewage works, sewage in excess of 15,000,000 gallons per day was being treated by a preliminary putrefactive process in tanks, followed by filtration, which was effected by means of nozzles expressly designed to break up the septic liquid into as fine particles as possible. The sewage was sprayed into the atmosphere without a precaution of any kind, even when high winds were blowing and distributing it through the air to distances which must approximate to that of salt spray carried by gales from the sea many miles inland. It followed that not only the local authorities and their officers, but also the Local Government Board and the Royal Commission on Sewage Disposal have cut themselves away from any possible relation between river pollution and the public health as an argument for the enforcement of the Rivers Pollution Acts, seeing that the sewage in question was far safer and much less expensive flowing between the banks of the Tame than being sprayed into the atmosphere, as it was at present. It appeared, therefore, that if the promoters of the Rivers Pollution Acts had been in possession of the knowledge that pollution had no bad effects upon the health of the public they must have abandoned their principal argument, and it was difficult to see what was left beyond questions of amenity. Of course, these remarks only applied to rivers not used for drinking, and there was no suggestion that the legislation referred to was carried out in anything but good faith. It was a different matter, however, with fresh legislation, and it was only fair that the ratepayers should be told what they were paying for before being subjected to fresh demands. There was no suggestion in what had been said that our rivers should not be purified. Many of them, such as the Thames, must be kept free from pollution at any cost, but the question of streams that were at present foul should not be treated as pressing on the ground of the public health in the face of the facts that were now in evidence. If it could be shown that the methods to be adopted were not likely to be superseded and were always certain to be successful, it would be a different matter, but it would be easy to show that that was far from being the case. The question was as to whether the ratepayers were ever likely to have a hearing at all. It should be remembered that in legislation of this kind it was quite easy to create vested interests that were naturally opposed to any interference with the volume of occupation, and that strong and influential bodies of opinion were brought into existence opposed to any modification of the law that might put a limit to the indefinite increase of fees and salaries. It should not be forgotten that while England had been making great efforts to solve the question of sewage disposal with small regard to the pockets of the ratepayers, many competent critics abroad were waiting to take advantage of our experience, and as an expert onlooker was often the best judge of a game, it might be well to quote from Dr. Calmette, the Director of Sewage Investigation in France, who said "that great land operations for the disposal of sewage can only be carried out by the principal capitals, or by the smaller communities where there are great tracts of land with sandy or chalky soils, very absorbent and of little value, and that, in the case of towns of less importance, and less favourably situated, it is absolutely impossible to have recourse to this method at all." Coming to bacterial processes as the latest phase in the solution of the sewage problem, although it was of comparatively recent date, it had been no exception to the rule of disappointed hopes and waste of money. So many points in connection with this branch of the subject were still in dispute, and there was such a complete absence of a scientific basis of any kind, that no statement, however guarded, was likely to meet with general acceptance. There were a good many people, however, who were agreed that contact beds had been associated with many disappointed hopes, and there were others who would think that that was putting the case very mildly. As to the question of hydrolysis as a preliminary to filtration, Mr. Moncrieff was of opinion that the process was altogether in its infancy, and was little understood, and as

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for percolating filters he doubted if there were so many as ten existing installations in which the designers arranged for their construction upon even remotely satisfactory data. Taking the county of Stafford as an instance of special carefulness in the administration of the law, he had been informed that about 1,000,000*l.* had already been expended on sewage schemes, and he was not aware of any of that sum having been spent upon the preservation of rivers used for drinking. Supposing then that the æsthetic element was the principal feature in the way of a return for the money spent, it might be well to say something of other conditions prevailing in many of the districts that were traversed by filthy streams. The population of the pottery towns were not obsessed by any great regard for the beauty of their landscapes, and it was hard to see how they possibly could be. The same remark applied to the inhabitants of most, or at any rate many, midland towns. The river Aire as it flowed through what was once the beautiful estate of Esholt was filthy in the extreme, but even if it was as clear as crystal it would not save the landscape from being exceedingly depressing on account of the destruction of vegetation by the smoke from factory chimneys. It was no doubt most desirable for many reasons that the Aire and every other river should be unpolluted, but it was also only fair and reasonable that the people who had to find the money should know that it was amenity and not health that they were being called upon to pay for, and that, at any rate, they should no longer be called upon to conform to the letter of a statute which might be interpreted as meaning that nitric nitrogen in an effluent was excrementitious matter, and must not be allowed to pass into a stream. When an Act was in force containing a clause which there was no conceivable means of complying with, surely the sooner it was amended the better. By all means, said Mr. Moncrieff, let us leave no stone unturned to arrive at a final solution of the problems of sewage disposal and river pollution, but let us at least get it upon something approaching to a scientific basis before insisting upon ratepayers spending vast sums of money upon the purification of already filthy rivers on no more pressing ground than that of amenity.

Mr. Easton Devonshire said as a waterworks engineer and administrator he regarded the question of the pollution of rivers from a selfish standpoint. Mr. Scott-Moncrieff stated that his remarks on the Rivers Pollution Acts only applied to rivers not used for drinking purposes, and, further, that many of them, such as the Thames, must be kept free from pollution at any cost. He wished to know where would Mr. Moncrieff draw a line and under what conditions of expediency or public advantage he would keep some rivers pure at any cost while reserving others as sewage carriers for the financial benefit of isolated communities? They could not all obtain water from Wales, and therefore the question of the preservation of their rivers and streams should start from the axiom that all the natural surface-water courses of the country were potential sources of water supply. Advance in knowledge and practice might some day convince them that the æsthetically sound method of the wholesale disposal of sewage was not hygienically the most perfect. He was tempted to suggest that conclusion by the conditions which obtained in a continental town whose water supply he helped to administer—he referred to Antwerp. The municipal authorities there had recently published a tabulated statement, which showed the death-rate of Antwerp for last year was 12.7 per 1,000, a figure lower than that of any other city in Europe. The condition of sanitation at Antwerp was interesting. The town obtained its water supply from the River Nethe, an upper branch of the Scheldt. The intake of the waterworks was at a distance of about sixty miles from the sea, and there was a rise and fall of tide at the intake of about 10 feet. Four miles below, at the point where the Nethe gained the Scheldt, the sewage of Brussels was discharged by the River Senne and mixed with the volume of the main sewer. Two miles above was the town of Lierre, the surface drainage of which discharged into the river on the falling tide. Under such conditions great expense and continual care had been required in the purification of the water of the Nethe before it was supplied to Antwerp. Brussels, as they all knew, had geographical advantages which should make it extremely healthy, and it had, moreover, a system of sewerage which would satisfy the Public Health Acts in this country. Æsthetically the sanitation of Brussels was beyond criticism, and the conditions in which its population lived were in theory eminently hygienic. The population of Brussels was 400,000, and the death-rate last year was 15.7 per 1,000. Antwerp, on the other hand, had adhered to the old-fashioned and unæsthetic plan of every man to his own cesspit. There were no sewers, but the construction of the domestic cesspit was subject to strict regulations, and connection with surface drains was strictly forbidden. The population of Antwerp was 320,000, and it was built on a low-lying plain. The death-rate was 12.7 per 1,000, or three per 1,000 less than that of Brussels. It was true that before the water supply was generally used, when the inhabitants drew their drinking water from shallow wells generally built as a compartment of the cesspit structure, the sanitary condition of the city was not what it was at present, and it was interesting to note the correspondence between the diminution of the death-rate and the increase in the number of houses taking the water company supply. The system of sanitation in Antwerp he supposed could not be termed æsthetic, but hygienically the city stood at the top of the tree, and therefore it was with difficulty argued that the ethics of its sanitary methods were unsound.

Professor Bostock Hill agreed it was perfectly true that the pollution of rivers was caused primarily by sewers being led into them, but they might also add that it was due to the increase in population, so that it was not fair to attribute the faults of such a system to the Legislature. They were all aware that the general public had a very exaggerated idea of the emanations of pollution from streams. No doubt if a river ran smoothly it would be difficult to prove that diseases were produced by the pollution. They must, however, remember there was another point. Cattle drank from many of the sewage polluted streams, in some cases the only source of supply, and there was no doubt they often suffered bad health in consequence. The pollution of rivers might therefore be considered as affecting not only amenity, but the health of cattle and the lives of human beings also. Mr. Moncrieff had referred to the treatment of sewage by which particles were sprayed into the atmosphere. The speaker said he was the medical officer of health for Birmingham, and he had stated to the authorities that there was great danger to health in the exposure of considerable volumes of sewage. Attention had been called to the fact that most land schemes and chemical processes for the treatment of sewage were found to be at fault. That, however, was no reason why experiments should not be continued on lines which they hoped would ultimately lead to success.

Professor Henry Robinson said that twenty-five years ago he had suggested there should be a department of State to deal with the question of river pollution. Such a department would have kept all streams under proper control, supervising and regulating the use and abuse of them. There must necessarily have been experimental work in the past, and though many of the methods had not been successful, they had not yet reached finality. He urged authorities not to fall into the error of adopting one particular method as applicable to all places; that had been done to a large extent in the past, with the result that great sums of money had been wasted.

Mr. Midgley Taylor said Mr. Moncrieff's main contention appeared in his fourth proposition, which stated that the millions of money expended in this country on the improvement of rivers had been entirely wasted, excepting so far as the amenities of the rivers were concerned. He could not accept that proposition in any shape or form. He agreed that it was an extremely cheap and easy method to dispose of sewage by discharging it into a river, but some consideration had to be shown to towns situated on the lower banks of the watershed. It was allowable to disperse a small amount of sewage into a stream, but harmful to discharge such volumes of matter as to render it dead. Personally he entirely disagreed with the attack made on the Local Government Board, because he thought they were wise when they insisted that every local authority should possess an area of land available for the bacterial treatment of sewage.

Mr. J. D. Watson also upheld the view that they must consider each case on its own merits. Local conditions had to be taken into account and they almost all differed. Birmingham and its distributor had been referred to. The results of the methods adopted there proved the treatment to be a cheap one, and if they could take the town of Salford as a precedent there was no risk to the health of the community by spraying distributors.

Mr. H. P. Boulnois said Mr. Moncrieff had entirely omitted consideration of the pollution of rivers by factories. Although they had been making only experiments in England, they had something to show for their efforts, since he believed they had the best sanitation in the world.

Mr. H. D. Searles-Wood formally proposed a vote of thanks to Mr. Scott-Moncrieff, which was carried by acclamation.

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OUR CONTEMPORARIES FROM OVER-SEAS.

THE *American Architect* has for the subject of its principal illustrations the new "Lotus Club," of which Mr. Donn Barber is the architect. The building is one of six storeys above the street level, and is somewhat unusual in composition from the importance of treatment given to the topmost storey. Some nice detail is illustrated, based upon Italian Renaissance work, but distinctly flavoured with a modern Parisian feeling. Another of the principal plates is devoted to the interior of Colchester Town Hall, by Mr. John Belcher, A.R.A. A short article on colour as applied to the exterior of buildings scarcely sufficiently deals with the subject, and the illustrations accompanying it are from seventeenth century German work; but as they are in black and white they do not help very much in the study of colour.

The Architectural Record (New York) has an article apparently intended for non-professional readers on "How to get a well-designed House," the examples illustrating the article being residences of Mr. Nicholas F. Palmer, Mr. Francis F. Palmer and Mr. George Palmer. They are given as examples of the failure that is likely to result when an employer goes to a decorating company, and show how easy it is for wealthy clients to spend plenty of money, and yet not get a well-designed house. A study of the New York suburb, New Rochelle, is largely another example of what to avoid. "A Contemporary Westover" is a good example of a modern adaptation of an old design, being admittedly, and in accordance with the instructions of his client, Mr. Charles A. Platt's reincarnation of the colonial house known as "Westover." The series of articles on "The Architect in History" is continued, and deals further with the architects of the Roman Empire.

The Engineering Record (New York) has an article on "Progress on the Bridge Loop Subway of the Rapid Transit Railway, New York," which is chiefly interesting from the illustrations and descriptions of the difficult and extensive underpinning of existing buildings that had to be undertaken. Two papers are reported on cast reinforced concrete piles, the one by Messrs. Sanford E. Thompson and Benjamin Fox, the other by Mr. M. M. Cannon. An article on cantilever and raft foundations for a twelve-storey building describes what seems to us a rather daring piece of reinforced concrete construction; the foundations of the internal columns of a twelve storey building of the total height of 150 feet being carried on cantilevers from the external steel framework.

La Construction Moderne illustrates the farm buildings erected at Bois-clair (Charente), designed by M. Henri Seay, architect, for the special requirements of a farm chiefly devoted to viticulture.

NOTABILIA.

THE *Illuminating Engineer* contains abstracts of papers by the editor, Mr. Leon Gaster, forming the second and third of his series of Cantor lectures delivered before the Royal Society of Arts on "Modern Methods of Illumination." In these lectures are treated the subjects of gas lighting, lighting by candles, oil, acetylene, petrol, air-gas and alcohol, and they are thus useful to architects who have to design country houses.

Page's Weekly gives Mr. F. J. Cook's paper on "Foundry Tests of Pig Iron," read before the Lancashire branch of the British Foundrymen's Association, which includes some valuable information, not only on the subject of tests, but on the modifications and the resultant character of cast iron that follow variations in the minutiæ of casting.

COMPETITIONS.

THE following is the result of a limited competition for an extension to the Southern Hospital, Liverpool, which takes the form of a detached out-patients' department, estimated to cost 8,500*l.*:—1, Haigh & Thompson; 2, Briggs, Wolstenholme & Thornley, FF.R.I.B.A.; 3, Willink & Thicknesse, FF.R.I.B.A.

MESSRS. MACINTOSH & NEWMAN, architects, London, have been awarded first place in the competition organised by the London and South-Western Railway for a concert-hall at Eastleigh. The second place went to Messrs. Petter & Warren, of Southampton, and the third to Mr. J. B. Fulton. The assessor was Mr. F. G. Knight, F.R.I.B.A.

MR. W. BEDDOE REES, A.R.I.B.A., architect, Cardiff, has been awarded the premium of 5*l.* 5*s.* offered in a competition for a chapel proposed to be erected at Penclawdd, Wales, to accommodate 800 sittings. The cost will be between 3,000*l.* and 4,000*l.* Mr. A. Conder, F.R.I.B.A., acted as assessor.

Correspondence

[The Editor will not be responsible for the opinions expressed by Correspondents.]

The Manchester Education Committee and the Architectural Profession.

SIR,—The Manchester Corporation has for some years past maintained a drawing office in connection with the education committee, in which all designs for new school buildings and for alterations to existing buildings have been and are prepared. Thus architects practising in Manchester are excluded from this work, and in the case of alterations the original architect may see his work copied or reproduced without any acknowledgment by the committee.

Surely a Corporation is not justified in setting up a department to do the work of an established profession, unless it can show clearly that the public will be thereby better served.

The education committee has had ample time to prove that its architectural department either does or does not justify its existence. Can the committee point to any superiority either in planning or in architectural treatment? While, as to cost, if the committee will state the average cost per scholar of the new buildings and will make a full return of the cost of maintaining its drawing office, it is submitted that it would at once be clear that its method does not make for economy.

The Manchester Society of Architects recently sent a protest to the Lord Mayor with reference to the new secondary school about to be erected in Chorlton Street in accordance with the method indicated above, but without result. This new school was planned by the education committee as an extension to the existing schools, which were built a few years ago by well-known Manchester architects. These existing schools provide good accommodation for secondary education at an actual cost, including some deep and difficult foundations, of 43*l.* per scholar. In the design for the new schools the general detail is copied from the old school, and the estimated cost, as shown by the accepted tenders, and which may be substantially increased, so far is 53*l.* per head—an increase of about 25 per cent.

Architects have at least the right as ratepayers to demand the same reasonable efficiency and economy in the spending of their money as would be demanded of them in their practice.—Yours truly,

ARTHUR S. BREWIS,
Secretary of Manchester Society of Architects.

April 8, 1909.

GENERAL.

Messrs. Henry Adams & Son, of 60 Queen Victoria Street, E.C., have been appointed consulting engineers for the proposed bridge over the Wey at Guildford, for which the design of Messrs. Clemence & Moon, of Guildford, was accepted out of seventy-five sets submitted.

At the Leicester Galleries, Leicester Square, W., there will open next week an exhibition of a series of cabinet pictures entitled "The Changing Hours," by Mr. Arnesby Brown, A.R.A. There will also be shown a series of water-colour drawings of the Sussex Downs, by Ruth Dollman.

Mr. Andrew W. Bell, late burgh engineer for Dunfermline, has lodged a claim against the Town Council for 1,351*l.* 15*s.* in respect of work expressly excluded from his contract as burgh engineer, and in other offices, and constituting work of magnitude. The Council unanimously decided to repudiate the claim.

The Longton Town Council last week considered proposals for improving the town hall by enlarging the large assembly hall, which has frequently been found to be inadequate for the purposes for which it was required. It is now suggested to do away with the ante-rooms and incorporate them into the large hall. The estimated cost of the work is approximately 6,000*l.*

A Special Committee of the Salford Town Council which was appointed in 1907 to inquire into the desirability of establishing a works department has decided against the proposal, and their recommendation was adopted last week.

Mr. Leslie Roseveare, chief assistant engineer and surveyor to the Birmingham Corporation, has been appointed borough engineer of South Shields. The commencing salary is 400*l.* per annum, and there were 122 applicants.

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THE WEEK.

THE Council of the Surveyors' Institution has taken important steps towards the establishment of reciprocity between the various Governments and examining bodies of the Empire in the examination and qualification of land surveyors. In the Colonies land surveyors are not allowed to practise without passing qualifying examinations, and as these vary in severity and scope, a subject of the Empire proceeding from one part to another may find that he has to undergo a fresh examination before being granted a license to act as land surveyor. It is proposed to hold a Conference of the Surveyors-General of the Colonies at the Surveyors' Institution in London, in order to consider the scheme for reciprocity, and Lord CREWE, the Secretary of State, has invited the attendance of representatives of the various Colonies by a despatch to the Governments of Canada, Newfoundland, Australia, New South Wales, Victoria, Queensland, South Australia, Western Australia, Tasmania, New Zealand, Cape of Good Hope, Natal, Transvaal, and Orange River Colony. It is suggested as a basis for a reciprocal arrangement (*a*) That a candidate must have matriculated at some recognised University, or passed an equivalent examination; (*b*) that an examination in the theory of land surveying be then taken, the standard of this examination to be as high as that in force in South Africa; (*c*) that the candidate be then required to pass an examination in practical surveying, and that he be ineligible to sit for this final examination until he has had at least two years' experience with a practising surveyor. It is also suggested that each Colony, before granting a licence to practise, should be at liberty to require the passing of a further examination on the law and regulations relating to the survey, registration, and transfer of lands within the Colony. The reason for adopting the standard of South Africa is that there the qualification for a land surveyor is higher than in any other part of the Empire. We wonder if an Imperial qualification for land surveyors will some day be followed by an Imperial qualification for architects.

Now is the time when the British archæologist starts his digging for the season. The programme for Silchester has not yet been settled, but the excavation of the area within the walls of the Roman city having been completed last year, there remains the space between these and the lines of the older British encampment, and also the cemetery, the situation of which has yet to be discovered. The Roman fort at Elslack, between Skipton and Colne, is to be examined under the direction of a special committee, which includes representatives from the University of Leeds and the Yorkshire Archæological Society. At Avebury the site of the prehistoric temple will be further investigated by Mr. ST. GEORGE GRAY. The Liverpool Committee for Archæological Research in Wales joins forces with the Monmouthshire Society in work at Caerleon-upon-Usk, and with the Powisland Club at Caersws, in Montgomeryshire. Hadrian's Wall is to be further examined, and so also is the Roman fort at Newstead, near Melrose.

ARCHITECTS cannot always get their charges paid by public bodies, even if terms are agreed, and the Woolwich Union Guardians have been surcharged by the district auditor 143*l.* 16*s.* for fees paid to Messrs. DINWIDDY, who acted for the Guardians as surveyors and valuers for the purpose of the 1905 quinquennial valuation. The South Metropolitan Gas Company appealed to the Courts against the valuation, and lost. Messrs. DINWIDDY's bill of costs amounted to 997*l.* 18*s.* 6*d.*, which, on taxation, was reduced to 151*l.* 17*s.* 6*d.* This amount the company paid, and the Guardians paid the balance. Then the gas company, as ratepayers, opposed the passing of the accounts in which this payment by the Guardians was included, and the auditor, as we have said, surcharged.

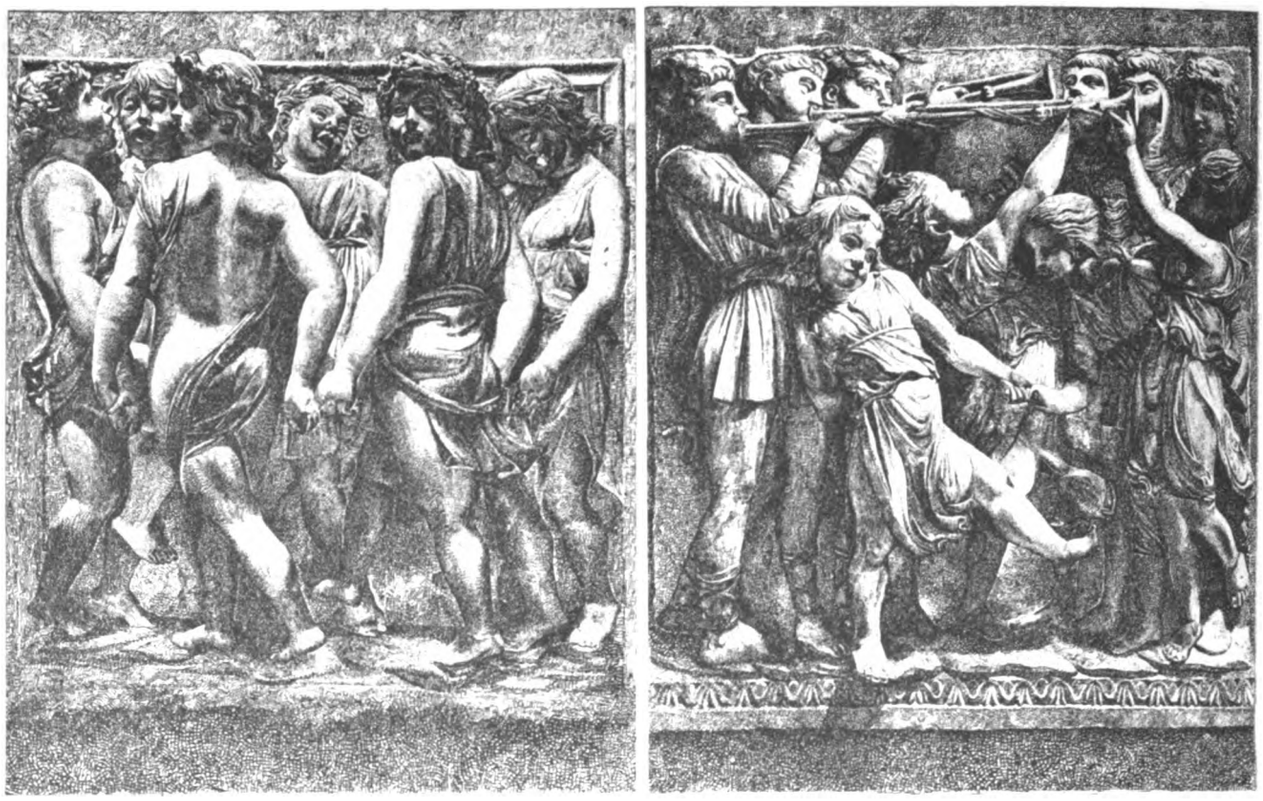
THE exhibition of drawings now on view at the Fishmongers' Hall is a highly interesting justification of the methods adopted by the founder and art director of the Royal Drawing Society, Mr. T. R. ABLETT, for teaching children to draw. The great object of these methods seems to be the preservation of the naïve observation and spontaneity of expression that are characteristic of children's untaught efforts at drawing, but are too often crushed out by the usual formal instruction in so-called "freehand" and "model" drawing. The great principle of Mr. ABLETT's system is that the drawings are made not from copies or from actual objects, but from memory. Hence the youthful artist records only what he sees, and naturally, therefore, selects the salient points, the vital elements of his subject. The result of this is that in the work of children of about fifteen years of age we find drawing that most forcibly reminds us of Japanese work in its truth of selection and simplicity of expression. The value of this is seen, not only in the charming records of the life and motion of things, but in its bearing on decorative design, for which the power to seize and express the vital elements of form and colour is of primary importance. Hence there are many designs in the exhibition, the production of young students of between sixteen and eighteen years of age, that have an actual commercial value. The fact that H.R.H. Princess LOUISE, Duchess of Argyll, Sir CHARLES HOLROYD, and Sir JAMES LINTON give prizes, and themselves select the deserving recipients, is evidence that the work of the Royal Drawing Society has met with approval from creditable judges.

CURIOSITIES of archæological and historical value, found by workmen during building operations, often do not come within the ken of the employer or his architect, but are bartered away at less even than their intrinsic value for the traditional "pot o' beer." The London County Council has, therefore, done wisely by posting the following notice on the site of the new County Hall:—"If any workman comes across any out-of-the-way object or substance embedded in the soil in which he is working he is required to hand over the same to the foreman or the clerk of the works. Any find which is of geological or archæological value may prove to be the property of the London County Council, and a reward of an amount equal to the real value of the article, less about 10 per cent. for expenses, will be given to the finder, and will be paid out on application to the Clerk of the Council." It is well for London that we have an antiquarian, in the person of Mr. GOMME, as Clerk of the Council.

BOURNEMOUTH is once more starting a big building on paper. The pavilion, kursaal or casino is this time designed for the site of the Belle Vue Hotel, and is estimated to cost 70,000*l.*, according to the plans prepared by the Borough Architect. It has been resolved by the Town Council to adopt the scheme, but that by no means implies that it will be carried into execution. The Mayor argued in proposing the adoption of the scheme that Bournemouth with this pavilion would be the premier seaside town in the country, but there is a little place called Blackpool in the north countree which will, even when and if this great effort of Bournemouth's is consummated, still maintain a position as an attractive and pleasure-providing town that will yet remain enviable. Bournemouth is getting rather ridiculous in the matter of unrealised schemes, and we shall believe in this casino when we see it.

THE recent failure of a reinforced concrete reservoir at Annapolis, U.S.A., illustrates once again the high importance of careful workmanship in reinforced concrete work. The soil in which the reservoir is being formed is a fine sandy red clay, which, though rather impervious and capable of standing in a bank for a year or more if undisturbed, becomes a soft, sticky mud under foot traffic when wet. The concrete used was found, on investigation, to be good and in accordance with the specification, but, in placing it in position, the labourers had managed to get it mixed with the muddy clay bottom; hence the foundations of the piers were partly mud and partly concrete, and in some places the reinforcement had no bond whatever with the concrete.

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RELIEFS IN MARBLE BY LUCA DELLA ROBBIA.

THE ARCHITECTURAL WORK OF THE LONDON COUNTY COUNCIL.

IT must have been patent to every one of the audience who listened to Mr. RILEY'S paper at the Royal Institute of British Architects on Monday last, that no one man, even with the energy and individuality of the late GEORGE EDMUND STREET, could have initiated, far less produced, all the designs of the buildings illustrated if he were hampered and harassed as Mr. RILEY must necessarily have been by the multifarious duties and responsibilities that belong to the office of the superintending architect of the London County Council. The duties that fall upon the holder of this office in respect of the administration of the London Building Acts alone are quite sufficient for any ordinary man to adequately fulfil. And when we remember that the buildings illustrated last Monday are only a small proportion of those erected under Mr. RILEY'S superintendence, we must feel more than ever convinced that he alone could not have designed them all from start to finish.

Although but few speakers followed the lecturer, it could not escape their notice, as it could not escape the notice of anyone who understands architecture, that the quality of design shown in the buildings produced by the London County Council during Mr. RILEY'S *régime* is of a very remarkable character, a character that marks an epoch in the history of English architecture, a character that could not have appeared at any time previous to the twentieth century or under other conditions than exist in the architect's department of the London County Council.

It is perfectly clear that this character of the recent architectural work of the Council is due to the initiative, the *naïveté* of young men—and clever young men. Of young men too in a subordinate and irresponsible position, whose originality has never been fettered by any fear of unfavourable criticism that might affect them personally, for their names are unknown outside the office except to a few. Therefore they have let themselves go, knowing that they would have no censor but "the chief," and have produced designs that would probably never have been ventured by these same young men if they had been in independent practice, and certainly not if they had been required to submit designs in open competition. To take, for example, one of the buildings not illustrated by Mr. RILEY, the fire station in the Euston Road, opposite St. Pancras Church, would any young man have ventured to send in such a design in open competition; and if he had ventured, would he have stood the smallest chance of success? And yet the modern architecture of London would have been the poorer if this design had not been carried into execution.

We have said that the character of the modern architectural work of the London County Council could not have appeared at any time previous to the present century. It is only within the last few years that there has developed amongst the younger men of the architectural profession the ability that is now evident, an ability that has seized upon the best side of the "new art" movement and refused to be bound strictly in the trammels of historic precedent. Nor would this ability have been seen if these young men had not been working under a "chief" who could distinguish between originality and eccentricity. It is clear that Mr. RILEY has had the power to select for his staff young men of ability, and whilst giving them scope for that ability has known how to restrain mere extravagancies of fancy. We can well understand that few designs have received the approval of "the chief" without modification and pruning down, but this has been so moderate and judicious that the verve of the original ideas has been preserved. Indeed, if we were inclined to be censorious, we should say that Mr. RILEY has been almost too indulgent to some of the crudities that mark the efforts of the young men, and at which we may be inclined to smile. But to have thrown cold water upon all of these would have been to sacrifice the essential character of the County Council architecture of the last decade. It would be easy, for example, to be severe upon the design of the Central Technical School and Training College, but we should rather recognise that the power and dignity of that design might easily have been lost by the exercise of such severity.

Mr. RILEY gave much attention in his paper to what we may call the financial aspect of the housing problem with which he has had to deal, and left the more purely architectural side of the question to speak for itself, but where before has the art of architecture been so manifest in the design of model dwellings and workmen's cottages as

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in the works that he has directed? Plenty of other people have tried to make workmen's cottages examples of architecture, and have merely succeeded in making them pretty. Mr. Riley and his staff have made them dignified and beautiful.

We think that Mr. Riley did not do himself justice as the director of the County Council's architectural work, and we should have liked to have seen illustrated more of the really charming buildings that he has produced, but if he had nothing more to show than the Cannon Street fire station and the delightful little building that accentuates the ugliness of Hungerford Bridge, these would suffice to prove the high quality of the recent architectural work of the London County Council.

THE BUILDING EXHIBITION.

THE dominant characteristic of the present exhibition is that there is in it no predominant feature, but that it represents the activity of the building trade as a whole and in all its branches. On previous occasions there has frequently been impressed on the visiting architect that some one trade or department of building has monopolised an undue amount of space. In the present exhibition there is something of everything and not too much of anything. This result has been obtained from a levelling up, on the one hand, of trades that were in the past insufficiently represented and a pruning down of those that were formerly too exuberant.

Another characteristic of this year's show is that exhibitors have begun to grasp the fact that if they wish to attract the attention of visitors they must make their stands attractive, and that architects at any rate are not likely to be attracted by loud screaming and bizarre display. Whilst therefore there has been a notable increase of what, in its way, we may call artistic window-dressing, there is a marked decrease of the vulgarity into which the bid for prominence often leads exhibitors.

One great object of these exhibitions is to give manufacturers and merchants an opportunity of displaying and architects and builders an opportunity of inspecting novelties. Striking or epoch-making novelties are few to seek on the present occasion, but improvements and advances are to be found in practically every trade. Even in such an old-established and, one might expect, old-fashioned department as timber supply, there are novelties —and quite charming ones. Reinforcement is to-day a word of potent import in building, and in this direction also there are displayed novelties, and, what are quite as valuable to many of us as absolute novelties, things that have been more or less on the market for some time but have not been hitherto brought prominently before the notice of architects and builders.

It is an open question in the arrangement of a building exhibition whether it is advisable to group together all the exhibits of a particular trade or, as is done on the present occasion, to mix them indiscriminately. The former is preferred by the expert who wants to study the latest developments in one particular branch of building, the latter adds to the general attractiveness of an exhibition and, to our thinking, is more consonant with the general habit of mind of those for whom presumably these exhibitions are intended, architects and contractors. When this latter system is adopted a good classified index to the catalogue is a prime necessity, so that if a visitor wishes to see what is being done in some one department he can readily locate what he wants. This year the catalogue in this respect is a great improvement on some earlier ones, and though not quite perfect very fairly performs its function. We would suggest for the future two improvements; first, a plan in the catalogue of the exhibition showing where the various rows and numbers of stalls are located, and, second, greater prominence on the stalls of the numbers under which they are entered in the catalogue. Many architects keep their catalogues from one exhibition to another for reference, and when they see a stall that attracts them, desire to make notes in their catalogue. It is annoying in such a case not to be able to find a number on the stall, especially when the representative of the exhibitor is away at tea.

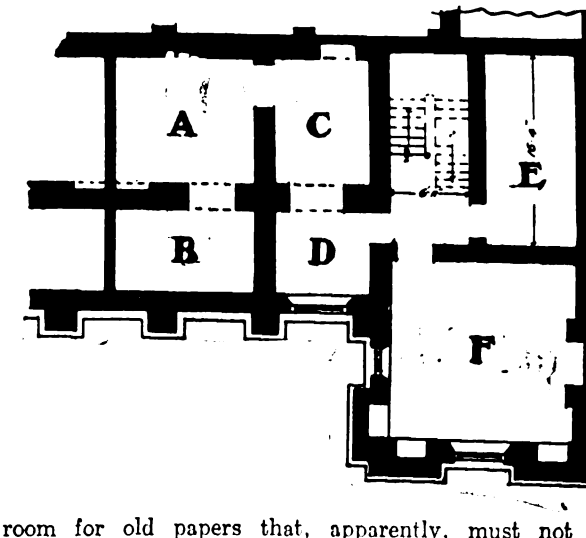
The display of competition designs for the poster to be used for advertising the exhibition is very interesting, and though, like all competitions, containing a number of attempts by vaulting ambition, includes several designs of high merit and not a few that must have run the successful competitor very close.

COMPETITION FOR NEW COUNTY OFFICES AT READING, BERKS.

WE gave last week some particulars relating to the conditions of this competition, for which about 250 architects have sent in their guineas.

There is a slight error in the plans originally sent out to competitors, but this has been corrected by an emendation that revises the line A F on Drawing No. 1, making the distance of the recess from A 11 feet 6 inches. A plan showing the position and depths of sewers has also been sent out by the County Surveyor. Most competitors will probably have noticed that the line A-A on ground-floor plan (Drawing No. 2) is wrongly lettered, and that the "sectional elevation on A-A" is looking north. The section, on this, of the wall of the hall of the Assize Courts is shown to apex of gable, and the springing of this gable is about 10 feet lower.

The "rooms in Assize Court buildings available for offices" are at present, on the ground, first, and second floors, used as such for the county offices located in the existing old houses, Nos. 28 and 30 Forbury, and, as competitors will gather from the plans, are well-lighted and useful rooms for their size. The staircase to these rooms is a wooden one in fair repair, with a book-lift in the well running from the basement to the top floor. For explanation of the basement we give a copy of the plan. A and B are quite dark, and A is used as a lumber



room for old papers that, apparently, must not be destroyed, but are not worth keeping. C is empty and contains an old stone sink in the recess on south side. D is used for electricity supply meters and is fairly well lighted. These four rooms are covered with brick vaults. E is at present used as the County Treasurer's strong-room and has an iron door. F is partly lighted and has a plastered ceiling, apparently on wooden joists. The recess on west side contains an old kitchen range, but the room is not used now. These basement rooms seem to be dry, but have a fusty smell from want of use and ventilation.

The hall of the Assize Courts is well lighted from windows on the north side and from top lights, so that the three windows in the west end shown on first-floor plan (Drawing No. 2) are of comparatively small importance.

The explanation of the "all rights of light" referred to in the particulars is that the houses Nos. 26, 28 and 30 Forbury, have been bought by the County Council

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from Mr. SUTTON with rights of light over Messrs. SUTTON'S premises. The cross-hatched buildings shown on plan at south end (Drawing No. 1) are low one-storey trial houses used in Messrs. SUTTON'S business, and will, presumably, be re-erected on their building-line, 14 feet from the south end of site. Messrs. SUTTON'S buildings, where figured 10 feet 6 inches from west side of site, are one-storey only, and about 12 feet from ground line to eaves, with slate roof of low pitch coming down to same, except for one small dormer about 10 feet wide. Where set back 13 feet 6 inches from site, Messrs. SUTTON'S building is about 16 feet 6 inches from ground to eaves. Messrs. SUTTON'S frontage to Forbury is in red and yellow brick, and may, we think, be safely ignored by competitors in determining the character of their design. The Assize Courts are in Bath stone, showing incipient decay; hence probably the stipulation that Portland stone is to be used in the new buildings.

As is shown on the sewer plan sent to competitors by the County Surveyor, the site faces on the other side of the Forbury large ornamental public gardens, so that the site is remarkably open to the north. The Forbury is a very quiet road and out of the bustle of Reading, except, of course, when the Assizes are being held.

The local building materials of Reading are red-brick and tile; even the stock bricks of the district are red, and good red facings are easily obtainable. Bracknell, from which the well-known T.L.B. bricks come, is only a few miles from Reading.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

A MEETING of the Institute of Architects was held on Monday evening last, at Conduit Street, W., Mr. Ernest George, president, in the chair.

Mr. ALEXANDER GRAHAM (hon. secretary) announced the decease of Charles Thomas Whitley, Associate, elected 1870; Horace Moger, Associate, elected 1903; and William Candler Reed, Associate, elected 1845, and the oldest member of the Institute.

Mr. E. W. RILEY read a paper illustrated by lantern views, entitled

The Architectural Work of the London County Council.

Mr. RILEY said that as there were at the London County Council thirteen main committees, divided again into thirty-five sub-committees, which dealt with constructional works, he could not adequately deal with all the ramifications of that part of the Council's operations in a short lecture. He proposed therefore to confine his remarks to structural works which might be grouped under the following heads:—Housing of the working classes, electricity buildings, special educational establishments, fire stations, bridges and street improvements. In dealing with the first part of the paper, housing of the working classes, Mr. Riley said it had been laid down that not less than 400 cubic feet of air space per person for adults should be provided in the Council's dwellings, 200 cubic feet per head being permitted for children under ten years of age, and that the number of persons should not work out at more than two to a room. Infants born in a tenement did not count till they attained five years of age. It had been stated before a magistrate that a certain tenant being in an insanitary area, upon whom an ejectment order had to be served, could not pay the rent asked by the Council. He had been paying 5*s.* 6*d.* per week, but would have had to pay 8*s.* 6*d.* per week for a tenement in the Council's dwellings suitable for the accommodation of his family. The point emphasised was that the family was paying 2*s.* 3¾*d.* for each 100 feet super under the old insanitary conditions, whereas the Council was in a position to rehouse them in a thoroughly sanitary manner without any charge on the rates at a little over 1*s.* 10½*d.* per 100 feet super. The two generally accepted forms of construction adopted in the planning of block dwellings were (1) self-contained tenements; (2) associated tenements. The first had its own independent scullery, water-closet and offices, and except where a common laundry was provided, its own washing arrangements. The second type shared with other tenements the sculleries for preparing food, sinks, water-closets, and wash-houses. Latterly the Council had invariably adopted the so-called "self-contained" plan. A good example approaching completion was the Bourne Estate and Union Buildings, which provided accommodation for 3,902 persons. The average area of the living room was 150 feet super, and that of the bedrooms 100 feet. The average cubic space in the living rooms was 1,275 feet, and in the bedrooms 850 feet. Gas on the slot system was laid on by arrangement with the Gas Company. The buildings were planned for the internal blocks to lie north and south, so as to obtain the maximum of sunlight in the living rooms, and each tenement had at least one room looking on a garden. The type of plan designed for these buildings was an improved "balcony plan," arranged so that the living rooms and the bedroom did not look on to any of the balconies, and had an unobstructed light. The buildings were five storeys high with a few attics, and were constructed of fire-resisting material with steel joists and concrete floors. All the sculleries and water closets were separated from the habitable rooms by ventilated lobbies. The type of plan of the buildings had since the completion of the first block been adopted by other authorities for working-class dwellings, amongst others by the Metropolitan Boroughs of Bermondsey and Hackney.

The Caledonian Estate was about two acres in extent, and being acquired by the Council under Part III. of the Housing Act there was consequently no rehousing obligation. The estate was therefore charged with the total capital expended in respect of land, buildings, gardens, &c., and all other outlay in connection with the development of the estate. After making due provision for all expenditure, including debt charges, the accounts showed a profit of 1.15 per cent. on the gross rental. The buildings were five-storey block dwellings containing 272 tenements, the four back blocks being of the improved balcony type. The front block had closed staircases with windows and white glazed tiled dado, giving approach at each landing to four tenements, averaging nine rooms for each set of four tenements. On the basis of two persons to the habitable room, six one-room tenements, 116 two-room, 146 three-room and four four-room tenements accommodate 1,384 persons. The estimated cost of the buildings and incidentals was 57,396*l.* 10*s.*, and worked out at 7.86*d.* per cubic foot. The most extensive developments under this part of the Act, however, had been the laying out of "Cottage" estates. Three large estates of this kind were in progress at the present time, while a fourth, the Old Oak Common Lane Estate, had been acquired, and a scheme for development was in progress. Totterdown Fields Estate at Tooting comprised 38¾ acres. The roads had all been formed and cottages had been erected on about 25½ acres. Norbury Estate comprised about 30 acres. The roads had been formed on about 18 acres, and cottages erected on about five acres. White Hart Lane Estate was divided into two parts. The larger or southern section comprised 178 acres; the roads had been formed on about 35½ acres and cottages erected on about 18.9 acres. The northern section comprised 46 acres and was not yet ripe for development. The Council had all along intended that this isolated portion should wait till the neighbourhood had opened up and become ready for building accommodation. Endeavour had been made to render the cottage estates successful, both from a commercial and architectural point of view. They were two-storey buildings arranged in short terraces with spaces at intervals, and they were almost invariably set back from the forecourt fence 5 to 14 feet. Each cottage had its own front door and its own plot of garden ground in rear. In every cottage suitable fittings were provided. The scheme for development and designs produced had been largely influenced by the following considerations:—(1) Economy of land area and road construction in proportion to buildings, but in no case had more than 33.33 cottages per acre been put on the land, the average number being about 29.14; (2) the avoidance, as far as practicable, of deep external back projections in close juxtaposition, which tended to cause insanitary pockets and prevent the free circulation of air currents along the backs of terraces of houses.

Mr. Riley said it might add interest to the paper if he referred in general terms to cost of construction and the methods employed of issuing particulars for tender and contract in regard to working-class dwellings, the expenditure on which had to be reduced to a minimum.

For large works plans were prepared in the usual manner, and specifications and bills of quantities were also prepared. Sometimes "open," sometimes "selected," tenders were invited. The cost of block dwellings, including professional and incidental charges, erected during the past five years, had worked out at about an average of 86*l.* per room, or 9.8*d.* per cubic foot. For cottages, however, it had been found generally most economical to obtain tenders as follows:—The working drawings of the buildings are prepared to ⅛-inch scale, and a few essential details to a larger scale. A simple specification is prepared giving very little detailed

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description of construction, but specifying the quality of the articles required. To the specification are attached the Council's instructions for tender, form of contract, and schedule as to rates of wages and hours of labour. No bills of quantities are prepared, but each contractor invited to tender is supplied with a set of drawings, specification, form of contract, &c. Under this procedure there was no difficulty in getting excellent contractors, both in large and smaller ways of business, to compete. This simple means of obtaining competition worked admirably, not only in the initial process of obtaining tenders, but in the adjustment of variations, &c., for at every step the architect knew just how the cost of the work stood. Care had to be exercised in the granting of advances for work done, but there was no difficulty in framing a table of values on which to work.

The cost of cottages varied considerably according to district.

Cottages recently erected had cost:—

At Totterdown Fields Estate, Tooting:—Five-roomed cottages, including professional and incidental expenses, 349*l.* to 384*l.*; four-roomed cottages, including professional and incidental expenses, 235*l.* to 273*l.*; three-roomed cottages, including professional and incidental expenses, 192*l.* to 216*l.*—the average cost per cubic foot being 6.14*d.*

At White Hart Lane Estate, Tottenham:—Five-roomed cottages, including professional and incidental expenses, 253*l.* 16*s.*; four-roomed cottages, including professional and incidental expenses, 204*l.* 4*s.*; three-roomed cottages, including professional and incidental expenses, 168*l.* 16*s.*—the average cost per cubic foot being 4.97*d.*

The lecturer then described the buildings constructed in connection with the electrification of the whole of the tramway system within the County of London, which involved the large generating station at Greenwich and sub-stations placed at convenient positions near the tramway routes. The area of the Greenwich station was about 3.7 acres, with a frontage to the river of about 240 feet. The next division of the lecture related to educational establishments including technical institutes, among which were cited the Central School of Arts and Crafts and the London Day Training College in Southampton Row; the School of Engineering and Navigation at Poplar; the Westminster School of Art and Technical Institute; the School of Arts and Crafts at Hammersmith, and other technical schools at Shoreditch, Paddington and Brixton.

The Central School and College in Southampton Row cost approximately 115,000*l.* exclusive of equipment, the Naval Engineering School at Poplar 27,000*l.* exclusive of machinery, and the Westminster school and institute 21,000*l.*

The planning of fire brigade stations was described at some length, the two essential points in arrangement being the provision of adequate accommodation for the necessary apparatus and the housing of the men in such a way that they could at any time reach the positions assigned to them as quickly as possible to ensure a rapid turn-out.

Referring to the Holborn to Strand improvement scheme, Mr. Riley said the Council, in the earlier stages of the improvement, fully realised the necessity of obtaining the best results in the new streets which, while affording improved facilities for traffic, it was hoped would result in an architectural treatment of great dignity; it was held that, if a high standard of excellence were obtained, the cost of the improvement would be reduced. The Institute co-operated with the Council in selecting eight architects, who were invited to submit sketches for the various frontages. Those selected by the assessors as submitting designs which were considered suitable for adoption by prospective lessees were Mr. H. T. Hare, Mr. W. Flockhart, Mr. M. Macartney, and Mr. L. Stokes. However desirable in the interests of architecture the adoption of any of these schemes would have been, the Council had hesitated to impose upon its lessees any coherent scheme as suggested by these exponents, with the result that each design submitted for new buildings was considered on its own merits. The Council had become, by reason of the surplus land acquired in carrying out improvements, one of the largest landowners of London, with a rent roll of 325,000*l.* a year, and, having regard to the interests of the ratepayers, it was most desirous of avoiding any restrictions as to elevation, &c., which might delay the letting of land. The building conditions had been amended in such a way that rendered them less restrictive than those in operation on any other large London estate. Although the circumstances had not been so propitious as they might have been, the result as regarded the architectural treatment was decidedly above the average hitherto attained in other metropolitan improvements. If the general effect of the future buildings did not fall below the present standard, the result would be one for congratulation.

The Council, too, had instituted a means of preserving a suitable record of architectural and historical buildings demolished in connection with improvement schemes. Every building was carefully surveyed, and if desirable, suitable photographs taken; when any valuable detail, either in stone, wood or iron was found, a measured drawing was prepared. That had been the practice for some years, with the result that an interesting collection of many hundreds of drawings and photographs had been formed which would be of great value in illustrating for future generations a phase of old London which was rapidly disappearing.

In connection with street improvements, which formed a very important part of the work of the Council, Mr. Riley said attention was at once arrested by the fact that the actual or estimated gross cost of county improvements effected by the Council since 1889, excluding bridges, had amounted to 11,000,000*l.*, towards which the local authorities had in some cases contributed. That large sum could only be regarded as the cost of patching up mistakes and remedying deficiencies which should never have arisen had any attempt been made originally to lay out London on a definite plan. The recommendations of the Royal Commission on London Traffic as to street improvements commence by affirming that at the root of the problem of London locomotion was the fact that many of the streets were too narrow; that fact was always endorsed at academic discussions, and idyllic hopes for the future were expressed; but it was to be doubted whether anything was being done to prevent a recurrence of the evils of which the effect was now so apparent. From 1897 to 1907 about 143 miles of new streets were sanctioned by the Council and 81,870 new buildings were erected in the county; but that enormous development had not been influenced by any directing control, and the meagre powers exercised by the Council under Part II. of the London Building Act provided only for a minimum standard which was quite incompatible with that laid down by the Royal Commission as to the width necessary in new streets. The building owner being only human, and his professional adviser being naturally anxious to make the most of his client's property, it was not, perhaps, surprising that the ideals which were so earnestly advocated in theory were not found to be adopted in practice in the development of suburban London. The want of control could only have disastrous effects, perhaps in the near future, but despite the high conceptions of what ought to be, it was doubtful whether any proposal, such as an amendment of the London Building Act on the lines of the Liverpool Act of 1908, to require a width of 80 feet in new main streets, would be favourably received. The Town Planning Bill might have a beneficial effect, and the Bill as amended certainly gave greater promise by enabling land in course of development or which, although built on, was necessary to a scheme, to be dealt with in such schemes. The scope of the Bill in London would be restricted by reason of the comparatively small area within the county which was now unbuilt on, but the Bill would in any case prove a useful supplement to the Building Act by enabling the provision of arterial communications to be required.

In his concluding remarks Mr. Riley referred to Vauxhall Bridge, and the great difficulties which beset the work in its early stages. He alluded to the proposed erection of pylons upon the shore piers, and said that though the value and importance of the whole scheme would be materially improved if something of the kind were added, the probability of such completion was only problematical. He expressed, too, his appreciation of the not wholly successful efforts made by the Institute to preserve unimpaired the beauty of Waterloo bridge in the perforation of the abutment by the tramway near Lancaster Place.

Mr. J. T. TAYLOR, London County Council, in proposing a vote of thanks to the lecturer, said the architectural work of the London County Council might be considered as in two volumes. They had the first in Mr. Riley's paper, and there was the second volume, or sequel, in the educational buildings undertaken by Mr. Bailey, and he hoped the Council would have an opportunity of hearing it. Mr. Riley's position was a very difficult one, and the speaker said he wished on behalf of the London County Council to state how the members of that body appreciated his work. It would seem that necessarily the Council's architect must come into conflict with some of the architectural profession who might feel aggrieved that they were not given more opportunities. Mr. Riley had a dual position to fulfil in the interests of the London County Council, the numerous com-

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mittees, and the chairmen of committees. He was sure it was not easy to meet the views of all and reconcile them with what was right. A good deal of the work brought before them in the lecture might be thought to be of an engineering character, but they would agree that in the architectural part of the design the work showed a breadth of treatment and a dignity of purpose which reminded them of some of the old Roman work, and on the whole the designs were extremely successful. The building on the Thames Embankment that had been shown to them was a typical example. It was still a vexed question as to how far the London County Council could do design work in architecture to the exclusion of the profession generally. He sympathised with architects, and in a large measure shared their views, because he felt that official architecture was apt to run into grooves and become stereotyped. The London County Council appreciated originality and variety in building, and it was their desire and aim to have the best possible results that could be obtained, and if better schemes were submitted by outside architects they would be ready to consider them with a view to co-operation, and he felt he carried Mr. Riley with him in that opinion. The lecture gave only a small idea of the work undertaken by the Council's superintending architect. He, the speaker, was in a position to see the magnitude of those duties, and he was often surprised that Mr. Riley was able to achieve as much as he did. He for one would like to see work of a special character thrown open to competition, or to selected outside architects, and he felt Mr. Riley would not be adverse to the proposal.

Mr. T. J. BAILEY seconded the vote of thanks, and said the multitudinous number of buildings which went through Mr. Riley's hands, and the variety of them showed perfectly clearly that the duties must entail a great strain on the architect's brain. He said he knew the difficulties which confronted an architect in dealing with various committees and the troubles which arose in working for a body like the London County Council, when different committees had their own business to carry through without official cognizance of the work done by other committees. Mr. Riley had kept his buildings within the limits of the economic restrictions imposed, but he did not know if Mr. Riley had often experienced the difficulty of treating with the finance committee.

Mr. J. W. SIMPSON said if he might be allowed, he would like to add an even more enthusiastic note to the vote of thanks than that of the proposer and seconder. He thought many of those present would have been struck with the great dignity and beauty of much of the design which had been shown on the screen during the lecture. They had had recently an interesting paper by Mr. Swales on "American Architecture," and he thought they could say, without hesitation, that the work they were considering that evening was quite equal to the large and fine conception of utilitarian architecture which Mr. Swales had brought to their notice.

Mr. W. WOODWARD wished to add his mead of praise to the expressions passed on Mr. Riley's paper, which he thought was terse and very much to the point. He asked whether it was desirable that the London County Council should erect dwellings for the working classes or whether such buildings should be left to that outside enterprise which was always forthcoming to meet a demand when profit was to be made? With regard to block dwellings he thought they would all agree that the Metropolitan Board of Works, followed by the London County Council, did most seriously anticipate unnecessarily the pulling down and clearance of sites before they were at all ready to erect buildings on those sites, causing hundreds of poor persons to be sent away without provision being made for rehousing them, or for the immediate starting of the housing schemes. That mischief had been remedied somewhat by the London County Council, but he wished to make some criticisms. The cost for maintenance, returnable as rent, was put at 8*s*. 6*d*. per week in the Council's tenements. Such a sum formed a very large proportion of the average wage earned by those for whom the dwellings were erected. It was about one-fourth of the wage earned, and therefore excessive, because he thought they would agree that one-eighth of the wage was the fair proportion that should be expended in mere rental. It seemed therefore that notwithstanding the cost per foot cube, some other means should be taken to provide dwellings for the real working classes who could not afford to pay more than 4*s*. 6*d*. or 3*s*. 6*d*. for a decent tenement. It devolved into a question as to whether the cubical area of the rooms might not be reduced, and more dwellings placed on the same site. It seemed also that the desire for two-roomed tenements was in the ascendant, and if they were to provide those dwellings the land must be obtained at far less cost than generally ruled. The profit on the Caledonian estate property had been mentioned, but Mr. Riley did not tell them what the profit would be on the net rental. Those buildings were not erected at an excessive price, but it seemed that, allowing for repairs and maintenance in the future, if the London County Council could only secure 1.15 per cent. now, that in the future there would be scarcely any profit. The cottage dwellings was a scheme which would meet with the commendation of everyone, and the speaker added humorously that if the building trade did not improve, he would expect to find many architects allocated to those cottages. He questioned, however, if the scheme could be a success financially, for with thirty-three cottages per acre, and 1,300 feet garden to each, it was obvious that the land must be purchased at a very small cost indeed. He could not account for the very great difference in cost between the cottages at Tooting and Tottenham. In alluding to the street improvements schemes, Mr. Woodward said the London County Council would do well to make the rents in the Holborn to Strand area still more progressive than they were.

Mr. RILEY, in his reply, agreed that land acquired for housing schemes had in the past been allowed to remain undeveloped, and one plot had been vacant for thirteen years. It was, however, he said, generally admitted that land ear-marked for housing purposes rendered certain sites in London valueless. The difference between the cost of the cottages built at Tooting and Tottenham was wholly topographical. At the latter place Fletton bricks were obtained easily, at Tooting they had to get Kent bricks, and they knew that if they got their bricks cheaply the financial problem was solved.

ARCHITECTURE: ITS TRUE PRINCIPLES.—VIII.

By R. OWEN ALLSOP.

SYMMETRY AND BALANCE.

IT is probably for the reason just suggested—the eye seeking a centre, as the mind sees a central motive—that we may best arrive at an understanding of the nature and true value of exact symmetry. Of itself symmetry signifies little; it is easily formed—most easily of all by a machine, as a turning lathe. It is offensive if forced, and yet can never be ignored without compensating effects of balance. The requirement of perfect unity of any material object necessitates a centre line or a point. The highest symmetry and the greatest unity are doubtless best exemplified in the sphere, but only perfectly so when it is poised in space. The value of symmetry is that it conduces to unity of effect. Thus we may plan a building by placing together, "anyhow," the several rooms, and in the same way we may make elevations wherein the several necessary solid features crop up anywhere and anyhow. Such a method of design necessitates little or no thought. Plainly, therefore, the designer who produces symmetry is so far superior to the other in that it had only been by an effort of reason and by persistent endeavours that he has been enabled to produce this symmetry. The *misapplication* of symmetry is when convenience and use of the building are sacrificed to the production of a symmetrical elevation.

Thus we call to mind a building with a very greatly extended "front," in which this chief façade is in perfect equal-sided symmetry. It would not be difficult to show that some (if not very many) practical conveniences must have been here sacrificed to obtain—what?—that which is produced in a few minutes by a turner, as when a wooden baluster is formed from the square timbers.

We might say that symmetry should be sought where practical needs do not interfere, and that generally there should be rigid bi-symmetry in the detail and perhaps in minor massing. We remember a design of a capital by ADAM in which one side there is a human figure and on the other side a horse's head, and scarcely anything has appeared to us more offensive.

The argument against symmetry in large parts is that however correct the symmetry may be in the geometrical representation, in actual fact we cannot see this genuine bi-symmetry. Many buildings are so large or so shaped that in execution the geometrical symmetry cannot anywhere be perceived by the eye.

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Fig. 20.—SANTA SOPHIA, CONSTANTINOPLE.

A common argument, too, against symmetry is the evident fact that material objects, excepting certain crystals in small matters and the heavenly spheres in large, are not strictly bi-symmetrical. Most leaves are roughly symmetrical, but no close examination is required to show that the symmetry is imperfect—that is, that there is no mathematical reproduction of similar forms either side of some exactly central axis. To this it might be urged that inasmuch as the designer drawing his inspiration from nature does not copy one special form, but generalises, the spirit he perceives underlying most plant life is that of the truly symmetrical, but that to obtain variety there is a constant divergence from this. And in respect to flowers, the basic formation of most such is truly symmetrical, the curl and curve being for the sake of variety.

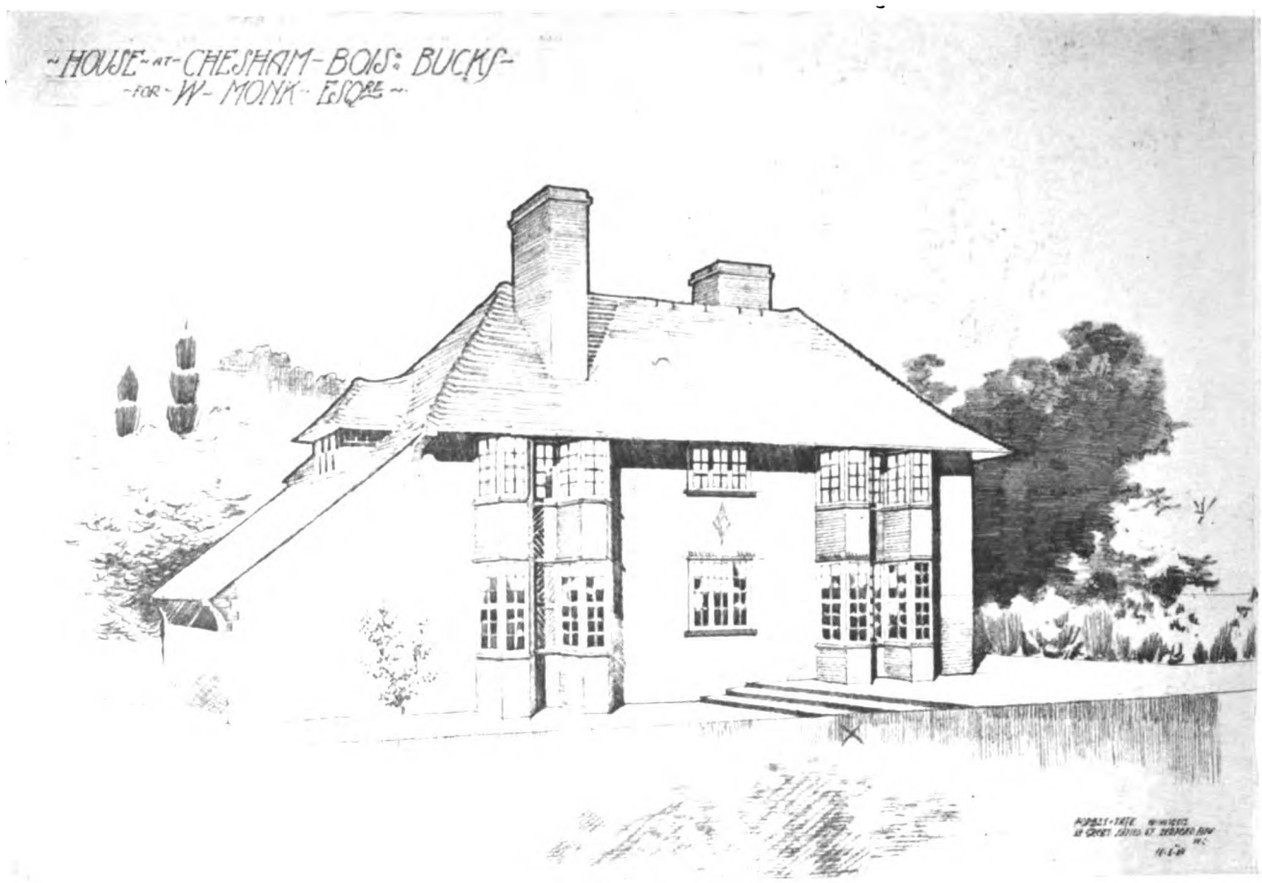
It seems possible that the sublimity of nature is an attribute of Divine creation that can have nothing germane to the creations of man. The apparent arrangement of the stars in the firmament is to be described as "anyhow." They appear to be the type of chance and haphazard. We know that, on the contrary, the arrangement is that of perfect order, only the finite mind not being able to comprehend infinity, we can express no opinion on the matter, our brain not having grasped the meaning of the whole conception any more than a fly on the cathedral window could comprehend the arrangement of the whole building. Possibly the same may be said respecting the universally persistent asymmetry of natural life on the earth. There is, in a profusion of naturally growing flowers, an echo of the same sublimity of arrangement that we see in the stars. From the considerations here made we may deduce a belief that there is no argument against symmetry in the fact that natural objects are seldom, if ever, perfectly so. The claim for equal-sided treatment must be based on some other grounds. It is not reasonable to look too much for inspiration respecting the arrangement of inorganic masses—as in architecture—to organic life, as plants. A more intelligible course would be to inquire into the arrangement of the lifeless matter subject to law and order, and here we find the crystal which is the production of what we call order out of the natural disorder, as we should say, a sublimity in terms—in matter—assumes symmetrical shapes having various phases of symmetry; and so, too, on the larger scale, the formation of suns and worlds out of primitive nebulous masses (the nebular hypothesis) results in symmetry of the sphere or spheroid, or at times a ring, as that of the planet Saturn. The truth is, possibly, the question of symmetry in design, especially as applicable to architecture, must be considered unsolvable. All that we see is that, not being able on our plane to produce true sublimity, we must in our weak human nature fall back upon rigid bi-symmetry as a symbol of order on a lower scale, and leave to natural forces—earthquakes, winds, frosts, rain, and time-weathering—the production of that "parasitical sublimity" discovered by Ruskin and most plainly evidenced in the ruin.

The old story of the complaint that a terrestrial and celestial globe did not constitute a "pair" seems often to find an echo in architectural design. It is just possible to imagine that some rigid equal-sided symmetrist would prefer the decorative inscriptions in Santa Sophia at Constantinople to be alike on opposite positions. The absurdity would be here apparent enough; but it is often just as inconsistent to create artificially equal-sided compositions in solid architectural device.

Exact symmetry, based on order, is evidently a true principle in architectural design; but the premises being thus made the whole grounds require examination. There is plainly a subtle relation between symmetry and asymmetry in architecture. It would appear that they are correlated much as regularity to irregularity, rough to smooth, or any other pure contrast where mutual enhancement is the outcome.

(To be continued.)

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NOTES AND COMMENTS.

The British Fire Prevention Committee has issued a "red book" containing a detailed account of a test on an "armoured" door, being a sliding door of four thicknesses of deal and covered externally (*i.e.* armoured) with tinned steel plates. The object of the test was to try if such a door could obtain classification under the Committee's scheme as affording "full protection" (Class A). For this it would be necessary for the door to effectively resist a fire of two and a half hours' duration at a temperature gradually increasing to about 1800° Fahr., followed by the application of water for two minutes on the fire side. This proved too severe a test for such a class of door, as when the wood was burnt the door collapsed before the expiration of the time limit, and accordingly armoured doors should be regarded as affording temporary protection only against fire.

A little breeze seems to have been blowing amongst the municipal officials of Sheffield, a thing very likely to happen in the extension of municipal professionalism resulting from the assumption of universal municipal management or mismanagement of all our affairs. When one elected and unpaid body of citizens undertakes to regulate for their fellow citizens the supply of water, gas, milk, and everything else there must be a multiplication of officials whose spheres of influence sometimes overlap, and hence result friction, shelving of responsibility, assumption of dignity.

The advantages of mechanical filtration in lieu of the old sandbed system for dealing with the town supply of water has been recognised by the Edinburgh and District Water Trust, and that body is now constructing filtration works at Fairmilehead, and building a filter-house to contain twelve Bell's mechanical filters. Mechanical filtration has the advantages of quicker action, equal efficiency, lower initial cost, small expense in upkeep as compared with sand filtration. The disadvantage of these mechanical filters is the necessity for disposing of the dirt filtered out of the water. This is washed mechanically out of the filters, and has to be collected in settling tanks in order that it may be cleared away.

ILLUSTRATIONS.

CONKWELL GRANGE, WILTSHIRE.—FORECOURT AND MAIN ENTRANCE—KITCHEN COURTYARD AND SIDE ENTRANCE—THE GARDEN ENTRANCE TO SOUTH FRONT—ENTRANCE DOOR AND VESTIBULE, &c.—THE HALL—THE DINING-ROOM.

This charming house, of which Mr. E. Guy Dawber is the architect, is built in a wood on the slope of a hill some seven miles out of Bath. Much of the wood had to be cleared to form the gardens and terraces. The house commands beautiful views towards Savernake Forest. The kitchen gardens, stabling, lodges, &c., have all been arranged near by the house. The walls are built in coursed rubble of stone taken from old walls on the estate. All dressings and ashlar work are executed in Bath "Ridge" stone from the Corsham Quarry Co. The roof is covered with old stone slates procured in the neighbourhood. Mr. Francis Crarg, of Bath, executed the stone and wood carving. The general contractors were Mesrs. Walker & Slater of Derby. The following are among the sub-contractors:—Steelwork, Redpath, Brown & Co., London; casements and fittings, John Pye, of Moreton-in-Marsh; stoves and grates, Bratt, Colbran & Co., London; plumbing and sanitary fittings, Mellowes & Co., London; parquet floors, Bassant Bros., London; modelled plaster work, E. P. Bankart and George Cox; door furniture, Brawn & Co., Birmingham; railings, J. W. Singer & Sons, Ltd., Frome; heating apparatus, Wm. Gould, London.

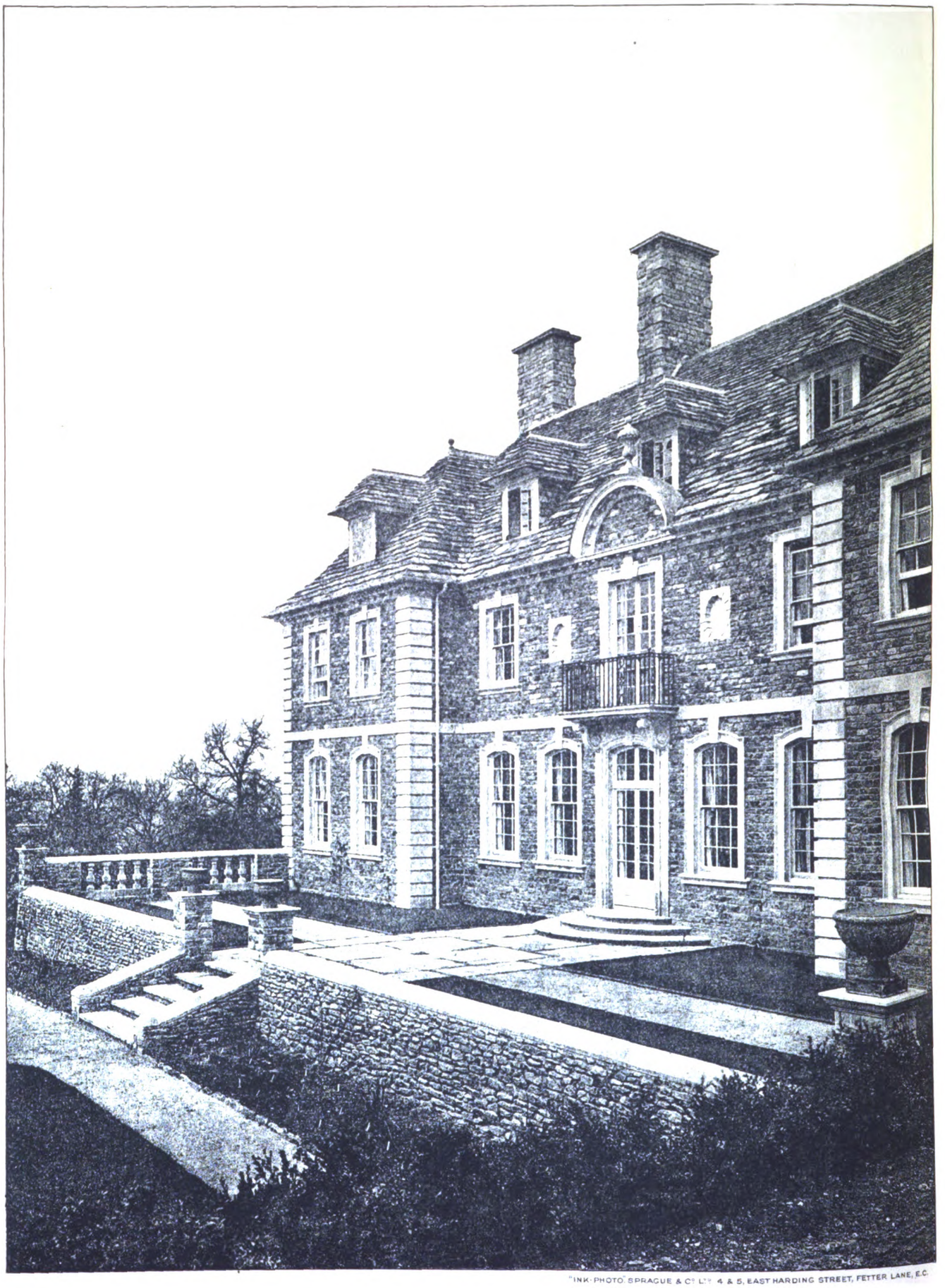
Our illustrations of Queen's College, Oxford, will be continued next week.

HOUSE AT CHESHAM BOIS, BUCKS.

This house was designed and built for Mr. Monk, artist and etcher. The house overlooks Chesham Bois Common. The brickwork is five courses to the foot with old London tiles on the roof. Messrs. Henry Hope & Son supplied the steel casements and leaded lights. Mr. Monk had a very fine collection of old casement handles, and these were fitted to the new casements. The feature of the house is the studio, part of which is finished internally with Dutch bricks. The garden has been laid out in an unique manner, using London paving and Dutch clinkers for the paths, while the grey garden was designed and plants supplied by Miss Jekyll.

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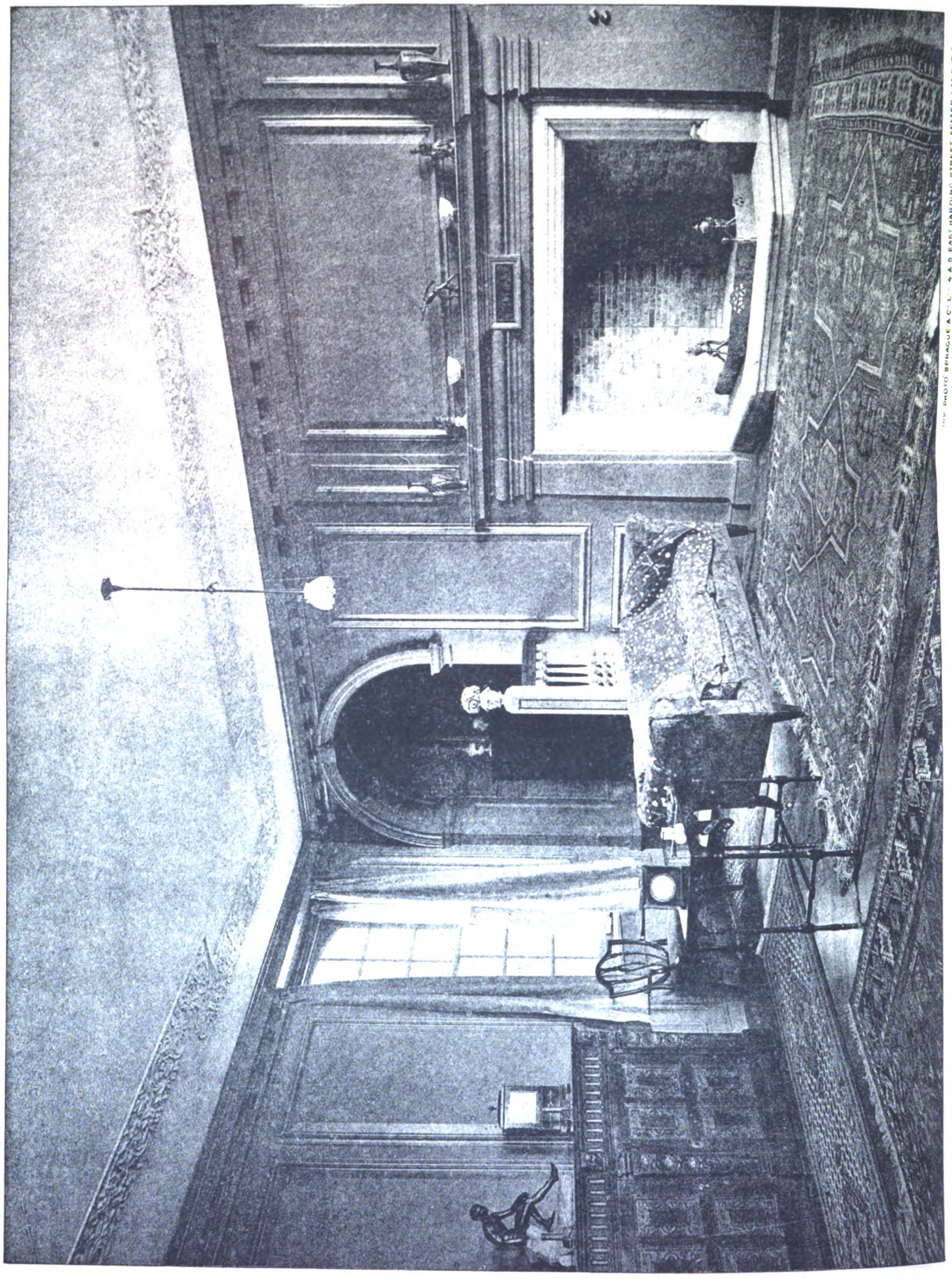
CONKWELL GRANGE, WILTSHIRE: THE GARDEN ENTRANCE TO SOUTH FRONT.

E GUY DAWBER, F.R.I.B.A. Architect.

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CONKWELL GRANGE, WILTSHIRE: THE HALL.

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CONKWELL GRANGE, WILTSHIRE: [illegible]
E. GUY DAW[illegible]

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COURTYARD AND SIDE ENTRANCE.

GRANGE. W.[illegible] A., Architect.

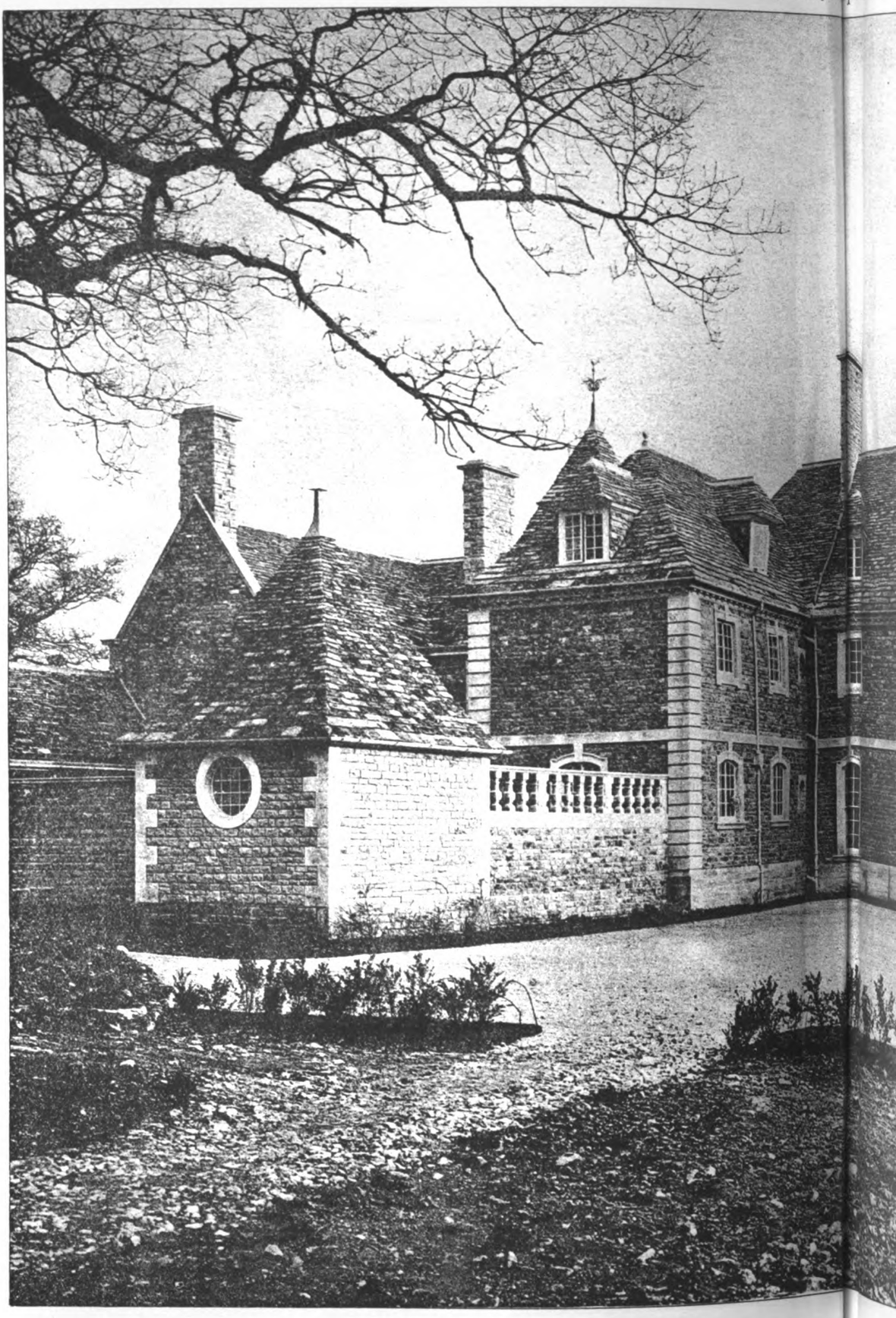
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CONKWELL GRANGE, WILTSHIRE.—COURT AND
E. GUY DAWBER, R.A., Architect.

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COURT AND MAIN ENTRANCE.

A. Architect.

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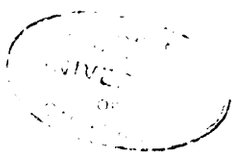
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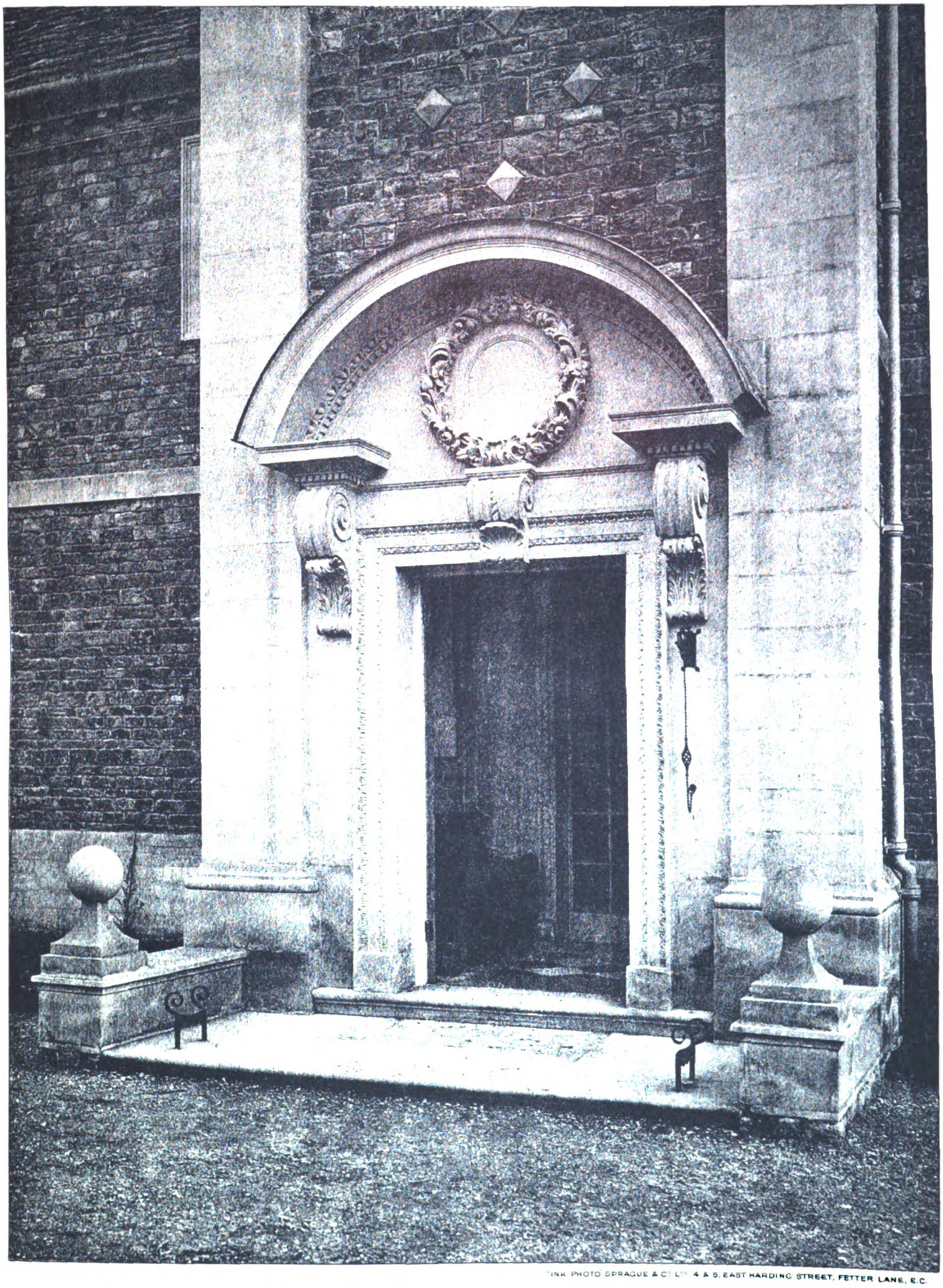
CONKWELL GRANGE, WILTSHIRE: THE DINING ROOM

E GUY DAWBER F.R.I.B.A. Architect

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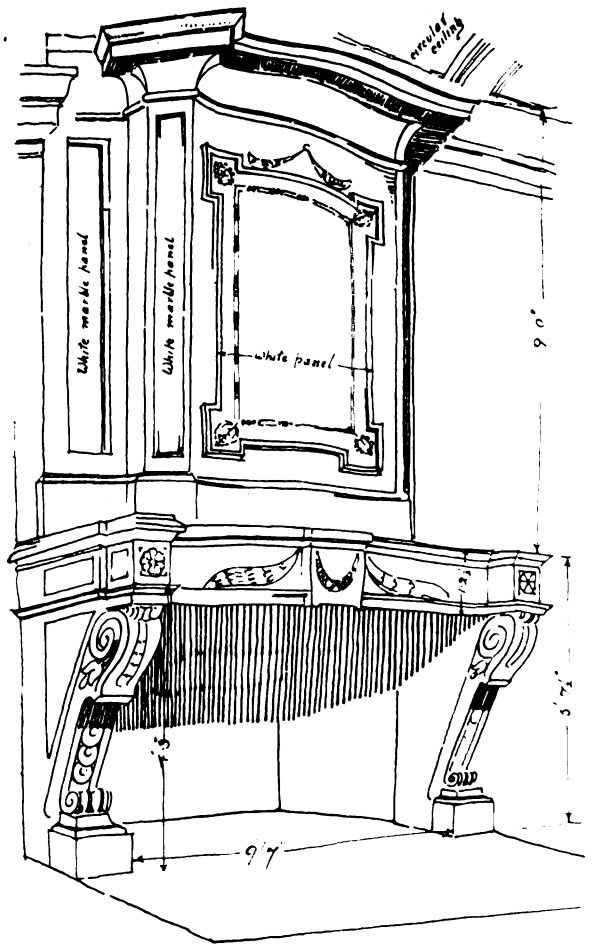
INK PHOTO SPRAGUE & Co LTD 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

CONKWELL GRANGE, WILTSHIRE: ENTRANCE DOOR AND VESTIBULE, &c.

E. GUY DAWBER, F.R.I.B.A., Architect.

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GREY AND WHITE MARBLE MANTLE, HOTEL DE LA CHANCELLERIE, YPRES.
From a Sketch by BANISTER FLETCHER.

STRESSES AND STRAINS IN GIRDER WORK.*

THE title of the paper I have the honour to read to you this evening was suggested to me by your energetic secretary, and I gladly accepted it in the belief that he was better acquainted with your requirements than I could be. It is interesting to note that from the time of the Britannia Tubular Bridge, 1845, when the theory of stresses first received general attention, to about the year 1880, it was customary to speak of the stresses in girder work as strains, so that Mr. F. Wentworth Shields's book on "Strains in Ironwork," and my own lectures to the Society of Engineers, with the same title, which dealt solely with stresses, did not at that time seem improperly named, as draughtsmen were in the habit of describing their preliminary work in designing a bridge as "taking out the strains," and as many of the leading "iron-men" in the various railway engineers' offices were old students of mine, I am afraid I must be held responsible for helping to keep up the misnomer. However, in my lectures just referred to I gave a full description of the true use of the terms, and I cannot do better than recapitulate that portion here. I said:—"By a load on any member of a structure is meant the aggregate of all the external forces acting upon it, including the weight of the member itself and of other parts supported by it; by a strain is meant the change of form produced in a piece by the action of a load; and by a stress is meant the resistance set up in the material by its molecular forces opposing the action of a load in producing a strain. Thus the strength of a piece in a given position may be such that a load of so many pounds produces a stress of so many pounds per square inch, the result being a strain, or change of form of a certain amount, whether temporary or permanent, and, when large enough, appearing as stretching, shortening, bending, crumpling or twisting. The term strain is commonly used instead of stress, and is usually meant as such when we speak of the calculation of strains; so that although we may use this term as an ordinary office phrase, we must bear in mind the distinction when we make a systematic study of the subject."

The various kinds of strain that may come upon a structure are:—

1. Tension: stretching, pulling, tearing.
2. Compression: crushing, pushing, squeezing.
3. Shearing: cutting, nipping, or when acting along the grain of wood it is called detrusion.
4. Transverse strain: cross strain, bending, deflection. This strain may be resolved into tension, compression and shearing, as we shall see later on.
5. Torsion: twisting, wrenching. This strain is a form of shear which belongs almost exclusively to machinery.
6. Buckling or crumpling, which is a compound strain made up of crushing and bending.

At the present day it would, of course, be taken as a sign of ignorance if we spoke of strains when we meant stresses, as the whole subject is now fairly well understood by the ordinary draughtsman.

I have here a model beam in indiarubber which will help us to understand a good deal about stress and strain. One side is plain, the next is divided throughout the length by parallel lines ¼ inch apart across the beam; the next side has squares of ⅜ inch all over it; and the fourth side is covered with circles ½ inch diameter. When I bend the beam double and turn it sideways you will see that the outside of curve is hollow and the sides bulge considerably on the inside of the curve, due to the effects of tension and compression respectively. A bar of iron of the same size bulges in just the same way when bent double. Now turning the parallel lines towards you and bending the beam, you will see that the lines come closer together towards the concave edge and go further apart towards the convex edge, while in the centre of the depth the spacing remains unaltered. This shows you that when a beam is supported at the ends and loaded on the top the upper part is greatly compressed; this compression, which is a measure of the compressive stress induced in the beam, gets less and less towards the middle of the depth, where it disappears, and below that the action is reversed, so that the material is stretched more and more until the bottom is reached, where the tension becomes a maximum. The middle of the depth where the strain disappears is called the neutral layer, and the line this would present in a cross section is called the neutral axis. So far we have only seen the effect of the longitudinal stresses, but turning the side with the squares towards you and bending the beam the squares will be found to become lozenge-shaped in opposite directions on each side of a vertical centre line. This shows the diagonal effect of the real stress, which takes shear into account as well as tension and compression. The side with the circles upon it shows this also, but perhaps in a more interesting manner, as the circles become ellipses with the long axis in the direction of the greatest stress. This model may also be used to show the compression which a column undergoes from an axial load, and the compression and tension from a non-axial or eccentric load. It will also show the effect of torsion, the relative movement of the particles being indicated by the change of shape of the squares and circles.

Now I am afraid we must come to a part of the subject not quite so interesting, but the apology must be that it is essential. I refer to the subject of bending moments. A bending moment is the effect of a load or its reaction at the supports, multiplied by the leverage with which it acts; in other words, it is the active part of the calculations, or the effort, as distinguished from the resistance due to the nature of the material and the disposition of its parts. The bending moments, however, do not tell us all the action that is taking place; we have also to take account of shear, and this is a matter which does not always receive due consideration. Many of the failures in early ferro-concrete work were due to the neglect of shear, and only recently the question of shear in masonry dams has been subject to investigation by many distinguished men.

I have now some lantern slides to illustrate the subject. The first figure shows a beam supported at the ends and loaded in the centre (diagram 1). The next shows the beam with lines on the side, originally parallel, but now closer together at the top and further apart at the bottom on account of the bending, indicating the longitudinal stresses of tension and compression. The next figure is an attempt to indicate the nature of vertical shear in a beam under the action of a load. It does not really divide up into blocks, as shown, as the effect is continuous throughout the beam, any series of particles in a vertical section tending to separate by

* A paper read before the Association of Engineers-in-Charge on April 14, by Henry Adams, M.Inst.C.E., M.I.Mech.E., Vice-President.

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sliding from the adjacent particles. Horizontal shear is shown in the next figure, and this can be illustrated more naturally, because if we put half a dozen boards together to carry a load they will visibly slide on each other as shown. The corner figure shows by a series of curves what is approximately the true distribution of stress throughout a solid beam carrying a load. On the right-hand side we have a diagrammatic view of a girder under a concentrated central load and an equal uniformly distributed load. The girder is shown by a thick line only, as what we are now considering does not take account of the material construction; it may be a solid beam or a flanged girder, but it makes no difference at present.

The bending-moment diagram for the central load is a simple triangle whose depth is $= \frac{Wl}{4}$.

Where W = total load in tons.
l = span in inches.

Vertical ordinates or depths at any part of the triangle indicate the amount of bending moment at the corresponding part of the beam. When the same load is equally distributed along the beam the bending-moment diagram becomes a parabola, as shown, the depth in the centre being $\frac{Wl}{8}$, or exactly half that due to the same load concentrated in the centre. Ordinates within the parabola at any point give the bending moments at corresponding points of the beam as

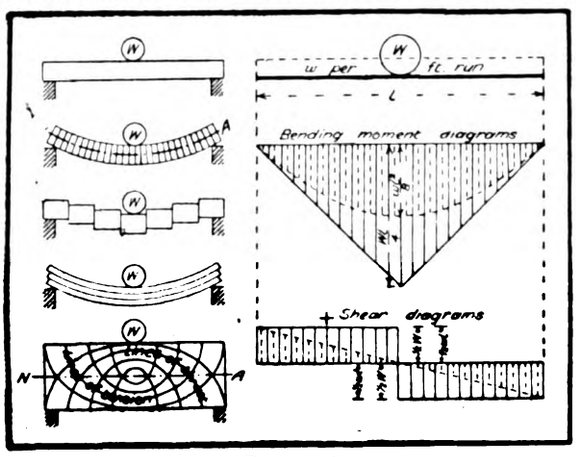


DIAGRAM 1.

before. The lower figure shows the shear diagrams for the same loads. That from the concentrated load is uniform throughout, the depth being equal to the reaction at either support, or $\frac{W}{2}$. The construction of a shear diagram for any load is very simple. If a start be made at the left-hand support with a shear stress equal to the reaction at that support, and the same length or ordinate is maintained until a load is reached, and then the ordinates are reduced by the amount of the load, and so on until the other support is reached, then the whole diagram will be formed. In the case of a concentrated central load, the ordinate will change from a plus value above the line to an equal minus value below the line. The terms plus and minus merely signify the position of the ordinates with regard to the line of origin, and do not indicate any difference in the nature of the shear. The question is frequently asked, "What is the shear exactly under the load?" The answer is that on the centre line of the load the shear changes from plus to minus, so that the centre line being taken as a geometrical one "having length without breadth," the change is immediate, and there is no point where both can be measured at the same time.

Following this method for a uniformly distributed load the ordinates begin to change directly the support is left, so that the complete outline forms two triangles, indicating that the shear stress is equal to $\frac{W}{2}$ at each support, the same as with a concentrated load, while it gradually diminishes to zero at the centre. To facilitate the work in the case of irregular structures, it may be useful to note that the bending moment at any section of a beam is equal to the area of the shear diagram up to that point measured on the length-load scale adopted, due attention being given to the plus and minus values of the shear diagram.

With this explanation you will be able to follow readily the bending moment and shear diagrams for all the regular conditions of loading and supporting, and these will be thrown upon the screen, so that any further points of interest may be described.

Fig. 1 (diagram 2) shows a cantilever loaded at the end, with the bending moment and shear diagrams. The maximum bending moment is $= Wl$, and the shear $= W$, uniform throughout.

Fig. 2 shows a cantilever with three concentrated loads, W, W_1 and W_2, at different points. The principle of constructing the bending moment and shear diagrams will be easily followed from the previous description.

Fig. 3 shows a cantilever under a uniformly distributed load. The maximum bending moment is only half that due to the same load concentrated at the end, and the shear stress being reduced from the support outwards in proportion as the load is passed becomes zero at the end.

Fig. 4 shows a cantilever carrying a concentrated load at the extremity and also a distributed load. The diagrams will be seen to be made up of figs. 1 and 2, where similar loads were taken by themselves.

Fig. 5 shows a cantilever with a partially distributed load. The construction of the bending-moment diagram is rather interesting. First the parabola is drawn for the load as if the cantilever extended out for the length z; then the outline is continued by drawing the triangle of ordinates as if the load were concentrated at its centre of gravity.

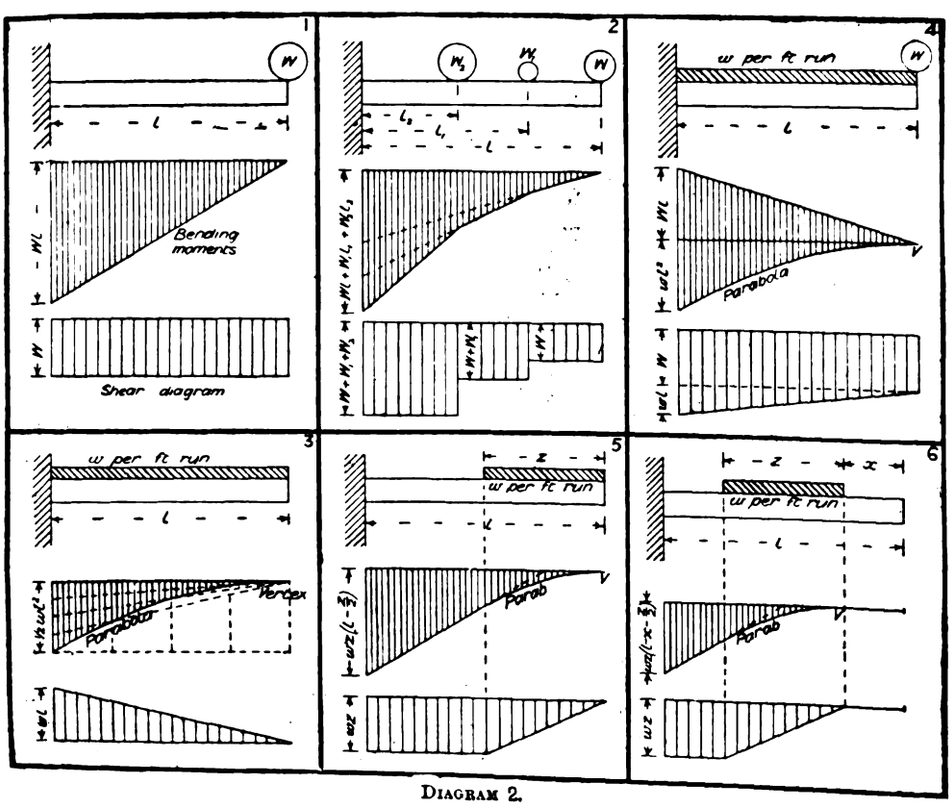


DIAGRAM 2.

Fig. 6 shows a cantilever with a partially distributed load not reacting to the outer end, and the diagrams are similar to the last, supposing the cantilever to terminate at the outer end of the load.

Fig 7 (diagram 3) shows a beam supported at the ends and carrying a concentrated load in the centre.

Fig. 8 shows a similar beam with the load shifted out of the centre.

Fig. 9 shows how two concentrated loads on a beam are dealt with. In the alternative bending moment diagram the overlapping of the dotted independent diagrams for each load being allowed for gives the same lengths of ordinates as the upper diagrams, although its shape is somewhat different.

Fig. 10 shows a beam supported at the ends and carrying a uniformly distributed load.

Fig. 11 shows a beam carrying a partially distributed load with rather a neat form of construction

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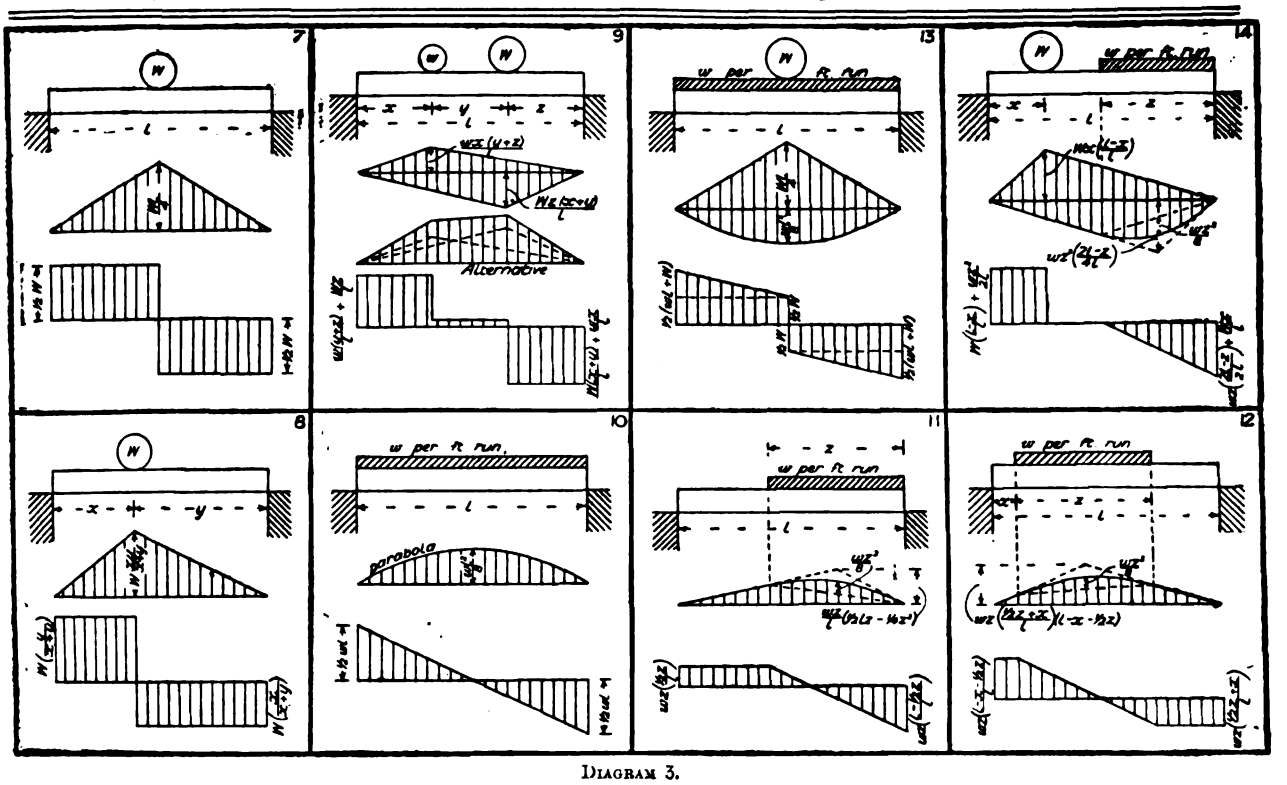


DIAGRAM 3.

for the bending-moment diagram. The load is first assumed to be concentrated at its centre of gravity and the main triangle drawn; then the apex is cut off by a chord line extending to each extremity of the load, and a parabola due to the distributed load drawn upon it.

Fig. 12 shows a beam with a partially distributed load not reaching either end.

compression stress in lower. The nature of the longitudinal stress is also shown in the elevation by the thick lines for compression and thin for tension, the terminations marking the points of contrary flexure where the bending moment is zero.

Fig. 16 shows a similar fixed beam with a uniformly distributed load. The bending-moment diagram depends to

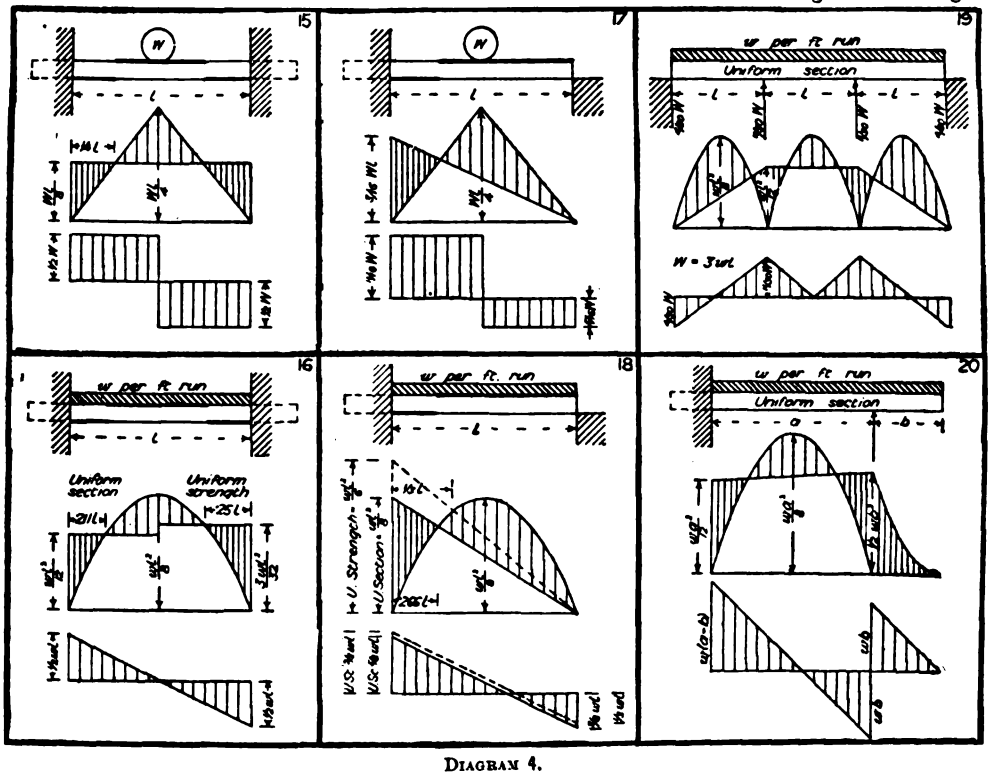


DIAGRAM 4.

Fig. 13 shows a beam carrying a concentrated load in the centre and also a uniformly distributed load.

Fig. 14 shows a beam carrying a distributed load over one half and a concentrated load on the other half. It will be seen that the portion of the girder between the two loads has no shear, according to the rules laid down. This happens because the two loads are assumed to be equal and their centres of gravity equidistant from the supports.

Fig. 15 (diagram 4) shows a beam with the ends sufficiently built in the walls, or carried continuously over supports, or otherwise secured, so that they are in the technical condition known as "fixed." The narrow spaced ordinates in the bending-moment diagrams show tension in upper side and some extent upon the construction of the girder in this case, as to whether it is of uniform section or uniform strength.

Fig. 17 shows a beam fixed one end and merely supported at the other end, with a concentrated load in the centre.

Fig. 18 shows a similarly fixed and supported beam, but carrying a distributed load.

Fig. 19 shows a "continuous beam" or girder with more than two supports.

Fig. 20 shows a beam in the condition of a gallery cantilever, one end fixed and the other projecting over a column or other support. The lettering in every case shows how the diagrams may be calculated and set off to scale.

(To be continued.)

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TESTS ON BRICK AND TERRA-COTTA COLUMNS.

PROFESSOR ARTHUR N. TALBOT, of the University of Illinois, assisted by Mr. Duff A. Abrams, Associate in theoretical and applied mechanics, has published a report on a series of tests carried out at the Engineering Experiment Station of the University. The experiments were conducted on sixteen short columns or piers of brick and sixteen columns built of hollow terra-cotta blocks not filled with concrete. The length of the columns varied from 10 feet to 12½ feet. In lateral dimensions the brick columns were 12½ by 12½ inches, and in the terra-cotta block columns the range was from 8½ by 8½ inches to 17½ by 17½ inches. The bricks used in the construction of the columns were of two grades—an excellent class of building brick and a soft grade selected as representative of inferior brick. The average compressive strength of the former bricks was in pounds per square inch 10,690, and the modulus of rupture under transverse stress was 1,670 lb. per square inch, whilst the inferior bricks had an average compressive strength of 3,920 lb. and a modulus of rupture of 481 lb. The terra-cotta blocks were of good quality. Different qualities of mortar and different grades of workmanship were used. The loads were applied continuously to failure in most cases, but tests were also made with repeated applications of the same load. Central loading of the columns was used in most cases, but in some tests the load was applied eccentrically. The following is the summary of the results as given in the report:—.

"Both brick columns and terra-cotta block columns gave high strengths in all cases where strong mortar and care in building were used. For central loading the strength of the brick columns ranged from 3,220 to 4,110 lb. per square inch, and the strength of the terra-cotta block columns from 2,700 to 3,790 lb. per square inch, the columns having the highest resistance not failing at the full capacity of the machine. The effect of the strength of the mortar is apparent in the carrying capacity developed in the columns; lower loads were found in columns built with 1-5 Portland cement mortar than in those with 1-3 Portland cement mortar, still lower loads in those with 1-3 natural cement mortar, and still lower loads in those having 1-2 lime mortar. The effect of the quality of the brick is shown in the columns made with inferior brick, which carried only 31 per cent. as much as columns built with the better grade of brick. In the case of the terra-cotta columns, the blocks which were culled out as somewhat inferior gave a column strength perhaps 30 per cent. less than the columns built with superior blocks. The effect of the attempt to represent hurried or careless workmanship in two brick columns and in three terra-cotta block columns was a loss in strength of about 15 per cent. and 25 per cent. respectively.

"The ratio of the strength of the columns to the compressive strength of the individual brick and block is of interest. In the well-built brick columns loaded centrally the ratio of strength of column to compressive strength of individual brick ranged from 0.31 to 0.37, and in the underburned clay-brick column the ratio was 0.27. In the terra-cotta block columns with central loading the ratio of strength of column to that of individual block was 0.74 for the incompleted test and 0.83, 0.85 and 0.89 for the others. If, as seems to be the case, the strength of the brick or block to resist cross-breaking is an element in determining the strength of the built-up column, a deeper or thicker brick would give higher column strength. It is possible that this partially accounts for the fact that the ratio is found to be higher for terra-cotta block columns than for brick columns. The tests suggest that the ability of individual pieces to resist transverse strength is an important element in the strength of the completed column. This suggestion may have an important bearing on the advantageous size of the component blocks which may be used in a compression piece where high strength is desired.

"The strength of the column is greater than the strength of the mortar cubes in both brick and terra-cotta block columns, excepting only the soft brick columns which had brick of low compressive strength. It is evident that the strength of individual brick or blocks and the strength of the mortar both enter into the resistance of the column. The relative effect of the two depends upon the character of the material. It is evident, however, that the better the individual piece the more important it is to have the mortar of high resisting strength.

"The results obtained in applying the load eccentrically were found to agree very well with those obtained from ordinary analysis. When the amount of eccentricity in the application of the load is known or may be estimated closely, the ability of the column to resist this action may be calculated quite closely. It is apparent from the results that the calculated resisting stress in the column on the side of maximum compression is higher than that which causes failure in centrally loaded columns. The higher stress developed with eccentric loading is probably due to the influence of the restraint of the less stressed interior portion. The tests made by applying and releasing a single load a number of times gave failures at loads below those which produced failure in similar columns at a single application of the load. The phenomenon is common in materials of the nature of brick and terra-cotta.

"It is apparent that the quality of workmanship in laying up such columns has an important bearing upon the resisting strength. The work of building columns, however, is not difficult and requires only ordinary care. Full joints and an even bearing are important, and the ordinary workman ought to be able to construct columns of high strength. In the tests made on columns intended to represent poor or careless workmanship the decrease in strength was not as much as anticipated. However, it must be understood that careful and trustworthy work is essential and that a few poor joints will materially reduce the strength of the structure. Wherever good material and good workmanship are insured the strength of masonry of this kind may be utilised with advantage."

TEST OF THREE LARGE REINFORCED CONCRETE BEAMS.

AT the Engineering Experiment Station of the University of Illinois, Mr. Arthur N. Talbot, Professor of Municipal and Sanitary Engineering, and in charge of theoretical and applied mechanics, has carried out some highly interesting experiments on perhaps the largest reinforced concrete beams yet tested, chosen almost at random from a large number of beams made up for use in a railroad structure, which may thus be considered to be representative of actual conditions of construction. The slabs were supported on balks of timber and were tested in pairs, being kept 12 inches apart by oak beams. Pressure was applied by means of hydraulic jacks. From the Professor's report we give the following extracts:—

1. *Materials.*

The information and data on the materials used and the methods of fabrication were furnished by Mr. Gaut of the Illinois Central Railroad, and as there was no thought of needing results for test discussion, no special measurements or analyses were made, only the attention usual in well-made construction work being given. The sand was torpedo sand of good quality from Merom, Indiana. The stone was unscreened crushed limestone from Chicago, the largest size being two inches. The cement was Owl Portland cement manufactured by the German-American Portland Cement Company. Tests of the cement gave a tensile strength of 822 lb. per square inch for the seven-day neat test; 95.2 per cent. passed the No. 100 sieve.

The main longitudinal reinforcing bars were 1 inch square corrugated bars, new style. Tests made by Robert W. Hunt & Co. of the bars used in this work show an elastic limit varying between 51,260 and 52,770 lb. per square inch. The ½-inch bars used in the top longitudinal reinforcement were cup bars. Tests showed these to have an elastic limit ranging from 45,800 to 51,100 lb. per square inch. The stirrups were ½-inch cup bars.

2. *The Slab and its Reinforcement.*

The general size of the slab was 6 feet 3 inches breadth by 25 feet length. One-half of the length had a general thickness of 34 inches, and the other one-half sloped from the middle to a thickness of 31 inches at the end. This difference in thickness was for the purpose of facilitating drainage. In addition to the thickness just mentioned there was an additional inch at the bottom at either end for a distance of 18 inches, the width of the bearing area. This arrangement permits a better appearing joint at the supports. The estimated weight of one of the slabs is 33 tons.

The longitudinal reinforcement was placed with the lower face of the bar 3 inches from the bottom surface of the slab. This makes the distance from the centre of the reinforcing bars to the top of the slab at the middle 30½ inches. Although the depth to steel is less than this for one half of the beam, the maximum bending moment is at the middle, and 30½ inches will be used in the calculations, both in calculating the resisting moment and in calculating the shearing stresses. This is admissible in the

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latter case because of the slope of the upper surface. Twenty-nine 1-inch bars were used in each slab, the spacing being 2½-inch centres and 2½ inches from the lateral faces. Counting the depth to the centre of the steel as 30½ inches, the reinforcement amounts to 1.27 per cent.

Two methods of placing the reinforcement and providing against diagonal tension were used. In No. 70 no stirrups were used and the bars were bent up at an angle of about 45 degrees rather close to the end. The bend for one-fourth of them started at about 2 feet from the end, for another one-fourth at 3 feet, for another one-fourth at 4 feet, while the remaining bars were straight throughout the length of the slab. No. 70 was the last slab made in this way. In the slabs made after No. 70 (including No. 71 and No. 72) stirrups were used and the bars were bent up farther back from the end and less abruptly, giving a better distribution of the reinforcement. In one-fourth of the bars the inclination started at a point 6 feet from the end, in one-fourth at 4 feet from the end, and in one-fourth at 2 feet from the end, while as before the remainder of the bars were horizontal. In these slabs U-shaped stirrups, made of ½-inch cup bars, were placed vertically at distances of 2½ feet, 4 feet, 5½ feet and 7 feet from the ends of the slabs. Each stirrup passed under and included five reinforcing bars and reached nearly to the top of the slab. In addition to the main reinforcing bars, four ½-inch cup bars were placed longitudinally 3 inches from the top of the slab, and transversely across the slab just above these were twelve ½-inch and six 1-inch bars, while transversely across the bottom face just above the longitudinal reinforcement were twenty-one ½-inch bars. As the top reinforcement is only one twenty-fifth of one per cent. it is not considered in the calculations of neutral axis position or of compressive stress in the concrete.

At the middle of the width of the slab and 2 feet 6 inches from either end, heavy steel stirrups were anchored in the concrete. These were designed to receive the device by which the slabs were lifted and placed.

3. *Composition and Fabrication.*

The proportions of the concrete were one cement, two sand and five broken stone. The concrete was mixed in a No. 2 Smith machine mixer. There was no measurement of the amount of water used, but the concrete was mixed so wet that little or no tamping was required, or even feasible. The forms were strong and substantial and were well braced. The main longitudinal reinforcement was carefully placed and held by wires and blocks until the concrete was in place. The stirrups were held likewise. It is probable that more mortar was used in space below the bars on account of the difficulty in working around the bars, but there was no attempt made to vary the mixture in the slabs. The concrete was well spaded and stirred, especially around the reinforcing bars.

4. *Storage and Age.*

The slabs were left where made, exposed to the weather, from the time of fabrication until tested. The sides of the forms were removed after forty-eight hours. No. 70 was made October 7, and No. 71 and No. 72 October 8, 1907. The test of No. 70 was made April 15, and of No. 72 April 28, 1908. No. 71 was used in both tests. The slabs were therefore more than six months old. On account of the temperatures prevailing during the winter, the setting of the concrete during much of the time must have been slow, and the conditions were probably less favourable for hardening than is the case in ordinary ninety-day laboratory tests.

5. *Manner of Failure.*

The manner of failure was quite different in the two beams, No. 70 and No. 72. In the case of No. 70, although it is evident from calculations that the steel of the reinforcing bars had nearly reached the yield point, there was no evidence of this in the appearance and action of the beam at the time of failure. At a load of 593,000 lb. the main diagonal crack outside of one load point was seen to be extending rapidly, and at 734,000 lb. it was opening wide. It was evident for some time that the beam was on the verge of total failure. Finally it failed suddenly by diagonal tension, so called shear failure, at an applied load of 801,000 lb., the diagonal crack having suddenly extended to the top of the slab and opened wide. At the same time the horizontal crack which had formed along the reinforcing bar (by the action of vertical tension) lengthened and the bar pulled away from the concrete above. The characteristics of this test were the formation of main diagonal cracks at either end and the final sudden failure of the beam by diagonal tension.

In No. 72 the presence of the stirrups and the changed position of the reinforcing bars at the ends were sufficient to resist the diagonal tension developed. Although the diagonal cracks were numerous and although some of them finally extended to within 12 inches of the top face of the slab they remained small and fine and were well distributed. They lacked the growth and concentration which are apparent in failures by diagonal tension. The tension cracks in the middle third of the beam extended upward as the load was increased and at 811,000 lb. nine of these were visible to within 12 inches of the top of the slab. At this load the tension cracks were opening wide, indicating that the yield point of the reinforcing steel had been passed. Above 800,000 lb. the deflection increased rapidly. The maximum load applied was 840,000 lb., the indicated load then falling off when the deflection was increased. It seems evident that a load of 811,000 lb. would not have held long, and the maximum load applied held but momentarily. The characteristic of the test of No. 72 was slow failure by tension of the steel, without sign of compression failure and without sign of impending failure by diagonal tension. The effectiveness of the stirrups and the bending of the bars at ends are evident in this test. This is the more important as the diagonal tension failure may give little warning and may develop with repetitions at lower loads. It may be noted that on the next day the test was continued until there was a deflection in No. 72 of 3½ inches, the load applied ranging somewhat under 800,000 lb. Upon release of load there was a recovery of 1 inch in the deflection. At this time the stretch of the steel and the consequent concentration of the compressive stress were so much that there was considerable crushing of the concrete. Slab No. 71, which was used as the lower beam in both tests, seems not to have suffered from the first test, the cracks closing up upon release of load. In the second test the tension cracks opened up at the maximum load and there was evidence of the steel being stretched beyond the yield point. It should be noted that on account of its inverted position and the location of the supports the bending moment developed in the lower beam was somewhat smaller than that in the upper beam. There was no sign of impending failure by diagonal tension.

6. *Compressive Stress in the Concrete.*

The compression in the upper fibre, calculated by the ordinary methods, runs up to a high figure, as is usual in tests of beams having a considerable amount of reinforcement and adequate provision for web stresses. Assuming the neutral axis to be 0.43 of the depth to the reinforcing bars and using the ordinary straight-line formula, the compressive stress in No. 72 at the maximum load was 3,190 lb. per square inch. Using the parabolic formula and considering that the compressive deformation is one-half of the ultimate compressive deformation of the concrete, the calculated stress is 2,870 lb. per square inch. Even at this high calculated stress there was no sign of compression failure and none was apparent until after the steel had stretched beyond its yield point. Comparing the deformation developed with that of other tests it seems probable that the beam would have taken at least one-third more compressive stress before failure in compression at first load would have resulted. Of course, repeated applications of any such high load might soon have injured the beam. A further evidence of the strength of the concrete is seen in the later test referred to, where after the maximum load had been reached and the steel was stretched well beyond its yield point the beam held a load of nearly 800,000 lb. until the deflection reached 3½ inches before any considerable amount of crushing of the concrete took place.

7. *Remarks.*

The tests showed that the concrete was of excellent quality and that the slabs acted similarly to high-grade test beams made and tested in laboratories. The uniformity and regularity of these large beams were shown in various ways in the tests. As these particular slabs may be presumed to be fairly representative of the slabs fabricated for the work, the tests ought to add confidence in the quality and soundness of the reinforced concrete used in this work, and in other work of large magnitude made under as careful conditions. The action of the concrete in compression under the high stresses developed was quite satisfactory. The tests show the effectiveness of stirrups and of the methods used in bending up bars at the ends in resisting diagonal tension. Diagonal tension weakness is particularly undesirable because of the possibility of sudden failure and of injury after repeated applications of the load and because of the difficulty of detecting incipient failure when the sides of the beam are

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not available for inspection. Ample safety against these conditions is important and means should be provided to resist the diagonal tension. Failures by tension of the steel and by compression of the concrete give warning through abnormal deflections and in other ways and are less likely to lead to serious results. Also, it seems evident from these tests that the action and properties of reinforced concrete beams made under efficient supervision do not differ much from those of laboratory test beams.

The following tables summarise the information obtained from the experiments:—

TABLE 1.

Test Data of No. 70 and No. 71.—Tested April 15, 1908.

The applied load includes the weight of the testing appliances but not the weight of the slab itself. The notes regarding cracks refer to No. 70.

Ref. No.	Applied Load Pounds.	Sum of Centre Deflections of No. 70 and 71 Inches. East Side.	Sum of Centre Deflections of No. 70 and 71 Inches. West Side.	Remarks.
0	25,000	0·00	0·00	This load is used as the weight of testing apparatus and men *plus* the initial tension in the wrought-iron rods
1	79,000	0·01	0·01	—
2	113,000	0·05	0·03	—
3	140,000	0·07	0·03	—
4	174,000	0·12	0·08	—
5	202,000	0·17	0·14	—
6	230,000	0·19	0·16	—
7	261,000	0·19	0·21	—
8	299,000	0·24	0·28	—
9	333,000	0·36	0·33	First tension crack noted in No. 70
10	364,000	0·37	0·40	Small tension crack at north load point
11	396,000	0·44	0·46	—
12	432,000	0·47	0·53	Second tension crack near centre of top slab
13	468,000	0·57	0·60	First diagonal crack outside north load
14	496,000	0·63	0·69	Numerous small tension cracks
15	532,000	0·65	0·77	—
16	561,000	0·78	0·83	—
17	593,000	0·85	0·90	First diagonal crack lengthening rapidly and becoming more marked
18	626,000	0·98	1·04	Cracking along the steel at south end
19	661,000	1·06	1·08	—
20	693,000	1·11	1·21	In the interval after 488,000 pounds other diagonal cracks appeared near the first one
21	734,000	1·24	1·30	First diagonal crack opening wide
22	768,000	1·34	1·45	—
23	801,000	1·60	1·72	Failed suddenly along first diagonal crack, which reached top just inside the load point

TABLE 2.

Test Data of No. 72.—Tested April 28, 1908.

The applied load includes the weight of the testing appliances but not the weight of the slab itself.

Ref. No.	Applied Load Pounds.	Average Deflection Inches.	Average Extensometer Readings Inches. Top.	Average Extensometer Readings Inches. Bottom.	Vertical Extensometer Readings Inches. South.	Vertical Extensometer Readings Inches. North.	Remarks.
0	*25,000	0·00	·000	·000	·0000	·0000	The "Average Extensometer Readings" are for a gauge distance of 50 inches
1	45,000	0·0	·000	·000	·0000	·0000	—
2	67,000	0·01	·001	·001	−·0001	·0000	—
3	103,000	0·02	·004	·004	−·0001	−·0003	—
4	131,000	0·03	·006	·006	−·0001	−·0002	—
5	159,000	0·05	·008	·010	−·0002	−·0003	Short tension crack just inside south load point
6	189,000	0·10	·011	·016	−·0002	−·0002	Numerous tension cracks
7	220,000	0·11	·015	·023	−·0002	−·0002	Vertical cracks just outside each load point
8	253,000	0·13	·017	·030	−·0002	+·0002	—
9	285,000	0·17	·019	·037	−·0003	+·0004	—
10	317,000	0·18	·021	·044	−·0004	+·0003	More cracks outside of load points
11	350,000	0·24	·024	·050	−·0005	+·0002	—
12	382,000	0·28	·028	·057	−·0006	·0000	—
13	414,000	0·31	·032	·064	−·0004	+·0003	—
14	447,000	0·36	·037	·070	−·0001	+·0011	Marked diagonal cracks
15	500,000	0·40	·043	·075	·0000	+·0014	—
16	514,000	0·43	·046	·081	+·0007	+·0021	—
17	578,000	0·52	·053	·094	+·0023	+·0045	—
18	643,000	0·61	·062	·107	+·0047	+·0079	—
19	704,000	0·70	·071	·122	+·0083	+·0119	—
20	780,000	0·88	·084	·156	+·0138	+·0152	—
21	811,000	1·32	·132	·270	+·0170	+·0181	Tension cracks opening wide
22	840,000	1·60	—	—	—	—	Maximum load. Tension failure

* This load of 25,000 pounds is assumed as the weight of testing apparatus and men and the initial tension of rods. After jacks were in operation all but 9,000 pounds was indicated by readings of the gauges.

TABLE 3.

Results of Tests of No. 72.

The applied load includes the weight of the testing appliances but not the weight of the slab itself.

Ref. No.	Applied Load Pounds.	Average Deflection. Inches.	k of Neutral Axis.	Unit Deformation. At Steel.	Unit Deformation. At Top Fibre.	Stress in Steel.* Pounds per Square Inch. From Deformation.	Stress in Steel.* Pounds per Square Inch. From Bending Moment.
0	25,000	0·00	·000	·00000	·00000	—	1,500
1	45,000	—	—	—	—	—	2,700
2	67,000	0·01	·549	·00001	·00001	300	4,100
3	103,000	0·02	·549	·00004	·00005	1,200	6,300
4	131,000	0·03	·549	·00007	·00008	2,100	8,000
5	159,000	0·05	·459	·00012	·00010	3,600	9,700
6	189,000	0·10	·392	·00020	·00013	6,000	11,500
7	220,000	0·11	·379	·00025	·00018	7,500	13,400
8	253,000	0·13	·326	·00035	·00019	10,500	15,300
9	285,000	0·17	·289	·00049	·00020	14,700	17,400
10	317,000	0·18	·263	·00059	·00021	17,700	19,300
11	350,000	0·24	·265	·00067	·00024	20,100	21,400
12	382,000	0·28	·273	·00077	·00029	23,100	23,300
13	414,000	0·31	·280	·00086	·00033	25,800	25,300
14	447,000	0·36	·300	·00093	·00040	27,900	27,300
15	480,000	0·40	·330	·00098	·00048	29,400	29,300
16	514,000	0·43	·328	·00103	·00051	31,800	31,400
17	578,000	0·52	·324	·00123	·00069	36,900	35,300
18	643,000	0·61	·334	·00140	·00070	42,000	39,300
19	704,000	0·70	·335	·00159	·00080	47,700	42,900
20	780,000	0·88	·306	·00204	·00096	61,200	47,600
21	811,000	1·32	·271	·00360	·00132	108,000	49,600
22	840,000	1·60	—	—	—	—	—

* Add 2,800 pounds per square inch for stress due to weight of slab.

TABLE 4.

Miscellaneous Calculated Stresses.

Ref. No.	Applied Loads Pounds.	Calculated Tension in Steel Pounds per Square Inch.	Calculated Shearing Stress Pounds per Square Inch.	Remarks.
		No. 70.		
9	333,000	22,800	—	First tension crack noted
13	468,000	—	125	First diagonal crack noted
17	593,000	—	156	One main diagonal crack extending rapidly
21	734,000	—	195	One main diagonal crack opening wide
23	801,000	51,700	209	Failure by diagonal tension
		No. 72.		
5	159,000	12,500	—	First tension crack noted
14	447,000	—	120	Marked diagonal cracks noted
—	—	—	—	Marked increase in vertical extensometer readings
15	480,000	—	128	Diagonal cracks numerous and extending
16	514,000	—	138	Marked increase in second extensometer readings
21	811,000	52,400	—	Tension cracks opening wide
22	840,000	54,000	220	Failure by tension in steel

The calculated stress in steel and the calculated vertical shearing stress include the stress due to weight of slab.

ART EXHIBITIONS.

VISITORS to the New Gallery are intended to commence with the paintings in the South Room, then to turn to the West Room, and lastly to make the tour of the North Room. The hanging committee seem to have put their most attractive wares in the first gallery, and to have considered the two later galleries of secondary importance. By this we do not mean that these are treated like a lumber-room, for the standard is too high; but the first gallery contains a larger proportion of noteworthy pictures than either of the other two. Even there that proportion is not a very great one, for though the twenty-second Summer Exhibition contains much that is excellent, it is rather lacking in works of striking force. One reason for this is that this year a change has been inaugurated in the usual arrangement. The Summer Exhibition is to be divided into two sections—the first, from April 17 to June 12, consists of new works, not previously exhibited in London, while the second, from June 21 to August 14, may be to some extent retrospective.

Individualism is shown in many of the pictures in the South Gallery, and with greatly varying results. One of the first to arrest attention is *The Farewell*, by Mr. F. Cayley Robinson, which is unlike anything else shown. There is such unmistakable ability that the spectator is in doubt whether to ascribe the treatment to affectation or to genuine impulse; in either case it has the power to charm

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though of a kind that if repeated often would sooner or later prove wearisome. The subject is but indifferently explained by the title; possibly the artist calculated on a certain amount of artificial interest being aroused by that uncertainty. Mr. G. Spencer Watson has sent three contributions, each pleasant to see. *Cupid and Psyche* is in its way as spontaneous as No. 49, *A Study*. The latter picture suggests that Mr. Watson set out to paint a conventional portrait, but was tempted from orthodoxy by his sitter coming under the sway of some strong emotion. Mr. R. Anning Bell is most restful in the subject and treatment of No. 16, which illustrates certain lines in a "Midsummer Night's Dream." *Vittoria Accoramboni, the White Devil*, is a bold work by the Hon. John Collier, which shows a handsome bejewelled woman three-quarter length, magnificently robed, and resting on a marble seat. Mr. E. Reginald Frampton suggests in his *L'Enfant Jeanne d'Arc*, that the romantic temperament of the Maid of Orleans could scarcely have escaped influence from the romantic environment of her childhood, and that the landscape at her feet might have been as influential as any heavenly voices.

The West Room has three portrait subjects of note, viz. *A Study*, by Mr. Watson (already alluded to); *In the Dunes*, by J. J. Shannon, A.R.A., and *The Motor Bonnet*, by John Lavery, R.S.A.; and we are tempted to include No. 61, by Mr. H. de T. Glazebrook. Both Mr. Lavery and Mr. Shannon have taken a welcome liberty with their subjects and departed from rigid portraiture. Mr. J. J. Shannon is more conventional, though scarcely less successful, in his presentment of *Mrs. Douglas Vickers*, in the North Room. This latter room has many interesting, though few important pictures. An exception is Mr. E. A. Hornel's *The Blackbird's Song*, which presents his curious treatment at its best. *The White Mill*, by Mr. E. A. Walton, should be a constant invigorator to its fortunate owner. Nearly all the familiar contributors to the New Gallery are represented, and constant visitors will have little ground for dissatisfaction.

The Central Hall is, as usual, devoted to sculpture and handicrafts. In the balcony are drawings, etchings, and handicrafts. The etchings of Mr. Theodore Roussel are particularly deserving of attention.

A singularly happy spring exhibition is to be seen at the Leicester Galleries, Leicester Square, W., where a room is given up to some fifty pictures by Arnesby Brown, A.R.A., and fancifully entitled "The Changing Hours." It might be called without disrespect eminently "seasonable," for the pictures carry the spectator to the open pastoral country at a time of year when his mind is probably more affected by Nature than at any other. It may be truly said that they are full of atmosphere, for they concentrate and embody all the vague emotions that spring up on the contemplation of a flat and peaceful landscape bathed in sunlight or toned down by the subtle approach of dusk and sunset. But the present small exhibition shows Mr. Brown as something more than a painter of pastorals, for his subjects are reminiscent of other months than July and of other places than level fields. Each and everyone is full of the fascination of the country, and they make the room an oasis in London. The catalogue has an introductory "Conversational Note" by Mr. C. Lewis Hind. We fail to see the necessity or advantage of this dialogue form, and we think it would have been better treated as ordinary essay.

Mr. Frank O. Salisbury has attracted considerable attention by his works. What we take to be his first one-man show is being held at the Doré Galleries. The effect on entering the principal room is rather overwhelming, for none of the pictures are sparing in colour; and while among the works at the Royal Academy they might be an admirable contrast to their less daring neighbours, they seem to form a somewhat exuberant whole. Mr. Salisbury can paint portraits successfully, but, unlike many of his fellow-artists, he does not devote himself to that lucrative side of his art. His talents find a wider play in such works as the large "Passing of Queen Eleanor," which reveals a temperament that is not daunted by petty thoughts of size and acceptance. The subject-pictures are all decorative, and the same feeling enters into the portraits. The artist will no doubt build up a popular reputation.

A New Scientific Society, with the title of the Institution of Colliery and Mining Electrical Engineers, is to be formed The object of the new institution is to secure greater opportunities for discussing matters of importance to electrical engineers in charge of colliery installations. The opening meeting in Manchester will be held on Saturday next.

NOTES ON BOOKS.

"Galicia, the Switzerland of Spain." By Annette M. B. Meakin. (London: Methuen & Co. 12*s*. 6*d*. net.)

GALICIA is perhaps, to Englishmen of the present day, the least known of all the provinces of Spain, and yet it is very easily reached by the Royal Mail Steam Packet Co.'s excellent boats from Southampton to Vigo. The Bay of Biscay is not always rough; indeed, though we have crossed it several times, we have never seen it so. In mediæval times, when Compostella was the bourne of crowds of pilgrims, it was so much frequented by English travellers that a guide book was published in the fourteenth century entitled "The Way from the Lond of Engelond unto Sent Jamez in Galiz."

Not only is Galicia full of beautiful scenery, but, what more immediately concerns us, it contains a wealth of interesting architecture, as may be gathered from the numerous photographs in the book before us. Although these are small and apparently very largely the products of a hand camera, they tell the reader, and especially the architectural reader, enough to make him realise that the architecture of Galicia is well worth study.

The great architectural masterpiece of Galicia is, of course, the famous cathedral of Santiago de Compostella, and this our authoress describes and illustrates very fully, *inter alia* demolishing the theory that it was copied from S. Sernin at Toulouse, and suggesting, what seems to us probably correct, that both S. Sernin and Santiago were influenced by Cluny, which we know to have been the great architectural university of Western Europe at the time these churches were built. French influence was undoubtedly strong in the early mediæval period in this part of the peninsula, not only in Galicia, but in the north of Portugal, which anciently belonged to the kingdom of Galicia. Braga, for example, and still more Alcobaça, show distinct French feeling. We should not, however, on this account, assume that all the architects of Galicia were Frenchmen, and may admit that Maestro Mateo, the architect of the Portico de Gloria of Santiago, was a Gallegan.

The cathedral of Santiago is not the only excellent piece of architecture in the city; this also contains the palace of Gelmirez and the charming Plateresco work of the Royal Hospital, where also we find examples of that latest phase of Gothic work of which Spain and Portugal have the monopoly. The Colegiata de Sar must not be taken by Mr. Goodyear as supporting his theory of refinements, for there is little doubt in this case that the obliquity is the result of the water beneath the foundations.

The architect visiting Galicia should not give all his time to Santiago. Noya, Pontevedra, Orense, Celanova, are all well worthy of a visit. Many phases of ancient work, from prehistoric cup-writing to the extravagances of Churrigueresco, can be studied in Galicia, and the pleasures of anticipation as well as a clear idea of what the north-western province of Spain contains can be obtained from a perusal of this very charming book.

"The Card System at the Office." By J. Kaiser. (Published by Author. 5*s*. net.)

Where to find what you want is important to everybody, and to no one less so than the architect. An index of some sort or another is a necessity, and is to be found in most architects' offices, generally in the form of a book. The card system of indexing has many advantages over the older method and a very clear exposition of the system is afforded by Mr. Kaiser's book.

"Sanitation of Public Buildings." By William Paul Gerhard, C.E. (London: Chapman & Hall, Ltd. New York: John Wiley & Sons. $1.50.)

This is an American book by a well-known American author; hence in particular details its information, based on the requirements and customs of the United States, do not accord with British conditions and practice. For example, when the author permits 66 to 68 degrees Fahr. as the maximum temperature for schoolrooms and stipulates that the humidity of the air should be not less than 40 nor more than 60 per cent., it is obvious that his figures are impracticable for Great Britain. As, however, the book rather deals with the first principles than the details of the sanitation of hospitals, theatres, churches, schools, markets, and abattoirs, it is distinctly valuable to the student at an early stage of his career, wherever he may reside. The best feature of the author's treatment of his subject is that he does not attempt to completely deal with any one section, but

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gives an ample bibliography for those who wish to pursue their studies in any special directions. He, in fact, takes his reader along the first few miles of the road to knowledge and then points out the paths by which may be reached the various provinces of that kingdom.

OUR CONTEMPORARIES FROM OVER-SEAS.

THE *Engineering Record* (New York) describes how a four-storeyed building, 25 feet frontage, 110 feet deep and 50 feet high, in Milwaukee, which leaned 16 inches out of the vertical at top, has been shored and straightened. In its sixth annual contractors' number, our contemporary gives particulars with diagrams of the design and construction of a large concrete retaining wall, 1,665 feet long and 27 feet high, save where defects in the soil required additional depths up to to 5 feet. This wall is situated in Pittsburg. Also in Pittsburg has been executed some remarkable underpinning of the Homœopathic Hospital, whose walls had seriously settled and gone out of plumb. At Galveston, Texas, a tidal wave did so much damage a few years ago that some of the streets were raised several feet, and a description is given of the manner in which St. Patrick's Church and the Broadway school have each been lifted complete, without damage, for a height of 5 feet, and new foundations constructed beneath. In the case of the church, no interference was made in the services during the thirty-five working days occupied in the operations. An interesting article is that on "Artistic and Commercially Practical Surface Finishes for Concrete Work," by Mr. J. H. Chubb, which describes and illustrates how various surface textures may be obtained. Mr. W. M. Christie gives his views and describes his methods, with illustrations, of obtaining depth and detail of photographs of interiors of buildings and engineering structures under the head of "Engineering Photography."

La Construction Moderne has for its principal matter a full set of plans and photographs of the exterior of a lofty block of flats in the Rue de Messine, Paris, a newly constructed street in the wealthy quarter between the Parc Monceau and the Boulevard Haussmann. This building is interesting therefore as an example of the latest thing in Parisian flat-planning, and also as an instance of modern French street architecture. In this case the ornamentation is chiefly of realistically rendered carving in stone of flowers and fruit trees, which meander over the architectural features in more than naturalesque fashion, a method of treatment that we can hardly bring ourselves to admire. The architect is M. Lavirotte.

NOTABILIA.

THE *Irish Builder and Engineer*, to commemorate its jubilee, has issued a special number in which opportunity is taken of the occasion to review what has been done in Ireland during the last fifty years of art work, not only in architecture, but in the other arts. Mr. Robert Elliott treats under the guise of a conversation between the spirits of Truth and Fact on Irish art generally, Dr. Robert Cochrane of archæology, Mr. J. Franklin Fuller of his personal reminiscences, Mr. W. Kaye-Parry of sanitation, and other writers of various aspects of architectural and engineering activity in Ireland during the last half-century. As the text is interspersed with numerous illustrations of buildings erected in Ireland during the period, this jubilee issue becomes a valuable history of Irish architecture from 1859 to 1909.

Garden Design, by John P. White, though virtually a trade catalogue of garden adjuncts in the Japanese manner, contains besides the things that Mr. White is prepared to sell, some charming illustrations of Japanese gardening that make it worthy of notice. Mr. Rowland E. Prothero gives a short sketch of the history of varied fashions in gardening introductory of course to the Japanese "style," but strange to say he does not mention the name of Sir William Chambers, who strongly influenced the eighteenth century taste for Japanese or Chinese forms, and was largely responsible for the introduction of "treillage."

The Future of Glastonbury Abbey has, by the decision of the Advisory Council, constituted according to the trust deed, been settled for the next five years. It has been decided to extend the lease of the former tenant for that period, and in the interval to accumulate funds for the safe restoration of the ruins and the provision of a capital sum for organising special church work.

Correspondence

[The Editor will not be responsible for the opinions expressed by Correspondents.]

Bere Regis Church, Dorset.

Sir,—Can any of your readers tell me whether the notes made by the late G. E. Street, R.A., on the churches he restored (or the contract drawings for the alterations from the work he found), are extant, and if so, in whose possession they are, in cases other than those in which they were deposited with the rectors and churchwardens?

I ask this information with particular reference to Bere Regis Church, in the county of Dorset, which was restored by him in the years 1874-75, and of which an account is now being prepared for the *Architectural and Topographical Record*.

Information as to the existence and ownership of these notes and drawings, or of those of any other churches restored by him will be most gratefully received.—Yours faithfully,

Wilfrid Travers,
General Hon. Sec.
Architectural and Topographical Society.
33 Old Queen Street, Westminster: April 19, 1909.

The Building Exhibition.

Sir,—The present Building Exhibition appears by general consent to be even better than former ones, but why has the collection of illustrations of actual buildings, which formed an important item in last year's Exhibition, been omitted this year? Surely there would have been no difficulty in getting architects to lend drawings and photographs for exhibition. Indeed, the fact that the President of the Institute and a great many architects took part in the opening proceedings shows that architects are very much interested in the Exhibition. It may perhaps be felt that as the architectural room at the Royal Academy will be open in a few days it is hardly necessary to have another collection of architectural designs on view at the same time; but it must be remembered that the Academy does not at present admit photographs, and a really good collection of architectural photographs at Olympia might go a long way towards bringing about an alteration in this matter. In any case there are plenty of working drawings, studies of old buildings and other illustrations that architects could furnish, quite suitable for a Building Exhibition and possessing great interest, but not of such a kind as could be sent to the Academy. It is to be hoped that the custom of former years will be revived in any future exhibition that may be held.—Yours faithfully,

Arthur Keen.

Reading County Offices Competition.

Sir,—Members of the Institute proposing to enter for this competition are requested to communicate with the undersigned before taking any further steps in the matter.

Ian MacAlister,
April 21, 1909. Secretary R.I.B.A.

GENERAL.

We Regret to have to announce the death in his seventieth year of Mr. Edward Potts, F.R.I.B.A., the head of the firm of Potts, Son & Hennings, of Manchester, Bolton and Oldham. The late Mr. Potts was elected a Fellow of the Royal Institute in 1888, and was a recognised expert in the designing of spinning mills, of which he erected a very large number. Amongst his other works were the Manchester Corn Exchange and the Blackpool town hall.

The Architectural Association's Annual Dinner has been postponed from May 5 to May 12 (Wednesday), 7 P.M., at the Georgian Hall, Gaiety Restaurant.

The Birmingham City Council will pave certain thoroughfares at an estimated cost of 16,607*l*. It is proposed to pave Oozells Street with prismatic oak, St. Stephen's Street and Crabtree Road partly with prismatic oak and partly with granite, and Gloucester Street, Bracebridge Street, Derby Street, Essex Street, Icknield Port Road and Western Road with granite.

The Bessemer Gold Medal for the current year has been awarded to M. Pourcel, of Paris, and the presentation will be made at the annual meeting of the Iron and Steel Institute, to be held at the Institution of Civil Engineers, at Westminster, on May 14.

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GREEK VASE PAINTING, ILLUSTRATING CONTEST OF ATHENA AND POSEIDON FOR THE SOIL OF ATTICA.

THE WEEK.

We congratulate the University of Sheffield on the opening by the Prince and Princess of Wales of the new library which has been provided by Mr. Edgar Allen and designed by Mr. E. R. Gibbs. Our younger universities recognise architecture as one of the vital interests of modern life, and we trust that they will not forget that research is as much the function of the university as teaching. The space, therefore, in the new library that can be spared for architectural books should not be occupied by cheap and popular books of to-day, but should be devoted to those rare and expensive works that financially are beyond the reach of the average student. To properly study architecture many and costly books are necessary—indeed, the books to which reference is required by every candidate for the qualifying examination of the Royal Institute would cost to buy some 300*l.* to 500*l.* There is another point as to which the greatest care should be given by those who have to select the books for a reference library on architecture. Unimpeachable accuracy is pre-eminently essential for books included in an university library. This, unhappily, is greatly lacking in books on architecture, both old and new, and to enforce a rigid censorship would reduce our library to very small dimensions. The architectural books, therefore, should be divided into two classes—the first, a small one, of reliable books possessing authority as records; the other, far more numerous, of those works that can only be regarded as suggestive.

Mr. Speaight's proposal for the alteration of St. James's Park having been, at any rate for the present, killed by the decision of the First Commissioner of Works, Mr. Eustace Balfour has, in a letter to the *Times*, essayed to drive a few nails into its coffin by a caustic criticism of some of its details, particularly objecting to the scale of the statues that Mr. Speaight proposed and the canal that forms part of the scheme. These are both remediable without destroying the essence of Mr. Speaight's suggestions, and we do not think Mr. Balfour advances the matter very much one way or the other by his criticism. As we have already said, Mr. Harcourt's position is perfectly logical, and his preference for the *status quo* is comprehensible and justifiable. It is of little use, therefore, to cavil at the *minutiæ* of Mr. Speaight's scheme.

The Council of the Royal Academy having requested that notices of the works exhibited shall not appear in the Press until after to-day, our first descriptive article on the contents of the Architectural Room will be given next week. Suffice it to say that the collection is truly representative of present-day architectural work, and that there are some quite remarkable designs included. We like the arrangement adopted this year of grouping together illustrations of similar types of buildings—educational, domestic, municipal, and ecclesiastical.

The Manchester City Council by a large majority has decided to demolish at the earliest opportunity the whole of the unoccupied buildings on the Royal Infirmary site, and thus to put completely out of court any proposal to utilise the old Infirmary buildings for municipal purposes. What is to be done with the site when it is cleared remains for future consideration and decision. The citizens of Manchester may be content to preserve as an open space the million pounds' worth of land, or they may decide to utilise some portion of it for the erection of a fine building. As Mr. Collcutt advised against the retention of the old Infirmary buildings, we are not disposed to cavil at the decision at which the City Council has arrived.

The Irish branch of the Surveyors' Institution at its annual general meeting was much occupied with the Land Bill of the present Session, and passed a resolution expressing their opinion that it would retard, and in many cases prevent, the sales of estates, inasmuch as it would neither encourage the landlords to sell nor tempt the tenants to buy. Although it might be alleged that the gentlemen who passed this resolution were biased in their opinion by the effect the Bill might have upon their position as agents to estates, it must be admitted that they are eminently qualified to pass judgment upon the effect of the Bill now before Parliament.

The competition for designs for buildings suitable for parts of Italy subject to seismic movements, initiated by the Lombardic Co-operative Society for Public Works, with the assistance of the Institute of Engineers and Architects of Milan, has attracted 211 competitors, of whom 40 are from places abroad, including Cairo, Paris, London, Vienna, and Berlin. The schemes are to be exhibited in the Palazzo del Corso Hotel at Milan, and the exhibition will remain open until June 20.

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STEEL FRAME CONSTRUCTION IN LONDON.

THE London Building Acts do not contemplate the possibility of such a thing as a steel-framed building—that is, one whose loads are borne by a steel skeleton construction, the walls being merely a protective casing to guard the steel frame from weather or fire. The advantages of such a method of construction have already led to the erection in London of steel-framed buildings, notwithstanding the handicap that the present regulations for the thickness of walls place upon a building whose walls are no longer weight-carrying, but relieved of this duty by a steel skeleton.

The Omnibus or "General Powers" Bill of the London County Council for the present Session having reached the Committee stage, it appears to us that this is an appropriate time for considering the provisions of Part V., which deals with the amendment of London Building Acts, with the view of removing the archaic restrictions that now hamper the development of the use of steel in architectural work.

Several professional societies and associations are opposing the Bill, but as our readers are probably aware, it is only by technically "opposing" a Bill that one can be heard, if one has a friendly suggestion to make for what one thinks may be an improvement. It is scarcely conceivable that any body representative of either the engineering or the architectural profession could object *in toto* and as a matter of principle to any amendment of the London Building Acts that is intended to facilitate the more extended use of steel, whether in the form of steel-skeleton construction or of reinforced concrete.

The details of the construction of steel-framed buildings that are included in the provisions of the Bill are so intensely technical that there is ample room for legitimate difference of opinion amongst experts as to these details, and so far the professional societies may be held justified in "opposing" the Bill *primâ facie*—for example, it might very well be argued that the stipulation that no steel pillar shall have an unsupported length of more than thirty-five times its least width does not make sufficient allowance for the superiority of mild steel over cast iron in pillars of many diameters in height.

Speaking generally, the technical details of the construction of steel-framed buildings have been admirably considered in the drafting of the Bill, and we might very well recommend them as a text-book on the subject to young engineering and architectural students. But notwithstanding this general commendation, there are points that are fairly open to discussion.

It is proposed to be enacted that "The compression flange of every girder shall be secured against buckling whenever the length of the girder exceeds thirty times the width of the flange." Herein is a wise recognition of the fact that girders usually fail by buckling of the compression flange, a recognition that evidences practical experience brought to the assistance of the draftsman of the Bill. But how is the security against buckling to be provided? Are stiffeners connoted or may concrete fulfil the function, as it is relied upon to do in one of the latest forms of fire-resisting floor placed on the market?

Again, "All party walls shall be of the thicknesses prescribed by the principal Acts (*i.e.*, the London Building Acts, 1894 to 1908) and may be built in lime mortar." This is a knotty point. On the one hand it may be advanced that a steel-skeleton building should have a complete skeleton, and that its metal framework system should embrace party wall as well as external wall and internal supports. On the other hand, it may be argued that a party wall, being the joint property of two owners, the man who wants to build a steel-frame building on one side should not be allowed to prejudice his neighbour, who does not wish to do so on the other.

It is prescribed that the metal-work of skeleton framing shall be coated with boiled oil, tar, or paint, save that when encased in concrete, Portland cement wash may be used instead. Here, we think, a little more elasticity is desirable, so that, in the event of improved methods of protecting steel being invented or discovered, it may not be necessary to amend an Act of Parliament before they can be used in London. Already there is a process by which steel-work can be coated with tin.

The Bill makes a distinction between the "dead load" and the "superimposed load" that the skeleton frame of a building has to carry. Briefly, the former is the weight of the building, the latter of whatever may be placed in or upon the building, including wind-pressure.

The loads to be estimated for floors are specified, and though less than are given in some text-books, are more than actual experience proves to be usual, so that they are on the safe side.

For roofs of a pitch of twenty degrees or less, the superimposed load is to be estimated at fifty-six pounds per square foot, measured on a horizontal plane. For roofs of a pitch of more than twenty degrees, the superimposed load is to be estimated at twenty-eight pounds per square foot of sloping surface. Is this enough for steep roofs? At least it seems arbitrary that there should be so much difference between roofs of twenty and twenty-one degrees. Would it not be better to make the superimposed load on roofs vary with the cosine of the angle?

Objection has been taken to the inclusion of interior frame-structure amongst the construction to be regulated by the Bill; but we hardly see how this is to be disassociated from the framework of the external walls. If the latter is to be regarded separately, cognisance cannot be taken of the support that the internal framework affords, for the adequacy or otherwise of that support is dependent on the sufficiency of the internal work. Again, the sole *raison d'être* of any legislative supervision or enactment is the public safety; and of what use is it to make the external walls safe if the internal framework of floors and their supports is permitted to be possibly dangerous?

Another objection that has been raised is that architects and their clients should not be put to the expense of supplying copies of drawings and calculations to the district surveyor. But when a steel-frame building is to be erected someone has to make drawings and calculations for it, and the mere cost of an additional copy of these is surely not a serious matter.

We have our own objection to make. We doubt if the district surveyor is the best authority to determine whether the design of a steel-frame building is safe. Doubtless some of our district surveyors are fully competent to perform the duty, but the examination by which they have obtained their certificates of competency has not, up to the present, been such as to test their ability and knowledge in this direction. We know that some of the present district surveyors would rather not be saddled with the labour and responsibility of examining the design and supervising the construction of steel-framed buildings, and that they do not regard the increased fees as adequate for the extra work involved. We should, therefore, suggest that the County Council should take the place of the district surveyor in the Bill, and then a special department of experts under the engineer or architect of the Council would be created, far more able to check calculations and designs of steel-framed structures. The appeal from district surveyor to the Council proposed by the Bill should then become appeal from the County Council to the Tribunal of Appeal, who would employ their own expert to advise them.

COMPETITION FOR EXTENSION OF GRIMSBY TOWN HALL.

THIS will not be an easy competition to tackle, and the conditions do not at present make everything quite clear. The matter is still further complicated by the fact that "a preliminary scheme has been prepared by the Borough Engineer on the suggestion of Alderman Sir GEORGE DOUGHTY, M.P., and a copy of this is furnished to competitors as an indication of what is desired." Competitors are not bound to follow this scheme, but it has

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evidently formed the basis on which the Corporation have decided the amount they wish to spend, and one of the conditions is that "architects submitting designs must guarantee that their scheme can be carried out exclusive of furnishing, electric light, and architect's charges for not more than 26,000*l*."

Under the preliminary scheme parts of the existing buildings are retained, and we think insufficient allowance has been made for the cost of supporting and altering the old work. For example, it is proposed to retain the council-chamber on the first floor, which at present has its walls carried by solid walls on the ground floor. In the suggested scheme, the end walls and half the back wall only have their old supports, and these undergo alterations; so, as the council-chamber cannot be supposed to possess the properties of MAHOMET'S coffin, there is a pretty problem to solve in its temporary and permanent support. Of course it can be done, but it will cost money.

In brief, the extension consists of an enlargement of the present assembly hall, the provision of office accommodation for municipal officials, and the expansion of the Police Court into three separate Courts—Police, County, and Registrar—with increased cell accommodation, &c.

The way in which the preliminary scheme has been evolved may be gathered from the opening paragraphs of the "outline of scheme." The present assembly room (on the first floor) is about 94 feet by 40 feet 6 inches. "It is proposed to bring forward the front wall of the building about 19 feet, to extend the end eastwards about 36 feet, and the other end westward about 21 feet, thus making a great hall about 130 feet by 59 feet 6 inches." Thus it is evident that the "extended" assembly room will be very much like the Irishman's coat in the amount of the present building that it incorporates.

There is another aspect in which the preliminary scheme hampers competitors. This scheme embodies faults that we should regard as fatal if we were assessing the plans in a competition. For example, the Town Clerk's department is a clear space 54 feet long by 27 feet wide, lit at one end from the open, and at the other from an area 9 feet 6 inches wide, partly covered on the first floor. The smaller assembly room, "capable of being used for exhibiting loan collections of pictures," and therefore presumably to be visited by ladies and other persons of refined tastes, is approached by a grand staircase, to reach which visitors must pass through the public entrance and general waiting-room for the Police, County, and Registrar's Courts. The existing premises are a regular rabbit-warren, and the plan of the preliminary scheme partakes very much of the same character. Any plan a competitor may submit that would be more satisfactory than the one suggested would almost inevitably entail greater cost.

It seems to us that there are only two courses open to those architects who propose to take part in this competition—either to adopt the by no means excellent plan of the preliminary scheme and design elevations to it, or to spend two or three days at Grimsby in order to study how most economically and advantageously the present buildings can be utilised. This is so much a matter of opinion that we do not see that competitors who hope to win can avoid the necessity of a personal visit by the furnishing of any information that we can give them.

The plans to be submitted include to one-eighth scale, plan of each floor including mezzanines; north and west elevations, tinted; sections (undefined number) and a perspective "if the competitor so desires." These are to be sent in on or before July 30 next.

"It is intended to appoint an architect of eminence to advise the Corporation as to the suitability of any of the designs for its purpose." This gentleman, when appointed, will be assisted by the Borough Engineer, and the premiums are offered for the designs "recommended by the assessors." "It is intended to appoint the architect of one of the premiated designs to carry out the work."

COMPETITION FOR SECONDARY SCHOOL AT WHITBY.

THIS school is to provide accommodation for 150 students, with provision for extension to take another 50. The amount to be expended is not to exceed 45*l*. per child accommodated. It is the "intention" of the Education Committee of the North Riding of Yorkshire County Council to entrust the work to the author of the design placed first by the assessor, Mr. PAUL WATERHOUSE, M.A., and further to give an honorarium of twenty and ten guineas respectively to the authors of the designs placed second and third by the assessor. The usual commission of 5 per cent. is to include travelling and out-of-pocket expenses.

The school is to be a mixed one—that is, the classes will be mixed, but separate cloak-room accommodation is required for the sexes. The special rooms required, in addition to the class-rooms, are not extravagant, so that there should be no difficulty in designing a school with the necessary desiderata for the sum allowed. The site is ample, and presents no special difficulty, except that a portion falls away at a steep slope. Drawings are to be sent in not later than July 17 next, and are to include block plan to scale of 20 feet to the inch, plan of each floor, not less than two sections, and four elevations to one-eighth scale. No perspective allowed.

COMPETITION FOR COUNTY OFFICES AT READING, BERKS.

AS our readers will have gathered from the letter of Mr. IAN MACALISTER in our last issue, all is not well with this competition. In our first article on the subject, we pointed out that the conditions gave the County Council power to ignore the assessor's award except as regards payment of premiums. To this, very rightly, the Council of the Royal Institute has objected, and a circular letter to competitors has been sent out this week by the County Surveyor intimating that "the assessor appointed has been compelled to resign," and that the competition is "suspended for the time being," "pending the decision of the County Council, which cannot be made known before May 8."

THE SOCIETY OF ARCHITECTS' ANNUAL DINNER.

A GATHERING of nearly 200 signalised the twenty-fifth annual dinner of the Society of Architects at the Trocadero Restaurant on Friday, April 23.

The chair was occupied by the president, Mr. Geo. E. Bond, J.P., and amongst those present were Mr. Ernest H. Lamb, C.M.G., M.P., J.P., Mr. T. B. Silcock, M.P., His Honour Judge Rentoul, Mr. A. A. Hudson (president of the Tribunal of Appeal), Mr. Edward White, J.P. (vice-chairman, London County Council), Mr. W. E. Riley, F.R.I.B.A. (architect, London County Council), Mr. G. L. Gomme, F.S.A. (clerk, London County Council), Mr. E. B. Barnard, M.P., J.P. (chairman of the Metropolitan Water Board), Mr. Walter Cave (president of the Architectural Association), Councillor Willis (mayor of Rochester), Mr. Alfred Neale (master of the Tylers and Bricklayers' Company), Mr. Murray Janes, C.C. (master of the Painters Stainers' Company), Mr. Maurice H. Pocock (master of the Carpenters' Company), Mr. Howard Martin, F.S.I. (president of the Surveyors' Institution), Mr. E. Purnell Hooley, M.Inst.C.E. (president of the Association of Municipal and County Engineers), Mr. W. S. Wallis (president of the Institute of Builders), Mr. F. G. Rice (president of the Master Builders' Association), Alderman A. J. Hopkins (mayor of Marylebone), Councillor Archibald Dawnay (mayor of Wandsworth), Mr. Edwin O. Sachs, F.R.S. Ed. (chairman of the British Fire Prevention Committee), the Mayor of Chatham, Alderman H. F. Whyman, C.C., Alderman J. R. Featherby, J.P., Alderman W. D. Driver, J.P., Alderman C. E. Skinner, Mr. Charles Tuff, J.P., Mr. R. D. Batchelor, J.P., Mr. William Banks, A.M.Inst.C.E. (city surveyor, Rochester), Mr. Charles Day (borough surveyor, Chatham), Mr. R. Geo. Bare, Mr. Ellis Marsland (hon. sec.), Mr. Wontner C. Smith (hon. sec. A.A.), Mr. Edwin J.

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Sadgrove, F.R.I.B.A., Mr. Albert E. Pridmore, F.S.I. (past president), Mr. Ed. J. Partridge, F.S.I., Mr. H. V. M. Emerson, A.R.I.B.A., Mr. Percy B. Tubbs, F.R.I.B.A. (vice-president), Mr. James Bartlett, Mr. R. A. Jack, Mr. E. C. P. Monson, F.R.I.B.A., Mr. D. G. Driver, F.C.I.S. (secretary A.A.), Mr. G. A. T. Middleton, A.R.I.B.A. (past vice-president), Mr. D. B. Butler, M.Inst.C.E., F.C.S., Professor Henry Adams, M.Inst.C.E., Alderman Weston Miller (mayor of Wisbech), Mr. B. R. Tucker (hon. treasurer), Alderman R. Cecil Davies (mayor of Chester), Mr. Walter W. Thomas, J.P. (past president), Mr. H. E. Hawker, F.S.I., Mr. A. J. Murgatroyd, Col. F. S. Leslie, R.E., Mr. Herbert W. Matthews, Mr. Chas. H. Mead (hon. librarian), Mr. J. Fletcher Trew, Mr. T. R. Richards, F.R.I.B.A. (hon. auditor), Mr. E. J. Hamilton (past president), Mr. C. McArthur Butler, F.C.I.S. (secretary), Messrs. F. F. Smith, W. B. Willmot, G. H. Leavey, Russell Watson, S. C. Skinner, A. Young, W. Mackay, G. Neaves, J. Llewellin Smith, S. E. Davies, D. A. Langdon, R. A. Low, J. F. B. Cockell, M. F. Surveyor, A. Alban H. Scott, Charles Mason, J. R. Nolan, P. M. Fraser, F. F. Munro Wilson, A. W. Roques, Roland B. Ling, Alex. Gordon, F.S.I., T. Woolnough, W. C. Goulding, H. T. Johnson, J. B. Corby, F.S.I., Percy Coad, Noel Hammersley, E. C. Isborn, W. H. Robinson, G. Hainton, O. C. Wylson, F.R.I.B.A., H. C. W. Blyth, H. C. Chevalier, Chas. E. Jackson, G. Sharpless, W. P. Ryan, F.S.I., C. F. Jones, F.S.I., Walter C. Williams, G. Trotman, J. W. Rowley, F. G. Minter, J. A. King, S. C. Arding, E. Carless, Sidney Marsland, F. J. Eedle, R. A. Dickson, Senor F. Santos, Messrs. G. Stapley, W. R. Power, A. O. Butler, R. Banks Martin, B. Dickens, A. H. Campbell, Gilbert S. Doughty, Albert H. Caslon, E. C. Beaumont, W. Balmain, Captain I. Cohen, Messrs. E. S. Curram, J. A. Souttar, S. Herbert, J. E. Coper, W. E. Waumer, J. Thompson, A. A. Atkins, C. Rowley, J. Davies, G. Topham Forrest, W. R. Mallett, F.S.I., P. M. Beaumont, F. Burdett Ward, E. Cable Pipe, H. S. Couchman, J. H. Champness, Ernest Beal, J. Gwyn, P. Jepps, Cholton James, F.R.I.B.A., C. W. W. Thompson, H. G. Todd, F. Harrison, Chas. Dunch, Chas. Watkins, B. Willson, J. Spurling, E. E. Barks, V. Wilkins, S. Gordon, W. Fenn, Henry Young, Benjamin King, F. G. S. Littlefield, P. A. Hopkins, F. C. Moscrop Young, A. W. Osborne, R. W. Lightfoot, H. A. Ross, W. Gunning, G. M. McCorquodale, E. E. Ryder, E. J. Naldrett, W. Bennett, W. T. Barks, E. Richardson, F. S. Chesterton, A. E. Mullins, Percy G. Hayward, C. D. Collins, E. A. Scanes, H. Spark, F. E. Lidiard James, F.R.I.B.A.

Mr. GEORGE E. BOND, J.P., President of the Society of Architects, having proposed "His Majesty the King" and "Her Majesty Queen Alexandra, their Royal Highnesses the Prince and Princess of Wales and the other members of the Royal Family," his Honour Judge RENTOUL proposed "The Houses of Parliament." He said that he had been preparing himself during four and a half hours for this particular dinner, having been engaged in trying a case between two architects. The question at issue was what was the proper qualifying fee to pay a professional witness for giving evidence necessary to win the case. Various distinguished architects were called. After a lengthy hearing his Honour asked if he might be allowed to send the case to a professional friend, for though he felt more or less able to decide as to the veracity of lawyers he could not do so as to architects. However both sides agreed to leave the case in his hands, and he gave his decision in a very halting manner, not being at all certain whether he was right or wrong. In alluding to the House of Lords he felt he was treading on dangerous ground, for it was so much a Liberal power. Since 1830, of the peerages created 243 were by a Liberal Government and only 179 by a Conservative; it was therefore a very Liberal House. As for the House of Commons, one of the saddest facts of his history was that he did not still belong to it. It was ridiculous nonsense to talk about political honesty or political dishonesty, for there was just as much honesty on one side as on the other. They were merely fighting their cause from different points of view. It would be wrong if he was to condemn the Liberals because he happened to profess another faith. They had just as much right to be wrong as he had to be right. The House of Commons was always ready to extend a hearing to a man with a real message.

Mr. ERNEST H. LAMB, C.M.G., M.P., J.P., in responding, remarked that he was set a somewhat difficult task in following Judge Rentoul. A Bill for the registration of architects had been introduced into the House of Commons. It was not his place to offer advice, but he should like to say that while the House was anxious to do its best with the Bills put before them, it was obvious that the opinion outside must be unanimous. The time had come, now that the Bill has been read, for architects to decide whether it is a profession or an art. If a profession, it should have registration; if an art, it should be left alone. Before the Bill could pass through the House an extended inquiry was necessary; it might prove that there was not that unanimous desire which was essential for success. When doctors disagree, who shall decide? It was always very necessary that those who promote private Bills should come agreed among themselves. Sometimes the mistake is made of putting a Bill on too high a ground, where it cannot be sustained. He was quite convinced that if the profession could come to a unanimous decision they would not find the House of Commons backward.

Mr. GEORGE E. BOND, J.P., the President, in reply to the toast of "The Society of Architects," said that the way in which the toast had been received was an encouragement for him to feel that the indulgence of those present would be freely extended to him while he endeavoured to justify the position the Society of Architects had taken up with regard to registration, a subject with which the name of the Society had been identified. Twenty-two years ago the Society pledged itself to promote a Bill having for its main object a statutory test for those who desired to become architects. The Bill was thrown out because of a clause which included engineers and surveyors. That was remedied, but nevertheless the Bill has never since obtained a hearing. The Society has ever since endeavoured to redeem its pledge, and it will never relax until that Bill or another based on the same principles is definitely placed upon the Statute Book. Their contention was that it would prove an advantage to the building public equally with the profession. In the first place they endeavoured to improve the status of the architect. They wished to raise the general professional practice by better preparing the architect for the multifarious duties involved in his whole work. They desired to protect the future from those who without a single qualification styled themselves architects, and practised as such—men who just keep within the common law, though drawing remuneration undreamt of by their client. Architecture demands a whole-souled devotion from its followers, and as a consequence its practice ought to be strictly confined to persons systematically educated to perform the duties involved in an artistic and practical manner, and also to appreciate the seriousness of their great responsibilities. The dominating principle of their Bill was the establishment of a scheme of compulsory examination to be passed by all before commencing practice. This would automatically prevent any growth of the nondescript class. The qualifying examinations would prove a valuable inducement for study among students and enable them to turn to account the opportunities offered in spare time. At the present moment many architectural students neglected those opportunities, contenting themselves with the more or less satisfactory performance of the routine duties in the office during the three or four years of their pupilage. Then they go for a year or two as junior assistants. When the time comes for them to set up in independent practice they are inadequately equipped and have to depend chiefly on the kindly help of the builder. The presence of this class is as bad for architecture as for the public. The health, comfort and convenience of the community, its great financial interests in building operations, and all the conscious or unconscious poetry derived from the contemplation of beautiful things are dependent upon the artistic sensitiveness, ability and rectitude of the general body of architects throughout the country. No other profession demands such varied gifts or diverse knowledge, or is saddled with greater responsibilities. Yet it is possible for a chimney-sweep to put out a brass plate and practise as an architect. The public have no means of differentiating between the qualified and the unqualified. Perhaps these examinations would not do everything, but the study and special preparation involved would be of infinite value to students. The main opposition to the Bill might be fairly described as a paradox, for it maintains that artistic qualification cannot be tested. At the present moment the majority of these opponents belong to a body which for many years has made compulsory these very tests. Yet they declare that the Society's schemes would tend to reduce the art of architecture to a dead level of mediocrity. It might be suggested to these people that they ought not to confuse the high artistic ideals of the few with the general practice throughout the country. And they should be asked if they at the present moment are satisfied that existing conditions are conducive to the best and highest interests of architecture as an art? They should not forget that their predecessors contented themselves for more than a century in observing

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certain rigid rules of art. It should be fully realised that architecture is essentially a constructional art, and in its very highest form springs inevitably from the working of true genius with sound practical knowledge, in the best materials at its command, with the deepest sincerity and the highest possible aim; and a real work of architectural art lives with us to-day, not by virtue of its beauty only, but to an equal extent by its truth in construction and its practical utility to serve its purpose. Each one unites beauty, strength and practical utility. Consequently there can be no hesitation in saying that the upward flight of true architectural genius will be assisted by such practical study as will enable them to pass successfully the suggested examination. The fact still remains, though we may affect to believe otherwise, that an architect fully qualified to do justice to his client must be not only an artist, but a scientist and a practical man of business. But for years a cloud of false sentiment has hung over the profession, to its great detriment. The membership of the Society is now considerably over a thousand, and it is still growing. There is no desire to enter into rivalry with any other body. Their only aim was to advance the art and profession of architecture and its best traditions. That the vast majority of architects are in agreement with the Society was suggested by the highly satisfactory results of the plébiscite carried out by the *Builder*. Five thousand copies were distributed, pointing out the advantages and disadvantages of registration, together with a postcard asking for a reply. Of the answers received, 2,113 were in favour and 264 against registration. That is to say, eight were in favour to every one against. Therefore the vast majority of architects throughout the country were in agreement. The remedy for the existing state of affairs lay in the Bill which has been before the public for twenty-one years. The time has come for a cessation of petty policy. All sections should send fully accredited representatives to discuss the matters at issue and to unanimously agree upon the Bill to send before Parliament. The difficulty might be entirely obviated by a friendly discussion among gentlemen.

Mr. Walter Cave, President of the Architectural Association, proposed "The Local Authorities." He said that he had experience of one or two local authorities, but that many others had come across them in a larger capacity than he had. There was a very common tendency to forget, in dealing with local authorities, that it was an Act of Parliament that they have to carry out. They are often approached in a wrong manner and considered as a nuisance. As people grow older they perceive that these Acts are in nearly every case of the utmost value, and the longer they live the more they appreciate this. The very fact that the local authority undertakes these onerous duties should never be forgotten. The law is administered here in a way that is unequalled in any other country. We are proud of our local authorities and the high standard of official life.

Mr. Edward White, J.P., Vice-Chairman of the London County Council, in response, said that as a builder himself he knew that the building trades would welcome registration.

The President gave the toast of "The Visitors," to which Mr. Leavey responded.

During the evening an entertaining musical programme was gone through, which concluded with the company singing "Auld Lang Syne."

THE SOCIETY OF ARCHITECTS.

A MEETING of the Society of Architects was held on Thursday, April 22, Mr. Ellis Marsland, hon. secretary, presiding.

Mr. A. A. Hudson was elected an honorary member and the following were also elected as members:—Messrs. Walter Andrew, Geo. Kenshole, G. S. Smith, Ch. R. Tudor, T. S. Vickery and Richard Willock. For studentship:—Messrs. F. M. Cashmore, L. L. Corkill, G. E. Hunter, W. J. McClure, B. J. Mendham, F. D. Sowerby, H. E. Willmets, G. Matthew Willis, W. Bradley, H. E. Matthews, Frank Brown, G. L. Evans, George Revitt, W. Macgregor Gibson and Horace Fyvie.

The Dangers of Breeze Concrete.

Mr. D. B. Butler, A.M.Inst.C.E., F.C.S., read a paper, illustrated by lantern views, in the course of which he said:—

During the past few years the author has met with increasingly numerous instances of failure of concrete composed of Portland cement and breeze, failures as a general rule caused by the expansion of the mass, resulting in more or less serious consequences to the structure of which it formed part. These failures have generally occurred where the concrete has been used to form flat roofs, or fireproof concrete floors, on the well-known embedded rolled joist system of construction; in some instances the expansion has been but slight, though noticeable; in others it has been sufficient to push out the brickwork walls, causing serious bulging and thus endangering the safety of the whole structure; while in one extreme case a flat roof composed of breeze concrete not only expanded sufficiently to push out the parapet walls and seriously endanger the stability of the structure, but the internal disruption set up within the mass was sufficient, owing to incipient disintegration, to cause it to become buckled and distorted and thoroughly rotten.

Careful investigation of some of the foregoing cases of failure justified the opinion that the mischief lay with the cement, but in many instances the most careful and searching investigation, both chemical and physical, disclosed nothing sufficiently definite in character to enable the investigator to lay his finger with positive certainty on the cause of the trouble. In nearly all the samples of so-called "breeze" concrete a very considerable quantity of material other than pure coke was noticeable in the aggregate, such as clinkers, stones, shale, ashes, &c., together with in some instances a noticeable amount of coal. It may be remarked in passing, that judging from the quality of the "breeze" which may daily be seen being delivered to buildings in the course of erection, presumably for incorporation in fireproof floors, &c., many a clerk of works must be imbued with a pleasing and childlike faith in the ability of Portland cement to stick together any kind of rubbish; it appears to be an established belief with some cement users that to produce a good concrete it is only necessary to have good cement and that any dustbin refuse or other rubbish will serve for aggregate, and it is not until failure occurs that they realise that they have been asking and expecting the cementing medium to perform impossibilities.

It is questionable whether on account of its combustible nature, pure breeze, i.e., fine coke, is desirable as a fireproof material; an instance has recently been brought to the author's notice in which a breeze concrete enthusiast used that material for a boiler setting, which eventually took fire and gradually smouldered away, with results that can be better imagined than described. Whatever may be the disadvantages of other extraneous material found in breeze, it will be readily understood that coal is not a desirable constituent for concrete; in the first place on account of its smooth shiny surface, the adherence of the cement would be extremely poor; in the second place, it is worse than useless as a fireproof material, on account of its tendency to decompose on heating. The question arose, however, whether apart from being undesirable for the reasons aforesaid, either coke breeze or coal was in any way dangerous as being likely to cause expansion of the concrete.

The first experiment was of a somewhat rough and ready nature and was made with coal. An ordinary bituminous house coal was crushed and sifted to about the fineness of standard sand, i.e., passed through a $\frac{1}{10}$-inch sieve and retained on a $\frac{1}{30}$-inch; with this coal a three to one mortar was made, and two small two-ounce glass bottles filled with the mixture; one bottle was filled quite full, and the other was filled to within a quarter of an inch of the top and sealed down with a paste of neat cement, the object of the sealing being to ascertain whether the imprisonment of any hydrocarbons set free from the coal would have any bursting effect. For comparative purposes a similar bottle was also filled with a paste of neat cement and three to one mortar of standard sand. Sixteen cements of various qualities and different origin were tried, some being sound when tested for expansion by the Faija test and the Le Chatelier boiling test, and some otherwise; the samples were those which passed through the author's hands for testing in the usual course, and were not specially chosen except for the purpose of obtaining as varied a selection as possible. English, German, Belgian, and Swedish cements were represented, and the results of these experiments were as per following table:—

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Sample No.	Origin of Sample.	Soundness Tests.				3·1 Coal Mortar.		Neat Cement	3·1 Standard Sand Mortar.
		Faija.	Le Chatelier.	Test Tube	Boiling.	1st Bottle filled to the top.	2nd Bottle not quite filled and sealed with Neat Cement.	Bottle filled.	Bottle filled.
1	English (Midlands)	—	—	Sound	Sound	C 70 D B 369 D	C 42 D B 369 D	C 245 D NB 12 MO	No test
2	Ditto . Rotary	—	—	Sound	Sound	C 35 D NB 12 MO	C 21 D B 49 D	C 70 D NB 12 MO	No test
3	English (Thames) Rotary	Sound	2 mm.	—	—	C 7 D B 28 D	C 35 D B 56 D	C 245 D NB 12 MO	No test
4	English (Midlands)	Very badly blown	54 mm.	—	—	C 21 D NB 12 MO	C 35 D B 63 D	C 63 D NB 12 MO	No test
5	Belgian Natural	Sound	7½ mm.	—	—	C 35 D B 245 D	C 35 D B 245 D	C 7 D NB 12 MO	No test
6	Origin unknown ..	Slightly blown as received. Sound after 6 days	—	—	—	C 14 D B 35 D	C 49 D B 63 D	C 112 D NB 12 MO	No test
7	German	—	—	—	Very badly blown and warped	C 14 D NB 12 MO	C 7 D B 14 D	C 91 D NB 12 MO	C 84 D NB 12 MO
8	German .. —	Sound	—	—	Sound	C 21 D B 49 D	C 7 D B 10 D	C 234 D NB 12 MO	C 234 D NB 12 MO
9	English (Hull) ..	Sound	2 mm.	—	Sound	C 10 D B 21 D	C 21 D B 49 D	C 233 D NB 12 MO	No test
10	Swedish	Slightly blown as received. Sound after 7 days	—	—	Very, very badly blown	C 21 D B 49 D	C 63 D NB 12 MO	C 233 D NB 12 MO	No test
11	English (Thames) ..	Blown	—	—	—	C 3 D B 42 D	C 35 D B 56 D	C 4 D NB 12 MO	C 35 D NB 12 MO
12	English Rotary	Sound	2½ mm.	—	—	C 49 D B 345 D	C 49 D B 220 D	C 220 D NB 12 MO	Sound
13	German	Badly blown	—	Cracked	Badly blown	C 28 D B 345 D	C 28 D B 77 D	C 35 D NB 12 MO	C 220 D NB 12 MO
14	Welsh Lias	Sound	3 mm.	—	—	C 2 D B 35 D	C 12 D B 35 D	C 7 D NB 12 MO	C 21 D NB 12 MO
15	English (Thames) ..	Blown	50 mm.	—	—	C 12 D B 35 D	C 7 D NB 12 MO	C 5 D NB 12 MO	C 35 D NB 12 MO
16	English (Hull) ..	Sound	2 mm.	—	Sound	C 12 D B 42 D	C 19 D B 70 D	C 335 D NB 12 MO	C 335 D NB 12 MO

REFERENCES:—C 28 D = Bottle cracked after 28 days. B 28 D = Bottle burst off after 28 days. NB 12 MO = Bottle not burst off at 12 months.

It will be observed that the whole of the bottles eventually cracked, with the exception of No. 12 filled with standard sand-cement mortar. But while those filled with the coal mortar generally cracked within two or three days, and with a very few exceptions continued to expand until the bottles burst away into several pieces, those filled with the neat cement and the sand mortar frequently did not develop any cracks whatever till several months, and it was the exception rather than the rule for them to continue expanding sufficiently to burst the bottle. A very good example of this is afforded by cement sample No. 16. It will be observed that both the neat cement and sand-cement mortar bottles remain perfectly sound after eleven months, and then only develop very minute cracks, whereas the coal-mortar bottle was cracked in twelve days, and burst right off in forty-two days. This suggests that the cause of the cracking after such protracted periods might be due to unequal expansion of the glass and the mortars at varying temperature; according to "Ganot's Physics" the co-efficient of linear expansion between 1° and 100° C. of glass is 0.000008613, and wrought iron (which is said to be the same as cement) is 0.000012204, or nearly 50 per cent. higher. Though, as before stated, the bottle test is only a rough one, it serves to show that coal develops dangerously expansive properties when mixed with cement, but since there is no clearly marked difference between those bottles sealed down with neat cement and those unsealed, it does not favour the theory that the expansion is in any way due to the evolution of gas within the mortar.

The next step was to test samples of so-called "breeze." of various origin, to ascertain if the coal sometimes present (probably partially burned) was unsafe, and also if there were other constituents present which might prove detrimental. Several samples of good breeze were procured; also some which the author was assured by the breeze merchant would never be sanctioned by a good clerk of works; the constituents of the latter, however, did not differ materially from the ingredients to be found in breeze concrete from many important constructive works.

With all the samples tested the general method was to separate them into their several fractions or constituents, so as to be able to identify, if possible, the cause of the expansion, if any. Each sample was therefore carefully separated out as follows:—

1. The fine material passing through a -inch sieve.
2. The fine material passing through a ¼-inch sieve, but retained on a -inch sieve.
3. The coarse material retained on a ¼-inch sieve; this was picked over by hand and separated out into its various constituents, such as clinkers, coal, coke, &c.

An "average" sample was also prepared, being 1, 2 and 3 mixed together in their proper proportions.

The variety of materials in some of the samples of so-called "breeze" was considerable, and in addition to coal, coke and clinkers, rubbish of all sorts was present, such as bits of steel saw, nails, brass and iron turnings, and other metal fragments, broken pottery, &c.; in fact, savouring rather of the rubbish usually found in the dustbin than of coke breeze proper. The percentage of each fraction was carefully recorded, and as a convenient size for making into

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mortar for testing purposes, was broken up to pass a $\frac{1}{10}$-inch sieve.

Two cements of previously ascertained stability of volume were used for the experiments:—

A, produced from the well-known lias formation near Rugby.

B, produced from chalk marl deposits and clay in the Midland Counties.

The bottle test, previously described as having been carried out with the coal mortars, was somewhat crude, and also qualitative rather than quantitative; moreover, as previously pointed out, it might conceivably be influenced by the difference between the co-efficient of expansion of the glass and of the mortars at different temperatures. In order, therefore, to render them more accurate and of a quantitative nature, the subsequent experiments with coke breeze mortars were made with prisms or rectangular bars 100 millimetres long and 22 millimetres by 22 millimetres cross section, the expansion and contraction of which were accurately measured in the Bauschinger micrometer calliper apparatus.

Cement and Standard Sand.—Eight bars or prisms were made with each kind of cement, four being made with neat cement and four with 3 to 1 standard sand-cement mortar. Two of each series were kept entirely in air and two placed in water after twenty-four hours, and kept therein during the three months with which this record deals. Each bar was measured after one day, seven days, twenty-eight days and three months.

Breeze Sample No. 1.—Described as "fine pan breeze"; it consisted mainly of clinker and coke, with traces only of coal. Separated out as previously described, about 32 per cent. passed through a $\frac{1}{10}$-inch sieve and 35 per cent. through a $\frac{1}{4}$-inch sieve. Of the remaining 33 per cent. about 22 per cent. was clinkers, and 11 per cent. coke with .08 per cent. coal. Each of these fractions, after being broken up to pass a $\frac{1}{10}$-inch sieve, was made into prisms or bars with the two different kinds of cement, two bars of each being left in air and two placed in water after twenty-four hours, and measured after one day, seven days, twenty-eight days and three months. The expansion, though measurable, was practically negligible in each case, being about 0.1 per cent.; the air bars, as with the standard sand bars, generally showed slight contraction.

The two cements give identical resulfs with each fraction or portion of the breeze, and the same remark will be found as a general rule to apply throughout to the whole of the subsequent experiments, whether the expansion be great or small.

Breeze Sample No. 2.—Described as "coarse pan breeze." This sample consisted of coke and clinker only, in pieces averaging about 2 inches diameter, the proportions being about 35 per cent. of clinker to 65 per cent. of coke. Treated in an exactly similar manner to No. 1, the results were likewise practically negative.

(To be concluded.)

QUEEN'S COLLEGE, OXFORD.*

By John R. Magrath, D.D., Provost.

(*Continued from page* 255.)

Provost Smith was at some trouble in estimating the amount of Lancaster's benefactions to the College. He took the sums evidenced by the Building Account Book to have been spent during his time, and deducted therefrom the benefactions received and the proceeds of the timber cut down and sold for the purpose, and concluded that Lancaster must have given of his own not less than 4,000*l.*, besides the 1,000*l.* which he bequeathed to the College at his decease. At Lancaster's death the new hall and chapel, begun in 1713, were approaching completion, but though Lancaster had spent most of his savings and had been backed by the liberality of several old members and friends of the College, there was a good deal of financial perplexity and anxiety for the future. The North Quadrangle was still unfinished, the south and east sides of the South Quadrangle were untouched, and not all the building already accomplished was paid for.

It took the thirteen years of Gibson's provostship, the further assistance of others who had been of the College, and the contribution of all that the members of the foundation could spare out of their own subsistence, to finish the north court and pay the arrears of the cost of what Lancaster had carried out. At the end of February 1718-9 Hearne reports that a part of Queen's College building butting against Peter-in-the-East Churchyard began to be pulled down. These must have been the old buildings just south of Sir Joseph Williamson's buildings which were retained in the new structure. In May 1719 the old chapel was begun to be pulled down. Till the new chapel was consecrated the College prayers were held in the chapel of Edmund Hall at six in the morning and five in the evening, so as not to clash with the Hall prayers. The service was soon transferred to St. Peter's Church, "under pretence," as Hearne says, "that Edmund Hall chapel will not hold them, and yet 'twill hold about 150, if matters are well ordered, whereas they have little more than three score at a time at prayers."

The new chapel was consecrated on Sunday, November 1, 1719, by Sir William Dawes, Bart., Archbishop of York and visitor of the College. He was received at the College gate, where a speech "was spoke to him" by Mr. Fletcher, one of the Fellows. Hearne objected to Fletcher as very dull and to his speech as "poor canting stuff, and y^t he spoke it in a whining manner, as if he had been a Presbyterian," but then Fletcher had been intruded into the sub-librarian's place at the Bodleian ("I having never resigned it"). The sermon at the consecration was preached by the Provost, and the dinner that followed "very great and," according to Hearne, "very extravagant."

The thirteen years of Gibson's rule saw the hall and chapel finished, the chapel consecrated, the north court entirely finished, and the College out of debt. To secure these objects an appeal, illustrated with cuts of the College as it was to be, was widely circulated, contributions came in, and the members of the foundation gave annually themselves all that could possibly be spared out of their own subsistence. The hall is 60 feet long by 30 feet wide; the chapel, continued to the eastward beyond the north-east corner of the front quadrangle and ending in an apse, has a total length of 100 feet.

The modifications in Sir Joseph Williamson's building involved in its incorporation in the new work included a recasting of the eastern face and the doubling of the depth of the building. At the foot of the stairs in the present staircases, Nos. 3 and 4, the old doorways from the quadrangle can be discerned. Staircase No. 5 owes the irregularity of the shape of its rooms and their unusual size to the difficulties of filling up a corner incidentally created by the meeting of two lines of buildings independently erected. Though the rooms are not such as would have been specially devised for this purpose, the difficulty has been overcome with a good deal of skill. A comparison of Loggan's picture with the actual eastern face of the back quadrangle will show that the architectural features have been quite altered. Some notion of the old arrangement may be formed from the present north face of the same building, where an empty niche with Sir Joseph's crest carved under it preserves a feature of the old eastern front.

The completion of the front quadrangle was left for Smith's provostship. Before the year of his election was out, an account was drawn up of "The Present State of the New Buildings of Queen's College in Oxford." Two hundred copies of the "State," as it was called, were printed off, and six of the fourteen cuts which Burghers had engraved for Gibson's appeal were added to each copy. Among the earliest of those to whom copies were sent were Lord Cardigan and Lord James Beauclerk, afterwards Bishop of Hereford. It was estimated that 5,000*l.* in all would be wanted for the work—3,600*l.* for the east wing, 800*l.* for the new gate and cloister, and 600*l.* for the purchase of such of the tenements on the High Street front as did not already belong to the College. No time was lost in making application to Queen Caroline for a share of her Royal bounty, and so successful was the petition drafted by Smith and presented to the Queen in the following January that not only was 1,000*l.*

* See Illustrations.

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given in four instalments between November 1733 and November 1734, but a further 1,000*l.* was promised, which, as the College Benefactors' Book records, "adhuc nobis insoluta, sed non insperata manet." A further circular was prepared by SMITH and sent "to the worthy Gentlemen of the two Northern Counties to which our Foundation is peculiarly appropriated." How widely this was circulated does not appear, but it does not seem to have produced much result. The actual contributions came mainly from those who were or had been members of the foundation. Five hundred pounds also was gained from the accumulations of the BRIDGMAN fund, which was secured to the College about this time by the activity of the indefatigable Provost.

The statue of Queen CAROLINE which stands over the main gate was made by CHEERE after a model which had been seen and approved by the Hon. GEORGE CLARK, Esq., and Sir JAMES THORNHILL. It was to have been 6 feet high, and CHEERE was to be paid for it 120*l.*, but as it was made 3 or 4 inches higher CHEERE received five guineas extra. The agreement was made May 30, 1734, and the statue was to be finished by the end of May 1735. The cost of the cloister with the modified cupola was estimated by TOWNSEND at 1,045*l.* The oak-work of the door closing the gate was estimated for by a man named FRANKLIN at 45*l.* 16*s.* 6*d.*, and came with some extras to 10*l.* 3*s.* 2*d.* more.

In a letter from a gentleman in Oxford to his friend in London, printed in the *Daily Post*, February 12, 1736, the "open temple" over the main gate in High Street is said to be "built after the design of Mr. HAWKESMOOR," and the statue of Queen CAROLINE "made by the ingenious Mr. CHEER, of Westminster." It appears from a letter written to Provost SMITH by WILLIAM TOWNSEND, the builder of the screen in front of the College, dated August 28, 1733, that he "made some alterations in the design of the Cupola" involving the "taking of the Coping and Fascia off that part of the Cloyster which is already done." HENRY CHEERE (knighted 1760) was also paid 135*l.* for making the three statues of Portland stone on the pediment of the east wing of the College representing Law, Physick, and Poetry, by agreement dated July 4, 1734. The statues were to be cut out of the solid stone, and not pieced as those at the end of the west wing. The latter seem to have been replaced by more substantial, if less artistic, ones early in the nineteenth century. The room above the porter's lodge was probably the last addition to the College buildings. The date of the order for its building was December 1, 1758.

To the new chapel were transferred from the old one some Perpendicular glass, some figures of bishops which appear from the date, 1518, upon them to have been placed by LANGTON in his ante-chapel, and a number of large glass pictures by the family of VAN LING, who had been glassmakers in St. Clement's from the days of CHARLES I., and whose degenerate representative, JOSHUA PRICE, is accountable for the east window and the little figures of Apostles in some of the demilunes at the tops of the windows. The fine brass, also transferred, by BURROUGHS, 1661, had been bought with a bequest left by JOHN PETTY, one of the Fellows intruded by the Parliamentary Commissioners, who had learnt in his short life to love the College to which he had been transferred from Balliol. The organ was designed by LEIGHTON GEORGE HAYNE, D.Mus., who was organist from 1858 to 1866. The windows in the hall were executed by Messrs. POWELL, of Whitefriars, from designs by Mr. REGINALD BLOMFIELD. The College owes them to the liberality of GEORGE AUGUSTUS SIMCOX, recently a Fellow of the College. The western wing of the front quadrangle has been destroyed by two fires, the first in 1778 destroying the Provost's house and the staircase to the south of it, and the second in 1887 the staircase fronting on the High Street. The front of the chapel and hall towards the southern quadrangle were refaced in 1864, and other portions of the building have had to be dealt with from time to time, but no new feature has been introduced to affect its general character, and the College is as it was when the cupola was finished in 1734.

The architectural reputation of the College has varied according to the fashions of the time. In the eighteenth century it was given a first place among the architectural glories of Oxford. The Gothic and mediæval revival altered all this, and even the last edition of MURRAY'S "Guide" talks of its debased style. We are apparently becoming again more cosmopolitan and able to appreciate various styles of excellence. The front of the College forms, even in the judgment of the Goths, "a striking feature in the High Street."

ILLUSTRATIONS.

LIVING ARCHITECTS.—NO. 6, MR. LEONARD STOKES, V.P.R.I.B.A.

MR. LEONARD A. S. STOKES was the Pugin student in 1880, and President of the Architectural Association for two sessions, 1889-90 and 1890-91, during which was organised the revolution of its system of architectural education.

NO. 7, MR. EDWIN T. HALL, V.P.R.I.B.A.

MR. E. T. HALL, like Mr. STOKES, is serving as Vice-President of the Institute.

NEW CENTRAL FIRE STATION, MANCHESTER.

THIS group of buildings faces London Road, Fairfield Street, and Whitworth Street, Manchester. The total area is 5,463 square yards, and has been used to accommodate the fire department, bank, coroner's court, gas-meter testing department, police department, and a central courtyard for drill, &c. Williams Deacon's Bank, Ltd., have their premises facing London Road; the fire department occupies the Fairfield Street front, and has accommodation for seven engines and horses. Over the engine-house are the men's quarters, the electrical operator's room, the chief officer's quarters, and the hose tower. This tower is a prominent feature, and is used for the quick and economical drying of the hose after its use at a fire. In the buildings brick has been used, with terra-cotta facings throughout. The site cost about 25,000*l.*; the contract for the foundations was 7,720*l.*, and that for the superstructure was 75,000*l.* The architects are Messrs. WOODHOUSE, WILLOUGHBY & LANGHAM, of Manchester.

ISLINGTON BRANCH LIBRARY.

THIS branch library was completed in 1907 at a cost of about 6,600*l.*, of which 5,000*l.* was provided by Dr. ANDREW CARNEGIE. The accommodation provided comprises the following:—Basement: A lecture-hall 41 feet by 36 feet, which will accommodate about two hundred persons; also staff, store, and other rooms. Ground floor: Lending library 41 feet by 36 feet, designed to hold 20,000 volumes; children's library and reading-room, to accommodate 100 readers and store 3,000 volumes. First floor: Reading-room 41 feet by 36 feet, to hold about 120 readers and 150 periodicals. Librarian's room and other accommodation. The builders were Messrs. DEARING & SON, LTD., of Islington. The architect was Professor BERESFORD PITE.

NATIONAL TELEPHONE COMPANY'S PREMISES, GERRARD STREET, W.

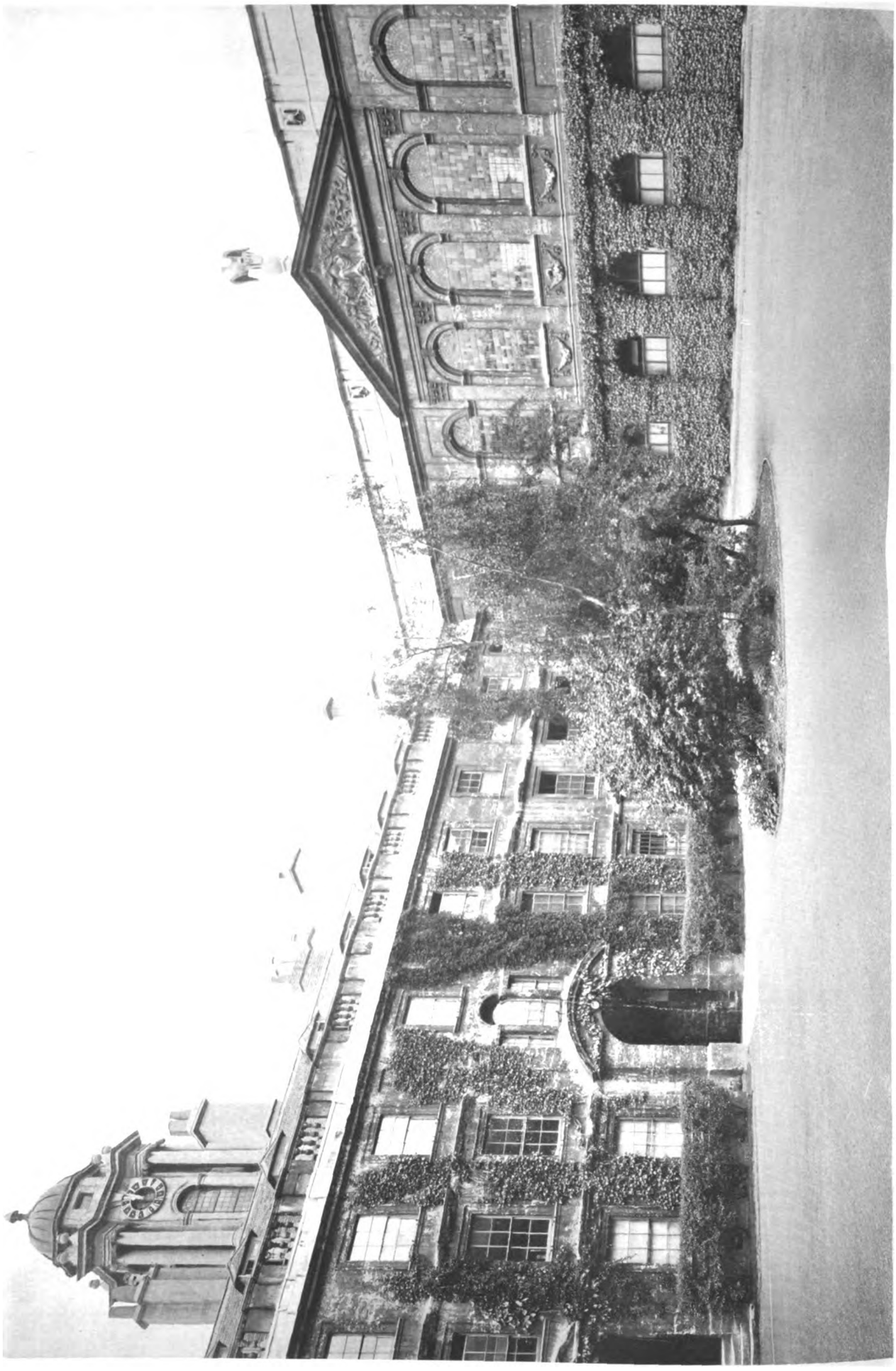
THE illustration shows the new Exchange lately built in Gerrard Street by the National Telephone Company, and is commonly known as "Gerrard." The ground floor contains offices, and the switch-room, with top light, is on the third floor; the other floors being occupied by the staff and the complicated plant which goes to make up an "Exchange." The elevations to Gerrard Street and Lisle Street are in Portland stone and red brick. Mr. LEONARD STOKES was the architect, and Messrs. KILLBY & GAYFORD were the contractors.

OXFORD COLLEGE SERIES, QUEEN'S.—BACK QUAD AND LIBRARY—BACK QUAD.

SEE article on preceding page by the Rev. JOHN R. MAGRATH, D. D. Provost.

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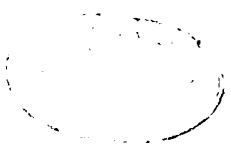
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OXFORD COLLEGE SERIES. No. 39.—QUEEN'S: BACK QUAD AND LIBRARY.

Photo by A. R. WALLHAM, 80 Doughty Street, W.C.

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ISLINGTON BRANCH LIBRARY.

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LIVING ARCHITECTS. NO. 6: MR. LEONARD STOKES, V.P.R.I.B.A.

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PHOTO BY CHAS. R. H. PICKARD, 5 PARK LANE, LEEDS.

NEW CENTRAL FIRE STATION, MANCHEST

Messrs. WOODHOUSE, WILL[illegible] & LANGHAM, Archit

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N, MANCHESTER.

LANGHAM. Architects.

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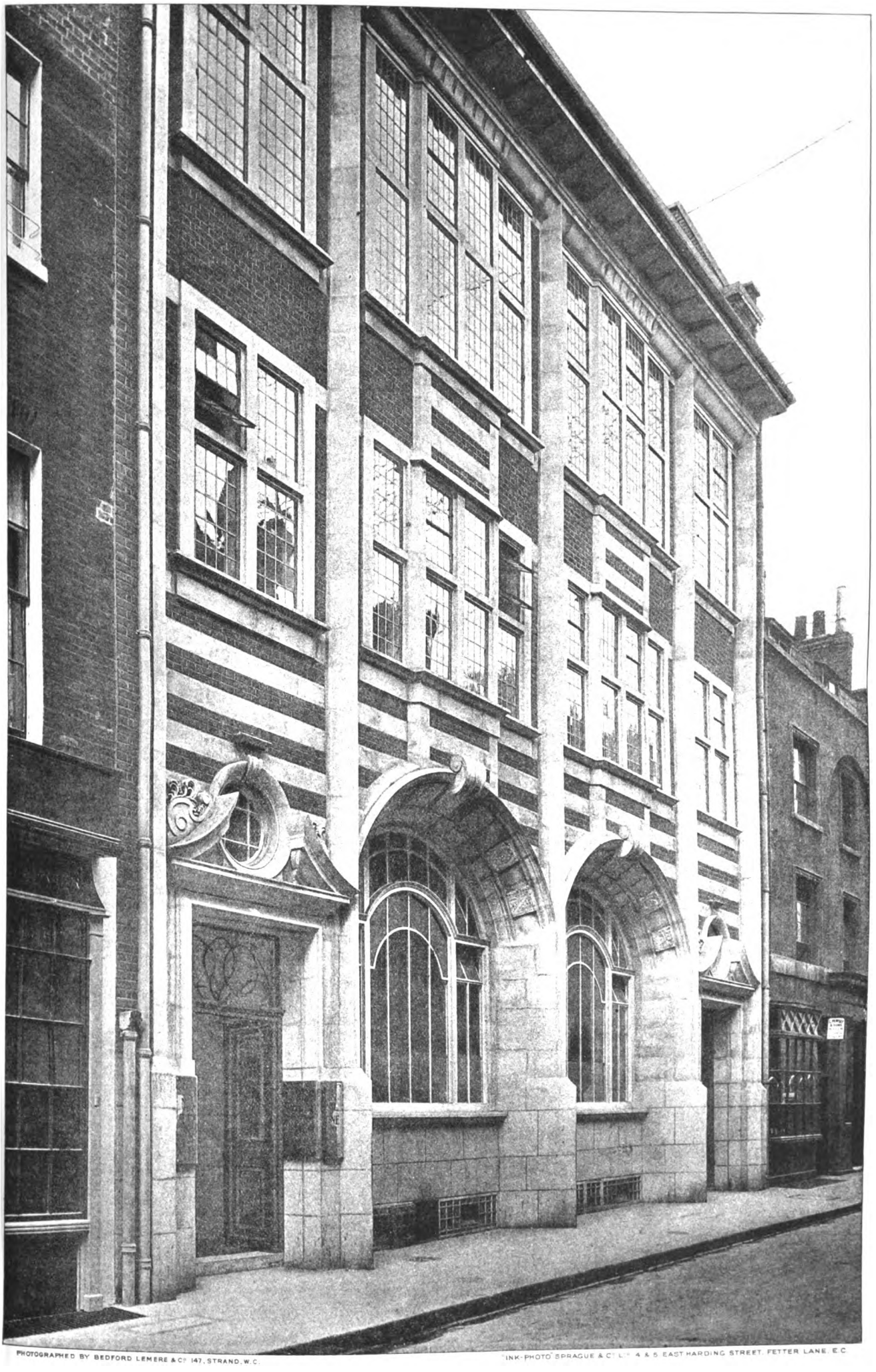


LIVING ARCHITECTS. NO. 7: MR EDWIN T. HALL, V.P.R.I.B.A.

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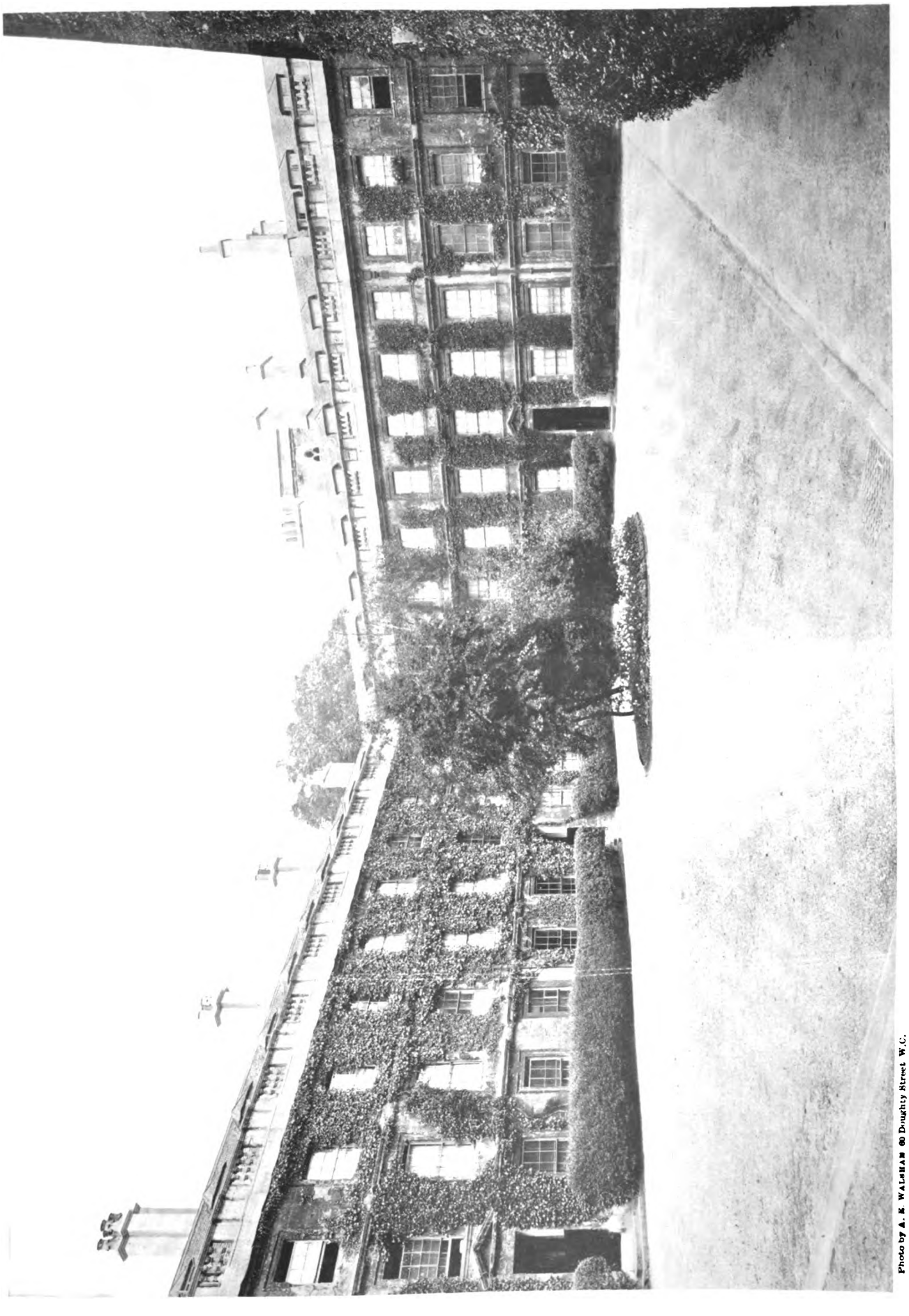
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NATIONAL TELEPHONE COMPANY'S PREMISES, GERRARD STREET, W.

LEONARD STOKES, F.R.I.B.A., Architect.

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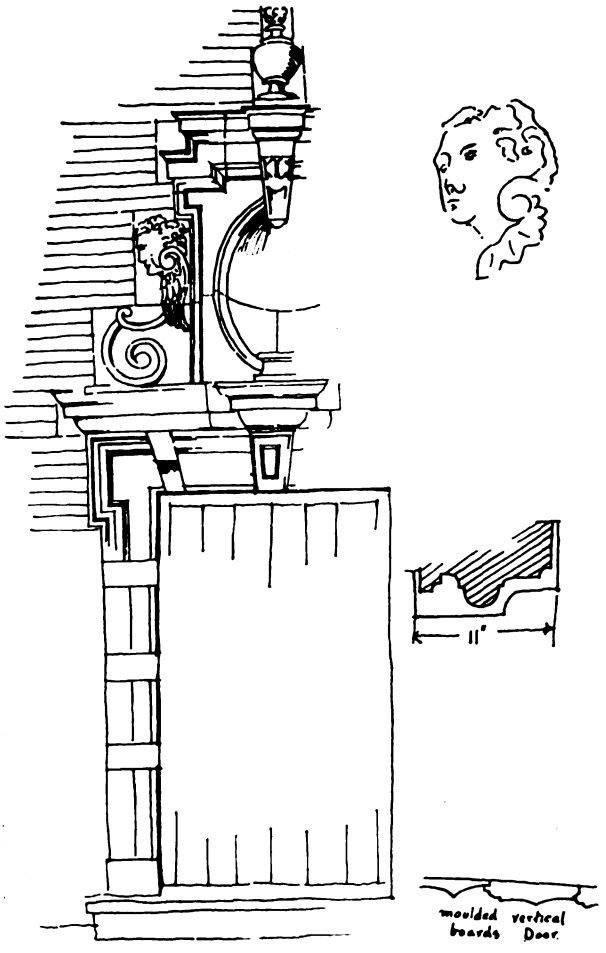


OXFORD COLLEGE SERIES. No. 40.—QUEEN'S: BACK QUAD.

Photo by A. E. WALHEAM 60 Doughty Street W.C.

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A STONE DOORWAY IN THE RUE GHEERWYN, BRUGES.
From a Sketch by Banister Fletcher.

STRESSES AND STRAINS IN GIRDER WORK.*

(Concluded from last week.)

IN order to make this paper more practically useful to you I now propose to take you through the details of designing a steel-plate box girder of 50 feet clear span to carry a uniformly distributed load of 100 tons (diagram 5). The work should be systematically entered upon a sheet of foolscap, headed with the name of the job for which the girder is about to be designed, and then continued as follows:—

Steel Plate Box Girder.

Clear span . . . . . 50 feet
External dead load uniformly distributed . 100 tons
Mean depth of girder, say $\frac{1}{20}$th span . . 2·5 feet
Width of flanges (least width between webs 12 inches), say $\frac{1}{20}$th span . . . 2·5 feet
Approximate weight of girder—

$$\frac{WL}{400}\times\sqrt{\frac{L}{d}}=\frac{100\times50}{400}\times\sqrt{\frac{50}{30}}=12{\cdot}5\times1{\cdot}291$$

= 16·1375, say . . . 16 tons
Gross load 100+16 . . . . = 116 tons
Safe load per square foot on York stone bed 15 tons
Chamfer on edge . . . . . 3 inches
Length of each bearing surface—

$$\frac{\frac{1}{2}\text{ (100 tons load}+\text{16 tons girder)}}{\text{2·5 feet, width flange}\times\text{15 tons safe load}}=1{\cdot}55$$

say . . . . . 18 inches
Total length of girder 50+2(·25+1·5) = 53·5 feet
Effective span centre to centre of bearings 53·5−1·5 . . . . . = 52 feet
Stress in flanges at centre $\frac{WL}{8D}=\frac{116\times52}{8\times2{\cdot}5}$

=301·6, say . . . . . 300 tons
Factor of safety to limit deflection—

$$\frac{\text{span}}{\text{depth}}\times0{\cdot}3 \quad . \quad . \quad . \quad . = 6{\cdot}$$

Ultimate stress per square inch . . . 30 tons
Working stress per square inch $\frac{30}{6}$ . . 5 tons
Sectional area of each flange $\frac{300}{5}$. = 60 square inches
Angle bars, say 4 inches by 4 inches by $\frac{5}{8}$ inch.
Approximate thickness of flanges at centre $\frac{\text{60 square inches}}{\text{30 inches wide}}$ = 2 inches.
Approximate depth of web between rivet holes, 2·5 feet − 2 inches for flanges − 4 inches for angles . . . = 2 feet
Maximum shear = reaction at support = $\frac{116}{2}$ . . . . . = 58 tons
Maximum shear stress per foot in depth and per foot run horizontal $\frac{58}{2}$ . . = 29 tons
Diameter of rivets, say . . . . . 1 inch
Total depth of web − 2 rivet holes = 30 inches mean depth girder − 2 inches for flange − (2×1) for rivets . = 26 inches
Thickness of web plates, allowing 3 tons per square inch safe shear stress—

$$\frac{\text{58 tons}}{\text{3 tons per square inch}\times\text{26 inches width}\times\text{2 webs}}$$

= ·371, say . . . . . $\frac{3}{8}$ inch
Sectional area of one rivet . . . . . ·8 square inch
Safe shear stress per square inch rivet area, single shear . . . . . 4·5 tons
Double shear, $4\frac{1}{2}$ by $1\frac{1}{2}$ . . . = 6·75 tons
Safe shear stress per rivet double shear 6·75 by ·8 . . . . . = 5·4 tons
Number of rivets per foot run, double shear $\frac{29}{5{\cdot}4}$ = 5·37, say . . . . . 6 rivets
Pitch of rivets, $\frac{\text{2 webs}\times\text{12 inches}}{\text{6 rivets}}$. = 4 inches
Bearing pressure of rivets per square inch not to exceed . . . . . 10 tons
Actual pressure in holes of webs per square inch—

$$\frac{\text{29 tons stress per foot}}{\text{6 rivets}\times\text{bearing area per rivet }(1\times\cdot375)}=12{\cdot}8\text{ tons}$$

As this exceeds the limit the pitch must be reduced at ends to $4\times\frac{10}{12{\cdot}8}=3\,125$, say . . . . . 3 inches
But the 4-inch pitch may be retained if desired for $\frac{10}{12{\cdot}8}\times\frac{50}{2}=19{\cdot}5$ feet each side of centre.
Equivalent plate thickness of one side of four angles $\frac{4\ (4\times\frac{5}{8})}{\text{30 inches flange}}$. = $\frac{1}{2}$ inch
Least thickness of top flange, rivets in compression not deducted, 2 − $\frac{1}{2}$. = $1\frac{3}{8}$ inch
Plates in top flange, say 3 − $\frac{5}{8}$-inch plates = $1\frac{7}{8}$ inch
Least thickness of bottom flange—
Net section required . . . = 60 square inches
Net section of four-angle sides less four 1-inch rivets = 4 (4 − 1)×$\frac{5}{8}$. = 7·5 square inches
Net section of plates 60 − 7·5 . = 52·5 square inches
Net width of plates 30 − 4 × 1-inch holes . . . . . = 26 inches
Least thickness of flange = $\frac{52{\cdot}5}{26}=2{\cdot}02$
say . . . . . 2 inches
Plates in bottom flange, say one $\frac{3}{4}$-inch and two $\frac{5}{8}$-inch plates . . = 2 inches

Steel plates may now be obtained in one piece at ordinary prices. Up to 20 cwt., 30 feet long, $2\frac{1}{2}$ feet wide, $1\frac{1}{2}$ inch thick, 60 feet super, and at extra cost up to 2 tons, 60 feet long and 120 feet super, but only one of these limits may be reached in the same plate.

In this case it will probably be well to put a joint in the inner flange plates and the web plates. The angles may be in on length.

* A paper read before the Association of Engineers-in-Charge on April 14, by Henry Adams, M.Inst.C.E., M.I.Mech.E., Vice-President.

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STEEL BOX GIRDER—50 FEET SPAN—TO CARRY 100 TONS

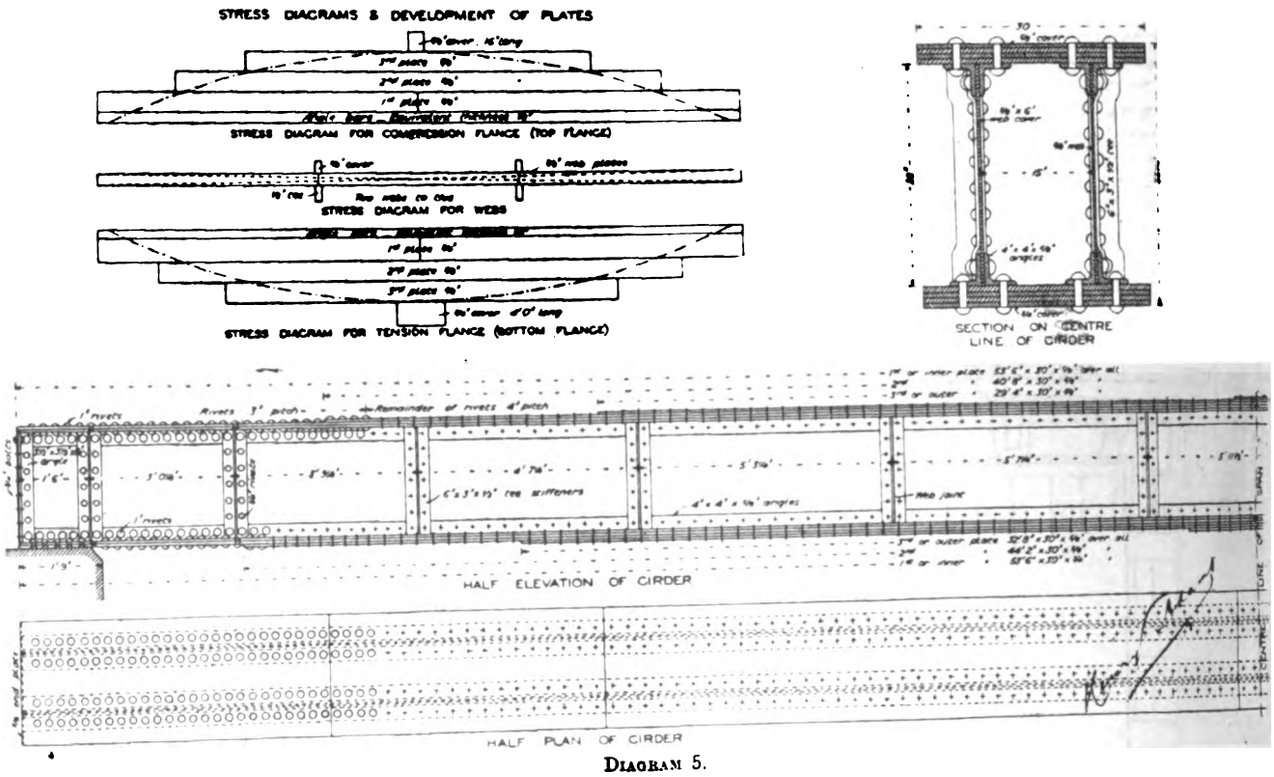


DIAGRAM 5.

Cover to joint in ¾ inch bottom flange plate.
Net sectional area of part cut through ·75 (30 − 4 × 1) . . . . = 19·5 square inches
Sectional area of one rivet, say . = ·8 square inch
Number of rivets each side of joint $\frac{19{\cdot}5}{{\cdot}8} = 24{\cdot}375$, say . . . . 24 rivets
Length of cover plate $\frac{24 \text{ rivets}}{4 \text{ in a row}} \times \frac{4\text{-inch pitch} \times 2 \text{ ends of cover}}{12 \text{ inches in 1 foot}}$ = 4 feet long

Cover to joint in ⅝-inch top flange plate being in compression with planed butt joints need only be small, say twelve rivets in two rows on each side . = 16 inches long

Cover to web plates on insides only, between angles behind stiffeners—
Thickness . . . . . ⅜ inch
Width . . . . . 6 inches
Rivets ¾ inch pitch, 4 inches

Stiffeners, between angles only, on outside:
At ends 3½ inches by 3½ inches by ½ inch angles. Over edge of bearing surfaces and 4 feet to 6 feet apart between, say 6 inches by 3 inches by ½ inch tees.

End plates to close girder, ⅜ inch thick, bolted through end stiffener angles by eight ¾-inch bolts and nuts.

Allowable deflection $50 \times \frac{1}{480} \times 12$. = 1¼ inches

Calculated deflection—
S = stress allowed, tons per square inch.
L = span in inches.
E = modulus of elasticity in tons.
D = mean depth in inches.
d = deflection in centre in inches.

$$d = \frac{SL^2}{4ED} = \frac{5\,(50 \times 12)^2}{4 \times 13{,}000 \times 30} \quad . = 1{\cdot}514 \text{ inches}$$

Permanent camber ⅛ inch to ¼ inch per 10 feet span, say . . . . . 1 inch
Building camber = 1·154 + 1 = 2·154, say 2¼ inch

The design may now be proceeded with, first finding the proper length of flange plates by drawing a parabola for each flange, of a span equal to the centre distance of bearings and a height equal to total thickness, including equivalent value of angles, to any convenient scales, the latter being to a larger scale than the former. This will be seen upon the upper part of the diagram. Where the parabola cuts the level of the inner edge of each plate, a distance equal to half cover, according to thickness, must be added to obtain the proper termination of the plate. Then the section, elevation and plan may be drawn in as shown to complete the design, and the actual weight may then be estimated.

It must not be supposed that in practice the designing is always as simple as this; often the work is only tentative, and has to be revised in different parts until a perfect result is obtained; but enough has been shown to indicate in a practical manner the subject of "Stresses and Strains in Girder Work."

In the discussion which followed the reading of the paper the CHAIRMAN (Mr. W. H. Maw), past president of the Institution of Mechanical Engineers, called attention to the scope that was left for the exercise of skill on the part of draughtsmen in considering the value of alternative methods of design after all preliminary calculations had been made, as, for example, thickening girder webs to reduce the bearing pressure in rivet holes as an alternative to reducing the pitch of the rivets, also the consideration of the depth of a girder where the cost of packing pieces behind the stiffeners would exceed the cost of joggling the ends and the general question of less depth and more weight, or *vice versâ*.

Capt. RIALL SANKEY, M.I.C.E., objected to the principle of stating an ultimate strength and then allowing a factor of safety. He preferred going direct to a working allowance for stress.

Professor ADAMS agreed with this in general, but in the particular example worked out in the paper the depth was reduced below the point of economy as regarded the girder itself for the sake of the economy preferred by architects in the height of their buildings, and the use of a sliding factor of safety compensated for the extra deflection that would have been produced by allowing the usual working stress. In reply to other criticisms the author stated the joint covers for angle bars were necessarily narrower by one thickness of angle flange, and the sectional area had therefore to be made up by giving an extra thickness to the cover. Upon structures of cast iron and mild steel stanchions a distinction was made between dead and live loads, but it was not usual or necessary in other cases unless in providing for quite exceptional circumstances. Uniform strength in a girder meant that the sectional area of each part was proportioned to the stress upon it, while uniform section such as was given by a rolled joist provided surplus material except at the one point of maximum stress. The practice of cutting the flanges away from the end of a rolled joist to enable it to fit between the flanges of another joist at right angles was reprehensible and might in some cases lead to failure. A

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stanchion standing on a girder and bolted to it should have the holes properly rimered, and turned bolts driven in should alone be used; in fact, in all structural work bolts should be a good tight fit, and not the loose job that was commonly found. A rolled joist could not be considered to have the end built in to make it equivalent to a "fixed end" unless it went into a wall at least four times its depth.

The CHAIRMAN, in proposing a vote of thanks to Professor Adams for his paper, remarked that the lecture had not only been of high interest to those present, but that it also possessed a great permanent value and would, he was sure, be frequently referred to in the future. Professor Adams had dealt with his subject with great clearness, and they were much indebted to him.

ASPECTS OF APPLIED ÆSTHETICS.

AT the Royal Institution on Thursday of last week, Mr. James Paterson, A.R.S.A., R.W.S., R.S.W., delivered the first of a series of three lectures dealing with aspects of applied æsthetics. The lecture was entitled "How a True Art Instinct may be best Developed," and will be followed by (2) "Landscape Old and New" and (3) "Art and Ethics."

In his opening lecture, of which we give a condensed report, Mr. Paterson expressed his fear that in the multiplicity of interests which call loudly in these busy days for attention the still small voice of beauty is in danger of being drowned. But the arts hold a place in the development of nations and individuals, and exercise an influence wider and deeper than most of us realise. The civilisations of the past live mainly in what remains of their artistic product. Conditions are changing every day, but the spirit which demanded expression in the far-off days lives, and its relation to its own time—*i.e.* ours— is of the deepest moment.

Possibly, in recent years especially, there has been too much talking and writing about art; there cannot be too much thinking. We perceive at different periods, and not least in our own day, widespread diversion of aim among the producers, largely the result of a misunderstanding of what is really worthy. The attitude has too often degraded the divine instinct almost beyond recognition.

It has been rightly said, "Our whole chance of education lies in looking at things for what they have, not for what they have not." On all hands we find none so ignorant but that he can see faults, none so wise that they can discern beauty. Within reach we have noble architecture, great pictures, heavenly music, literature of the gods; and, alas! the travesty of all these. The intention to know and follow beauty presupposes the humble mind, willing to learn, reverently to inquire. Too much in the past, a nominal acquaintance with art (displayed in the acquirement of stock phrases of praise or blame) sufficed to make the so-called man of taste. No art can be treated as a pastime, and it is open to question whether the results of treating it as such have any but evil results.

What are the benefits we should expect from a more intelligent and widespread study of art? In all the depressing influences of daily life we have in it a palliative, an escape from the too insistent ego. Here we may find a perennial resource, growing and widening with the years, revealing ever new horizons. The ugliness of sin has often been descanted upon, the sin of ugliness has been too little realised. The entire neglect of art influences indicates a limited and stunted life; through their reverent approach a new interest is awakened in the sights, sounds and thoughts which throng our days, a new sense is developed of discriminating appreciation in our enjoyments, character is built up, sympathies in all noble things aroused which had otherwise lain dormant. By the formation of an educated public opinion all vulgarity is discouraged; the sins against good taste which make hideous beautiful country and hateful the aspect of our towns and villages, will become less possible.

Personal idiosyncrasy must decide the direction in which to develop our faculties. It is far better to become thoroughly familiar with even a limited region of artistic production than to embark on a hopeless attempt to compass its full range. A knowledge of one art does not qualify for definite opinions of praise or blame where others are concerned.

The battle which raged so long regarding the advisability of all children learning to draw has been won, and an enormous improvement has been effected in recent years which should have far-reaching effects. The training of the eye to see truly is, we might say, the beginning and end of all instruction in drawing; until truth is grasped and the hand trained to express it, beauty may be left to take care of itself. The training of the eye is not necessarily, nor is it primarily, concerned with art production. It is, strictly speaking, scientific in its methods and aims. The multiplicity of subjects in higher-class schools prohibit proper attention being devoted to the drawing lesson. But school days over, those who have the leisure, and most especially girls, should be encouraged to continue, or perhaps begin their education. It is astonishing what can be done by practice; and a pupil gifted with unusual facility is often excelled by one of seemingly far inferior talent. Attainment after all is not the real measure of success. Even to those without any special gift the gain accruing from a serious effort to master the difficulties of drawing is real and lasting. The stumbling-block to the average amateur is the impatience to proceed to the charm of colour. To produce a work of art in colour is impossible without a long and assiduous apprenticeship.

Much has been done and said in recent years to counteract the tendency to regard painting as the only form of art which amateurs should pursue. Modest crafts concerning themselves with making beautiful objects primarily produced for use are becoming less neglected and despised. "It is of the highest importance, nay, it is just the one thing of all importance, to show people what good work really means, and not so much to teach them to produce a good work themselves as to know it when they see it done by others," said Mr. Ruskin. The surest discipline through which to attain that sound judgment is the practice of drawing, leading to the exercise of one or other of the handicrafts. The great majority of people, distrusting their judgment in these matters, entrust the choice of everything in which their personality is most deeply concerned to the architect or house painter, with the result that in so many houses the environment in no way reflects the character and preferences of the inmates.

Among the truest devotees of beauty are many absolutely incapable of producing anything worthy of the name. The task is hopeless of prescribing rules to guide everyone who desires to raise his standard of taste. To the open and receptive mind progress may be slow, but should be sure; at every step the caution to ask, "Am I right to enjoy this or that?" following upon the pleasure received, not preceding it, being most necessary. The field indeed is wide; architecture, sculpture, and painting with their subsidiary and co-related arts of decoration invite us. Within the last 2,000 years or more how memorable have been the achievements. Greek and Roman sculpture and architecture, the mysterious period of Gothic creation in stone and wood and metal. Spain, France, Germany, the Low Countries, each has its memorable contribution to the wealth of the ages, holding pleasure and satisfaction for whoever has eyes to see. Our own little island has a worthy place in the records of the past, and affords a wide field to the sentient student.

Regional study of the order of the day, and in art also the surest foundation for wider and deeper appreciation lies in the caring for what of beauty we ourselves and our forefathers have accomplished. The material lies around us, and we cannot entirely ignore it. Without cultivated taste our so-called judgments are quite certain to be mistaken.

A dawning interest in artistic productions most commonly finds its first pasture in the work of contemporaries. The number of practising artists of all kinds is to-day so numerous, the circle is very restricted which does not include one or more within its orbit. Personal bias will thus account for much supposed æsthetic sympathy or antipathy; to many this is the beginning and end of their dealings with the subject. It frequently happens that the accident of personal acquaintance with an individual artist gives a bias from which it may take years to escape. Discrimination at this point of development is not to be looked for, although it may soon come into play if only through comparison between the various works of the favoured one, and his attention is drawn to the work of other men in the same direction. Probably he may have backed his appreciation by acquiring what was admired. The test of living with and daily scanning the acquisition probably reveals new beauties, but not improbably imperfections as well. Time alone will decide if a growing taste will allow the work to retain its position in his affections.

There are households, of course, where such considerations would be thought fantastic. Surroundings are regarded solely from the point of view of comfort, the pictures on the walls are part of the furniture, and neither worth a moment's thought. Such people may live in a clean pig-stye, but it is a pig-stye all the same.

Most people in caring for art of any kind naturally appre-

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ciate in the first place that of their own time and of their own country. This appreciation is seldom, if ever, discriminating. The Royal Academy is annually thronged by crowds which never cross the doors of the National Gallery, and it is not doubtful that popular admiration seldom is attracted by the best picture. This interest, uncultivated though it be, is to be welcomed; what we seek is its development and deepening.

Free play may be given to personal bias, variety in conception, subject and execution has its appeal for different natures; but accompanying the pleasure derived from any work of art, or rather following closely upon it, the spirit demands an answer to the question, Am I right in my enjoyment? What is it that attracts me? Am I swayed in my judgments by motives alien to the work itself? It were well, perhaps, to hesitate before giving a positive opinion of unqualified disapproval of what at first does not appeal; but, on the other hand, unthinking acquiescence in popular or even expert applause is equally to be deprecated.

No standard can be given by which the uneducated may judge of works of art. Truth to nature is claimed by many as the ultimate and only test; but this is begging the question. Until our eyes are trained, we cannot be said to see even nature truly; when they are trained we see it differently. To judge a picture by our notions of what truth is may appear plausible; but what of decoration, of architecture? And yet we find many who should know better applying this standard. A curious and illuminating example occurs in the life of Sir John Millais. The minister of Kinnoul, in connection with a window which Millais had presented to the parish church in memory of his son, wrote to the artist as follows:—"On the design and blendings of colour I need not dwell, for they at once strike every beholder of average taste; but that which appears to me one of the greatest triumphs of the work is the marvellous perspective of the various landscapes. Painted glass in general, so far as my acquaintance with it goes, offers to the eye no more perspective than that which is seen upon a china vase in a teacup. The Kinnoul window is very different character, and is at once a window and a picture true to nature." The window was executed from the noble designs Millais drew from the Parables; but if the perspective is as marvellous as the good man thought, the window would therein have fallen short in the essential qualities of fine glass.

For the cultivation of judgment the study of the work of former generations is essential. The greatness of certain artists is beyond question, and not to feel this for oneself argues very limited æsthetic perception. To place ourselves in touch with the best of ancient art requires a cultivated imagination which is not commonly aroused, even in those who love beauty most, till youthful days are passing and past. Clausen says:—"The greatest service the old painters can do us is to steady our judgment, for we are peculiarly liable to be led away by following whatever fad happens to be in vogue at the moment."

But old painters cannot steady our judgment till we have acquired some sound idea of what is to be admired in their work. If a method were wanted it might be suggested that one artist be chosen for study whose works are accessible, say, in our National Gallery. Become familiar with them, returning again and again, not necessarily for a long time at once, but often. Compare his pictures with one another and also with those of his contemporaries. At a certain stage get someone like-minded, but further developed in culture, and compare judgments.

A common mistake is made in looking at too many pictures at a time. Had we only half an hour to spend in a gallery of masterpieces it were better to see and feel vividly the greatness of one picture than to be able to say we had seen all and yet have realised none. There is no final appeal in the ultimate questions of æsthetics, but we are far more liable to stumble in condemnation than when we confine ourselves to appreciation.

Supposing we have after much attention and study outgrown our early admiration of feeble and faulty things, it is not necessary to conclude that the art of our own day is unworthy of notice and approval. The cant of the old masters was never more prevalent than to-day. It is very certain that work is being produced at the present moment which will rank with the masterpieces of past generations when a few decades have passed. Living dogs become dead lions sometimes, and in the history of art those are remembered who bravely encouraged the struggle to achieve excellence by the artists of their day.

It would be futile to expect any absolute agreement on the part of those who have learned to care for what they feel to be supremely fine in any of the arts. In this department of human interest there is no common creed, no ultimate appeal. Therein lies much of its attractiveness. Enjoying to the full what we ourselves recognise as worthy, let us cultivate a broad catholicity and endeavour to sympathise with the seemingly limited, or even antagonistic, outlook of those who differ from us.

Art is a wide domain; the most gifted can only occupy a little corner of its territory.

THE INSTITUTION OF CIVIL ENGINEERS.

AT the ordinary meeting on Tuesday, April 20, Mr. J. C. Inglis, President, in the chair, a paper was read on "The *New York Times* Building," by Mr. C. T. Purdy, M.I.C.E. The following is an abstract of the paper:—

Early in 1902 the proprietors of the *New York Times* determined to move from the newspaper district near the City Hall to quarters in the newer part of the city. The site selected for the new building is bounded on the north and south by Forty-third and Forty-second Streets, and on the east and west by Broadway and Seventh Avenue. The Underground Railway, in curving from Forty-second Street into Broadway, crosses the north end of the property, passing through the basement of the building. This led to special features in the steel construction.

The length of the block is 137 feet 9 inches from north to south, the width at the south end is 58 feet 4 inches, while at the north end it is only 20 feet. On three sides, however, the basement storeys extend under the sidewalk. The height of the building from the sidewalk to the twenty-third storey is 329 feet, and above this is an observatory and lantern, the roof of which is 30 feet higher; the basement storeys extend 48 feet below the level of the sidewalk.

The framework of the building is constructed of steel, and the walls are of brick, with limestone and pressed-brick facings and terra-cotta trimmings. All the structural steel is covered and protected with terra-cotta material laid in cement mortar. Four high-speed elevators serve the building, and all heating is by means of steam.

The subway through which the Underground Railway runs is owned by the city, and in dealing with the subway problem two things were required:—First, the two structures of the subway and the *Times* building were to be entirely independent of one another; and, secondly, the building had to be protected from the vibratory effects of passing trains. In a number of cases the building columns came between the railway tracks, and the columns supporting the subway came through the lowest basement storey, which extends partly underneath the subway; but in practically all cases an air space was left round each column, and there was thus no connection between the two.

The building is supported on columns which rest on a rock foundation. The waterproofing of the basement extends continuously over the entire area and up the retaining walls to the street level. Mains are laid from the outside to a sump inside the building, so that no hydrostatic pressure can come on to the retaining walls.

Owing to the extreme narrowness of the building the stresses from wind load were considerable. To resist these the floor girders were increased in depth, and extra heavy girders were used in the spandrel construction round the building. In addition three special panels were used extending the entire width of the building, being formed by bracing between the columns. The total dead weight of the building is 33,611,000 lb. (15,000 tons). In no case was a column stressed to more than 13,000 lb. per square inch without wind load, nor to more than 19,500 lb. per square inch with it.

A serious question was the problem of vibration arising out of the Underground Railway. In addition to making the structure of the subway independent of the building, it was arranged to found the supporting columns of the former on cushions of sand, and thus still further to insulate the building. The results at first were quite satisfactory, and no vibration was felt from passing trains; but later distinct vibration was detected, and at last this became very pronounced. Seismograph observations were taken, and a thorough examination of the two structures was made.

The trouble disappeared when the railway company relaid the tracks through the building, all perceptible vibration then ceasing. The author considers, nevertheless, that the insulation of the two structures and the provision of the sand cushions for the subway columns have a material effect in producing this result. Under many conditions such insulation of structural members would be the most effective and

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economical method of preventing vibration. It is stated that it was certainly efficient in the *Times* building, which has four railway tracks through it, and often three or four trains in the building at the same time, some stopping, and others passing through at high speeds.

EXHIBITION OF COTTAGE DESIGNS AT MANCHESTER.

AN exhibition of cottage designs promoted by the Council of the Manchester Royal Institution will be opened in the Manchester City Art Gallery in June. The promoters desire particularly to illustrate designs of workingmen's cottages which have already been erected, and of which reliable particulars as to cost and construction can be given, and they wish to discourage representation by picturesque drawings and to rely rather on working drawings and photographs to show the designs. They think that such an exhibition will be of practical value, and encourage the provision of better homes, and the desire to occupy and possess them, especially in this neighbourhood, which has hitherto been backward in this respect. The exhibition will be open for about nine weeks, and after about a month at the City Art Gallery the drawings will be moved firstly to the Queen's Park, and secondly to the Ancoats Museum galleries, with a view to interesting as large and varied a public as possible. A certain amount of space will be available for models.

It is also hoped to illustrate developments in town planning, and an effort will be made to take certain districts known to the local public, districts which are now being gradually built up without plan or regard to hygienic or artistic considerations, and to show how by a little thought they may be laid out on a proper planning scheme.

While the promoters have in view the desirability of exhibition designs for cottages which shall give definite information as to the sort of cottage which may be reasonably within the reach of the working man in town or country, and shall not be misleading from mere cleverness of draughtsmanship, they are prepared to receive suggestive designs for laying out groups of cottages, which may be of interest more from the point of view of collective design or of town planning than of individual dwellings.

Mr. Percy Worthington, M.A., F.R.I.B.A., is acting as hon. organising secretary to the exhibition, and will be glad to receive applications for forms and particulars from those interested in the subject, as landlords, architects, builders, or in any other way in the improvement of cottage building.

ESSENTIAL FORMULÆ IN STRUCTURAL ENGINEERING.*

By HORACE CUBITT, A.R.I.B.A.

FORMULÆ have been stated to constitute a mathematician's shorthand. From this it would seem evident that, where the facts which it is desired to represent are in no way complex or involved, the use of formulæ, or, in other words, the use of shorthand, is not necessary. Unfortunately, however, the large majority of engineering, and even architectural, text-books attempt to carry a cargo of formulæ which, instead of acting as useful ballast, is of such ponderosity as almost to sink the ship of the reader's interest and attention. My quarrel with the ordinary text-books is twofold: in the first place, because they quote formulæ for cases which can quite easily be worked out without such "aids"; and, secondly, because formulæ which are really necessary are often so disguised by inversions and transpositions of all kinds, and by the lack of standardisation in the symbols, that the average student, who in excess of zeal consults two or three text-books, usually gets his ideas of the subject hopelessly confused. A redundancy of formulæ is not, of course, confined to structural engineering. Many text-books dealing with the flow of water in channels quote, for instance, the formula $Q=AV$—i.e. the quantity equals the sectional area of the water flowing multiplied by the velocity of flow. It would be just as reasonable for a person keeping hens, and knowing the average number of eggs laid per week, to calculate the quantity of eggs produced in any particular number of weeks by such a formula as $Q=EW$.

In the present paper it will be my endeavour to demonstrate that, when a proper analysis of the question is made, the real essential formulæ for structural engineering purposes will be found able to be counted on the fingers of one hand.

Probably almost all that I have to say will appear obvious to those fairly well conversant with structural engineering. But some of the younger members may not be too familiar with my subject-matter, and possibly not a few municipal engineers, who have to deal with a multitude of matters of the most diverse character, will not object to having their attention invited to what is and is not essential in structural engineering formulæ.

The several members met with in structural work are able to be grouped under four heads:—

1. Where the forces act directly away from the member, producing tension.
2. Where the forces act directly to the member, producing in the first instance chiefly compression.
3. Where the forces act in a transverse direction to the axis of the member and induce a bending tendency, tension compression and shear being consequently produced.
4. Where members are subjected at the same time not only to direct tension or compression, but also to compression tension and shear due to bending.

Members in Tension.

In this case once the total stresses have been calculated—in framed structures usually with the aid of graphics—the determination of the required sectional area of the member to resist such stresses is most simple. No one thinks of using a formula. The ordinary rules of arithmetic, applied with common-sense, are in every way sufficient. There being no complex problem, the use of shorthand—or formulæ—is not necessary. But in several other almost as simple cases, to be subsequently referred to, formulæ for some unexplainable reason are often used.

Members in Compression.

Dealing with the most elementary form of construction coming under this heading—ordinary walls—calculations to determine thickness are rarely necessary. The thickness of walls is almost always fixed by schedule. But it is often necessary to calculate the size of piers carrying considerable weight. In this case no formula is used, the weight on the piers and the consequent load per unit of area are worked out by ordinary arithmetic, and, if necessary, the sectional areas of the piers increased, so that the allowable safe stress of the particular material per unit of area is not exceeded.

Coming to the question of reinforced concrete pillars we find that, in the report of the Reinforced Concrete Committee convened by the Royal Institute of British Architects, a formula is given which is applicable to columns whose lengths do not exceed eighteen times their least dimension, and in which the reinforcing bars are satisfactorily tied together in order to resist any bending tendency. Upon a little investigation, however, the process of calculation is seen to be so simple that to deal with it by means of symbolic representation appears merely an unnecessary burdening of one's memory with symbols. To obtain the safe bearing capacity of such a pillar it is simply necessary to find the sectional area of the whole pillar, add to this fourteen times the sectional area of the steel, and treat the combined area thus obtained as that of a plain concrete pillar in direct compression. To me it is more reasonable to think of this in plain English than to have recourse to symbols.

Those, however, not familiar with the subject may ask why the area of the steel is multiplied by such an apparently arbitrary figure as 14. The reason is that the respective moduli of elasticity of steel and concrete in compression are in the ratio to one another of 15 to 1. With the materials acting together the steel therefore provides a resistance per unit of area fifteen times that of concrete. If the steel is stressed so as to provide more than this resistance the concrete will suffer. It is therefore necessary to add to the area of the concrete fifteen times the area of the steel. But, taking the area of the whole reinforced pillar, this obviously includes both the area of the concrete and—putting it thus for the sake of clearness—one times the area of the steel; consequently it is necessary to add to the total area of the pillar fifteen minus one—viz. fourteen times the area of the steel.

When wood struts and iron and steel stanchions of a length customary in ordinary practice are considered the circumstances are different. In addition to the direct pressure there is the tendency to fail by bending, and to an average person it is practically impossible without formulæ to carry in the memory all factors which have effect in determining the strength of such members. Formulæ here appear

* A paper presented at the general meeting of the Institution of Municipal Engineers, held at the Building Exhibition, Olympia April 24.

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to be essential, and of these it is generally considered that the most reliable is the adaptation by Professor Rankine of Gordon's formula.

Essential Formulæ (1) (as applicable to steel columns and stanchions):—

$$p = \frac{f}{1 + a\frac{l^2}{r^2}}$$

where p = unit breaking stress
f = unit elastic limit of material in compression (about 18 tons per square inch)
l = length
r = least radius of gyration
a = a factor usually taken as :—
$\frac{1}{18000}$ for free ends,
$\frac{1}{36000}$ for fixed ends.

} The same units of force, length and area being respectively taken throughout.

When this formula is used for calculating the strength of cast-iron columns or stanchions and wood struts, the constant a is usually taken respectively as eight and twelve times the value given above, and the value of f in the case of cast iron will be about 35 and in the case of deal struts about 2.2 tons per square inch.

Many authorities, however, consider that this formula should be applied, not with a fixed factor of safety, but that it should be used in connection with some other formula giving a greater factor of safety, in accordance with the increased liability of failure due to an increase in the ratio of length to least radius of gyration. Probably the most simple and appropriate factor of safety formula for steel stanchions is:—

$$\text{Factor of safety} = 4 + \frac{1}{100} \times \frac{l}{r},$$

l and r being in the same units,

which was given by Mr. E. Fiander Etchells in a paper read before the Civil and Mechanical Engineers' Society last year.

It is to be noted that in the application of the Gordon-Rankine formula there exists in the radius of gyration a factor whose determination from first principles will necessitate too great a demand upon the time and, I am afraid, also the mathematical knowledge of the average engineer. For all ordinary joists, angles and tees and compound stanchions of common type, the radii of gyration are given in the steel section books of the various manufacturers, but for wooden pillars, cast-iron columns and built-up stanchions of other than standard section it will be necessary to work out the radius of gyration, and for this there is a fairly simple practical method.

The radius of gyration is, as is well known, equal to the square root of the ratio which the moment of inertia bears to the cross-sectional area. This is usually written

$$r = \sqrt{\frac{I}{A}}.$$

The fact that it is the square root perhaps hardly needs emphasis, but the early edition of vol. iv. of the well-known "Rivington's Notes on Building Construction" contains an inaccuracy, the square root being omitted from the equation. The area can be simply obtained, and the least moment of inertia may be approximately deduced from that of a rectangular figure, which is $\frac{bd^3}{12}$, b and d equalling breadth and depth in the same units. As it is the least moment of inertia which is required to be obtained, it is, of course, the direction in which the post or stanchion is weakest which has to be considered, and the breadth of the section considered, except in the case of squares and circles, is greater than the depth. It is worthy of notice that the least radius of gyration of a rectangular section is $\frac{\text{least dimension}}{3{\cdot}47}$, and of a solid column $\frac{\text{diameter}}{4}$. In a hollow column it will be somewhat more than this, so to take $\frac{\text{diameter}}{4}$ in the case of all circular sections is to be at any rate on the safe side.

The use, however, of such elaborate formulæ as Rankine's for every single calculation to determine the strength of a member is in practice almost unknown. Either straight-line formulæ of the American type are adopted, or, as is more customary in this country, graphical diagrams, or tables, based on the more precise formulæ, are used, from which the safe unit stress in accordance with the ratio of length to least radius of gyration may be obtained. By the use of such diagrams or tables the calculation of struts or stanchions is a very simple and straightforward matter.

The following may be quoted as a type of the straight-line formulæ favoured in the United States as applied to steel stanchions:—$s = 12{,}000 - \left(50\frac{l}{r}\right)$, when s = safe unit load in pounds, l = length of member, r = least radius of gyration. with the same units of length and area.

The Bill which is being promoted by the London County Council in the present session of Parliament with a view to allowing steel-frame construction in London contains tables giving the proposed maximum safe loads on cast-iron, wrought-iron and steel pillars. Among the safe loads "with both ends fixed" are given the following (taken from the R.I.B.A. *Journal*):—

Ratio of length to least radius of gyration.	Allowable safe stresses in tons per square inch.		
	Cast iron.	Steel.	Wrought iron.
20	3·5	5·1	In all ratios of $\frac{l}{r}$ five-sevenths of the stresses specified for steel.
30	3·3	4·9	
40	3·0	4·7	
50	2·8	4·4	
60	2·4	4·2	
70	2·1	4·0	
80	—	3·7	
90	—	3·5	
100	—	3·2	
110	—	3·0	
120	—	2·7	
130	—	2·4	
140	—	2·2	

"Ends fixed" is perhaps rather a debatable expression, but the figures given in the table are very decidedly on the safe side, and may be applied to all cases where reasonable fixity is obtained. This table, it will be seen, does not go beyond an $\frac{l}{r}$ of 70 for cast-iron columns and 140 for steel columns or stanchions. This is contrary to general practice, in which members having ratios in the case of cast iron of 80 and in the case of steel of at least 160 or 180 are often used, and it is to be hoped that during the committee stage the Bill will be amended so as not to prevent construction based on these ratios being still permissible in London, not only in general building, but in work coming within the scope of the new Act.

The stresses on rectangular wooden pillars in special and temporary buildings or structures coming within the scope of the existing Building Act have generally been required not to exceed those given in the following table:—

Ratio of Length to Least Dimension.	Allowable Safe Stress in Pounds per Square Inch.	
	White and Yellow Pine.	Oak.
10	510	730
12	456	696
15	376	645
20	273	560
25	204	475
30	155	390

Members Subject to Bending.

It is with regard to members of this nature that modern text-books are responsible chiefly for confusion. In the early days of scientific research and the formation of engineering formulæ it was customary in every case to deal separately with the moment of resistance and the bending moment.

Essential Formula (2):—

$$M_r = M_b$$

when M_r = the moment of resistance
when M_b = the bending moment

} The same units of force, length and area being respectively taken throughout.

To make these as near as possible equal and thus provide efficiency with economy was the object of the engineer, and by the use of such simple and straightforward methods the solution of engineering problems was on a very clear and logical basis. Of late years it has become customary to

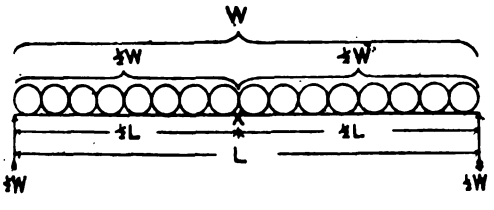
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depart from this simplicity, and to quote formulæ applicable only to central distributed and other similar symmetric forms of loading, and with the symbols transposed in a manner to facilitate easy, and unfortunately blind, methods of working.

If, and this is the point I wish particularly to emphasise, nothing but central and evenly distributed loads were met with in practice there would be no great objection to this procedure. But loads unfortunately are so inconsiderate as not to adapt themselves to such formulæ, and very often are irregularly placed. I am afraid there are not a few of the younger generation who, while quite competent by means of the "stock" formulæ to work out problems where the loads are central or distributed, are unable to deal with a collection of "point" loads irregularly spaced on a girder. They have not devoted the necessary attention to the quite simple method of finding the bending moment of a supported beam—a method, of course, applicable to all kinds of loading.

I believe that this departure from the old established methods of finding the bending moment and designing the construction so that the moment of resistance is not of less value has been most unfortunate. Now that reinforced concrete work is becoming so general a proper understanding of the root principles of beam design, applicable not to a few but to all materials, is essential.

The method of finding the bending moment by obtaining the algebraic sum of all the forces on one side of the point in question is, of course, quite elementary and is explained in almost every text-book. It may be illustrated by quoting the method of arriving at the well-known bending moment $\frac{WL}{8}$ of a supported beam bearing a distributed load.



taking moments from, let us say, the left reaction about the point X.

$$M_b = (\tfrac{1}{2} W \times \tfrac{1}{2} L) - (\tfrac{1}{2} W \times \tfrac{1}{4} L)$$
$$= \frac{WL}{4} - \frac{WL}{8}$$
$$= \frac{WL}{8}$$

I feel bound to apologise for quoting such an elementary point, but it is of interest as illustrating the method of finding the bending moment of supported beams under any condition of loading, and further, it is these elementary points, in our days of higher education in the lofty and rather supercilious sense of the term, which we are liable to despise—and consequently forget.

To deal fully with the true mathematical method of finding the moment of resistance would take up considerable space, and to do this would be beyond the scope of what is intended to be a purely practical paper.

The practical method of obtaining the moment of resistance is by multiplying the section modulus (at one time often itself wrongly termed the moment of resistance) by the safe unit stress of the material. The section moduli of joists, angles, tees and compound girders of ordinary type are given in all steel section books, and are obtained in each case by dividing the moment of inertia by half the depth of the joist or girder. In rectilinear beams such as one meets with in timber work, the section modulus is $\frac{bd^3}{12} \div \frac{d}{2} = \frac{bd^2}{6}$, and in a steel joist or girder an approximation of the section modulus may be obtained by multiplying the sectional area of one flange by the depth of the joist. It is on this flange area stress that a very well-known formula is based—a formula not quoted for the reason that to my mind it is better forgotten, and reliance placed only in the simple formula $M_r = M_b$.

Some illustration of the applicability of the formula to a particular instance may not be undesirable. Taking the case of a supported beam bearing a distributed load:—

$$M_r = M_b$$
$$fz = \frac{WL}{8}$$

when W = load, L = span, z = section modulus, f = safe unit stress. The same units of force, length, and area being respectively taken throughout.

The formulæ for beams given in the report of the R.I.B.A. Reinforced Concrete Committee need perhaps some little investigation before it is discovered that to a great extent they are old friends in new dresses. It is desirable first to look back and realise the exact principles upon which all beam formulæ are based.

In the modern type of steel joist composed of a single material offering equal resistance to compressive and tensile stresses, the neutral axis is situated at the half depth of the section, and the area of the compression flange has to be exactly equal to that of the tension flange. In the old, practically obsolete, type of cast-iron girder—a girder composed of material offering much greater resistance to compressive than to tensile stresses—the circumstances are different, and the area of the tension flange must be about six times greater than the minimum area of the compression flange in order that the material may be stressed according to its respective capabilities in tension and compression, and the neutral axis in this case does not coincide with the half depth, but, with the centre of gravity of the section.

Coming to reinforced concrete, we have here a combination of materials, of which not only is the safe stress of the steel, which takes up the tension, about twenty-seven times that of the concrete which takes up the compression, but also a further difference of characteristics has to be considered, as the modulus of elasticity of the steel is about fifteen times greater than that of the concrete. The steel, that is to say, is this much stiffer than the concrete. Thus, prior to the ultimate provision of the materials in the ratio demanded by their respective safe resistances—a process to some extent analogous to that adopted in the case of a cast-iron beam—it is necessary to find the neutral axis, for the position of this will greatly affect the moments of the resisting stresses in the steel and concrete.

(To be continued.)

OUR CONTEMPORARIES FROM OVER-SEAS.

THE *American Architect* contains illustrations of the dam and power-house at McCall Ferry, Pa., which, though primarily an engineering work, is really an admirable piece of real architecture. Not only is it here shown that utilitarian structures, for which the engineer is mainly responsible and of which he is usually the sole designer, can be made beautiful with the expenditure of mind rather than money, but we have also an admirable example of how a concrete building can be treated so that it retains its expression of monolithic construction whilst at the same time presenting high architectural character. Ornament there is none; dignity, power, rhythm, composition are dominant, and a very fine presentment of architecture is the result. The architects, to whom credit for this remarkable work is due, are Messrs. Trowbridge & Ackerman, of New York. By way of contrast, we suppose, the University Club of Chicago is illustrated. Of this we will say nothing, except that we do not consider a literal transcription of fifteenth-century English detail, with an occasional soupçon of French thirteenth-century work, to be the most suitable dressing for a twentieth-century twelve-storey building in Chicago.

The Architectural Review (Boston, U.S.A.) has an attractive and fully illustrated article on "Half-timber Buildings of Saxony," with examples from Stolberg, Wernigerode, Halberstadt, Quedlinburg, Marburg, Osterwieck, Neuhaldensleben, Gardelegen, Flechtingen, Homburg, Schleusingen, Halle and other places. The type of work here described is not, however, confined to Saxony; the city of Brunswick and its neighbouring towns are full of it. A good example of a high-class flat building of eleven storeys, by Mr. Charles A. Platt, is illustrated, together with some of the interiors—quite good.

The Engineering Digest (New York) has an advance notice of a forthcoming book on the history of the slide rule, an instrument of which in this country the use is now almost a forgotten art, but was much appreciated in the eighteenth century. In America its employment seems to be gaining favour with the introduction of new and improved types.

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The Engineering Record (New York) contains a trenchant criticism on the defects of architects' specifications for reinforced concrete structures, from an address delivered at the Armour Institute of Technology, Chicago, by Mr. Ernest McCullough, which is worthy of study on this side of the Atlantic as well as in the United States.

La Construction Moderne for this week should be interesting to our younger readers, as it contains illustrations of a French rendering of a very similar subject to that of the last Soane medallion competition. The designs are given that have won the first and second prizes in the Concours Achille Leclère, the subject being "Un grand Casino de bains de mer," and the successful authors M. G. Bellou and M. G. Migeon.

NOTABILIA.

THE first part of *Engineering Wonders of the World* has an article on "Ancient Engineering" containing some good illustrations of prehistoric stone monuments and Roman bridges and aqueducts.

Correspondence.

[The Editor will not be responsible for the opinions expressed by Correspondents.]

The Building Exhibition.

SIR,—I am very pleased to read Mr. Keen's letter in the current issue anent the Building Exhibition, and I deplore the lack of enterprise evidenced by the direction in omitting the customary display of "architecture on paper." The collection of poster designs by no means compensates for the omission. Surely Mr. Montgomery dd not fear that the public interest was not expansive enough to enjoy the two displays? Indeed, if there be any truth in the notion that the appetite grows by what it feeds upon, Mr. Montgomery should have felt encouraged by the extreme interest displayed in former years in the architectural drawings; and in repeating the exhibition of the latter he would have been insuring an interest in the posters. The Architectural Room at the Royal Academy is no criterion in this respect, for it merely acts as the conservatory or staircase for the heated reception-rooms. The neglect of architecture has been of too long standing on the part of the public authorities; and Mr. Montgomery may, if he chooses, be a pioneer in regard to a better condition of affairs by reviving the exhibition of drawings two years hence and by allotting it a much better position than hitherto.—Faithfully yours,

PERCY L. MARKS.

Albert Buildings, 49 Queen Victoria Street, E.C.

SIR,—Like Mr. Arthur Keen, I am one of those—and they are many, to judge from the sentiments my friends express—who regret that the Exhibition this year does not include a successor to the excellent collections of architectural drawings and photographs that you, Sir, have organised on former occasions. Not only is it the fact that many drawings, highly interesting to architects and other visitors to the Exhibition, are unsuitable for the Royal Academy, but the space that body allots to architecture is, as is well known, quite insufficient for all that are sent in, and many are excluded not because they are inferior to those hung, but because there is not room for them, and they have been unfortunate enough to be the wrong shape or size to fit in with the mosaic that the Academy hangers present to us year by year.

It is not only the architects who like to show their drawings that miss this part of the Exhibition, but also the non-professional visitors. If I remember rightly, H.R.H. the Princess of Wales took a great interest in the drawings and photographs shown at the last Exhibition, and I am quite sure that her Royal Highness was only one of many visitors with the same appreciation. In fact, it is because we believe that others besides our professional brethren look at the drawings that we architects are willing to have our work exhibited.—Yours truly,

A FORMER EXHIBITOR.

The Chemistry and Physics of Building Materials.

SIR,—In reference to your review of my book and the useful criticisms therein contained, may I point out that, although it is not to be expected that everyone will be satisfied with the relative amount of space devoted to different topics in a small volume covering so much ground, the test for white lead, of absence of which your reviewer complains, is given and given under this particular material. On page 318, in reference to impurities likely to be present, the following paragraph occurs:—"Any sulphur compound will, when strongly heated with sodium carbonate on charcoal in the reducing flame, produce sodium sulphide, and if the freed mass be placed on silver (a coin) and wetted, a brown stain on the metal will result from the presence of this sulphide." The book is not a laboratory manual, but the use of the blowpipe will be found described in an earlier chapter.—Yours,

ALAN E. MUNBY.

We have submitted Mr. Munby's letter to our reviewer, and the following is his reply.—ED.

I admit that I have not expressed myself quite clearly. The substitution of one little word, "as" instead of "for" determining, &c., would, I think, have made my meaning more obvious. My point is that Mr. Munby gives the test to which I referred as a test for sulphur compounds, but does not impress upon the architectural student who is a tyro in chemistry the connection between the sulphur compounds and the trade qualities of white lead with which he has become acquainted. Mr. Munby credits the young architectural student with greater powers of deduction than he usually seems to possess when he steps outside the field of æsthetic studies to those of a scientific character.

THE REVIEWER.

GENERAL.

The First Commissioner of Works has appointed Mr. Arthur I. Durrant, M.V.O., Deputy Controller of Supplies, to be a Principal Clerk in H.M. Office of Works, to deal with questions of contracts.

Mr. J. Parkinson, architect and surveyor, Lancaster, who died on April 3, left estate value 9,988*l.* 5*s.* 6*d.* The bequests include 50*l.* to the Architects' Benevolent Society.

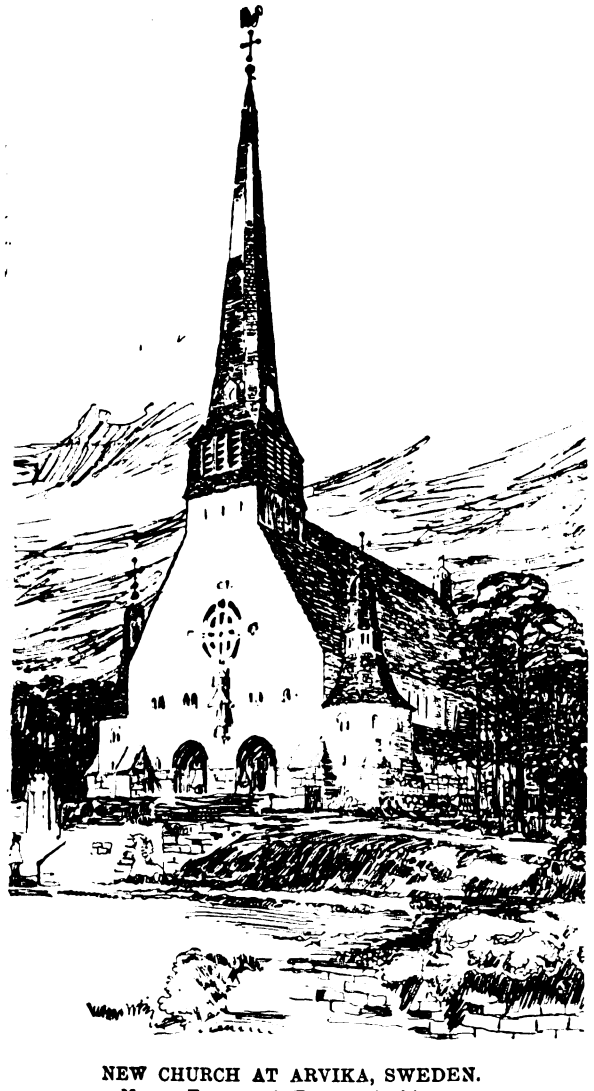
The Duke of Argyll will perform the opening ceremony of the Imperial International Exhibition, to be held this year at the "White City" at Shepherd's Bush. The exhibition grounds, which last year extended over 140 acres, have now been increased to 150 acres, and a number of buildings have been added in which many interesting exhibits will be housed.

At a Meeting of the members of the Institution of Municipal Engineers resident in the Home Counties District (Northern Division), which includes Bedford, Buckingham, Essex, Herts and Middlesex, held at Olympia on the 24th inst., Mr. Henry C. Adams, A.M.I.C.E., A.M.I.M.E., A.M.I.E.E., consulting engineer, of 60 Queen Victoria Street, E.C., was elected chairman of the district committee and a member of Council of the Institution. Mr. Bernard Partridge, Surveyor's Office, Walthamstow, U.D.C., was elected honorary secretary, and an executive sub-committee was appointed.

The Surrey Education Committee have now adopted the scheme for the provision of a technical institute and boys' secondary school at Woking, close to the station, at an estimated cost of 22,000*l.*

At the Last Meeting of the Glasgow Corporation a member said he would be glad if the Convener would give some more information as to the position of local manufacturers in regard to quick-drying paints, which were made at other places in this country and abroad, and were sold in competition with the local article. It was believed that some of these products did not comply with the requirements of the Petroleum Act, and consequently their use, carriage by rail, storage, &c., without being properly labelled, was fraught with danger. He understood that paints with a lower and more dangerous flashpoint could be made much more cheaply. It was so far good that the chief inspector should visit those who manufacture in this city, but something more seemed necessary to ensure, as suggested in the minute, that "all persons dealing with the material in question should be uniformly treated." It was obviously unfair that local men who complied with the Act should be placed at a disadvantage. The Chairman (Bailie Shaw Maxwell) said he was assured everything was contained in the minute. They would, however, keep in view the point raised.

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NEW CHURCH AT ARVIKA, SWEDEN.
Messrs. TENGBOM & TORULF, Architects.
(From *Byggnadstidnungen.*)

THE WEEK.

THE annual general meeting of the Royal Institute was, as usual, somewhat of a farce, with Mr. WOODWARD as the chief player. Each year this gentleman sensibly and logically criticises the report of the Council, but nobody seems one penny the worse, and the Council still go on managing the affairs of the Institute in its own way and keeping the members as much in the dark as possible as to what it is really doing. The annual report of the Council should be a full account of their stewardship by the outgoing members who are seeking re-election; instead it is the minimum of information that may be expected to keep the electors quiet and ready to cast their votes in favour of the present members of the Council. Mr. EDWIN T. HALL once more assumed the rôle of the heavy father, in which he has become so proficient, and assured the few members present that if they only knew how much the Council really did do, and the vast amount of time and ability it gave to safeguarding and promoting the interests of the members, they would be good boys, shut their eyes and open their mouths for the inestimable privileges that the Council will procure for them—some day. This is the backbone of the present Council's policy; the ordinary members of the Institute must have blind confidence in the wisdom and energy of the members of the Council and must not want to know all about what the Council is doing, or whether it is doing anything. The diplomacy of the Council far surpasses that of MACHIAVELLI or RICHELIEU; it is stealthily doing all sorts of wonderful things, which must not even be whispered lest some of the myriad cords of the Council's statecraft be snapped and all the skilful schemes gang agley.

WHEN the question of registration is broached and the Council is asked what it is going to do now that it knows that of all the architects in the kingdom who care to express an opinion a majority of eight to one is in favour of registration, its answer, per Mr. HALL, is wait—elect us for another year, and then you will see—what you will see. Under our wonderful scheme of Licentiates all the architects of the kingdom are going to join the Institute, and then we will do something. Only re-elect us for another year. We are not a bit tired of being on the Council, as Mr. WOODWARD has suggested, even though the time we spend on committees and council meetings—and dinners—does diminish our incomes by 1,500*l.* to 2,000*l.* a year each. Or at least it would do if we were paid for our time on the usual professional scale. You have not seen the new Charter, which we have kept quite safe for three months, and very shortly—after you have voted and, we hope, re-elected us for another year—you shall have laid before you some wonderful new by-laws which have received most careful consideration.

POSSIBLY, if the present members of the Council are not all re-elected, the new by-laws may receive a little revision before they come before the general body of members; they have certainly been long enough in preparation for the present members of the Council to forget some of the many things that they have promised should be dealt with by "the new by-laws." As determining the future course of the Institute, the by-laws are in a sense more important than the Charter itself, and they may easily be drafted with a bias against the principle of registration. Mr. HALL says the basis of the new Charter was agreed unanimously; therefore he wants the members to once more be good boys and accept the by-laws as the Council drafts and presents them—but the present members of the Council must be re-elected first.

IT is really very modest of the Council not to explain fully to the general body of members all the great and wonderful things it does and the fatherly care and advice it bestows on the little boys in the lower forms. For example, no mention was made in the report of the advice given to members of the Institute respecting the competition for Concert Hall, Eastleigh. This advice appeared in the Institute Journal of April 3 last. The date for sending in drawings was March 24.

THE Ulster Society of Architects has taken the opportunity of the loan of the prize-winning drawings of the Royal Institute's student competitions for an annual exhibition at the Belfast Free Public Library, Royal Avenue, to celebrate the opening of which the president of the Society, Mr. W. J. GILLILAND, F.R.I.B.A., held a reception, and in his speech during the evening laid stress upon the importance of the authorities of the recently established Queen's University, Belfast, following the lead of Liverpool, Manchester and Sheffield, and providing the proper equipment and a teaching staff for architecture.

THE first public museum devoted exclusively to heraldry that has ever been founded in the British Isles has been opened by his Excellency the Lord Lieutenant of Ireland at the Office of Arms, Dublin Castle. It has been established mainly through the efforts of Captain WILKINSON, Ulster King-of-Arms. Heraldry as a science is one of considerable interest, and deeply fascinates its votaries, but it is also the repository of much excellent art, and as such a museum of heraldry is of widespread value. Although this museum is situated in Dublin, it is not confined to Irish objects alone, but embraces the whole field of European heraldry. This is a wise policy, for with so good a start as has been made, there is no reason why the Dublin Museum should not be the headquarters of heraldic students, a body that is increasing in numbers year by year.

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ARCHITECTURE AT THE ROYAL ACADEMY.—I.

THE most striking feature this year of the Architectural Room at the Royal Academy is the awful disregard of anything like propriety in the hanging of the drawings. It would seem that the Academician in charge had first of all settled the principle that buildings for similar purposes should be grouped together—ecclesiastical, municipal, educational and domestic—a principle with which we cordially agree. Then that he had selected the drawings for "the line" and directed their position. So far, so good; and we have no fault to find with the selection and placing. But after this the débâcle—the hangers have worked their own sweet and unreasoning will, with the kindly intention of giving as many poor architects as possible the privilege of occupying a corner in the inadequate space that is all the Royal Academy grants in its annual show to the Mistress Art.

And away the hangers went at their job with a hustle. Bird's-eye views! Sky them, so that the birds may not have their range of vision unduly taxed. Drawings with a low horizon! Put them on a level with one's knee. Small and delicate drawings! Stick them on the skirting, or as near the cornice as possible, or tuck them into an odd space between big half-inch scale, powerfully rendered drawings. This sort of thing has been seen in previous Academy exhibitions, but we think that on the present occasion the hangers have surpassed all their previous efforts in this direction. No better proof of the necessity for an independent display of architectural drawings, at the Building Exhibition or elsewhere, could be given than this year's Architectural Room at the Academy. No wonder the general public only go there for a quiet rest when they have done, or are done up by, the oil-paintings, and lack capacity for any more cups of tea.

The place of honour on the west wall, devoted to ecclesiastical work, is occupied by Mr. Temple Moore's "New Nave, Hexham Abbey, Northumberland," the exterior and interior of which are represented in excellent pencil drawings showing a scholarly design, of which the best commendation is that it looks like old work in feeling and spirit but is original in essence, such a design as Mr. Moore might have produced had he lived when the Abbey Church was built, but still imbued with his own personality. Next to this hangs Mr. Arnold Mitchell's design for "Chapel at Berndorf, Austria," for Herr Arthur Krupp. This is of a distinctly Sussex type in composition, low and with a central tower, modest and squat in form; but the detail, though English Perpendicular in motif, is distinctly twentieth century. The interior shows a somewhat original treatment, low pointed arches dividing the nave into bays with low-pitched polygonal panelled ceilings, and under the tower a circular domed ceiling with a distinctly Renaissance touch. The interior of another design for "Proposed Chapel, Berndorf, Lower Austria," by Mr. John T. Lee, is a very fine design, dignified and stately, and free from all affectation or undue straining after originality, which quality is, however, attained without obvious effort.

Mr. Temple Moore is also represented by his "New Choir and Transept, Ecclesall Church, Sheffield," a pleasant interior, in which quaintness is obtained by the use of irregular spacing and forms of arches. Professor Beresford Pite's "English Mission Church, Safed, Galilee," is naturally a small building, in which an attempt has been made to impart local feeling by the use of detail of the character that one might suppose to have been employed in Herod's Temple. Mr. W. Campbell Jones's "School Chapel, Tonbridge," is shown by two drawings, respectively of the exterior and interior, the former beautifully showing a quite scholastic type of Perpendicular with good modern feeling, and the latter, simple in general treatment, emphasising the richly designed reredos.

Messrs. Douglas & Minshull have only one drawing in the exhibition, "New Chancel, Vestries, &c., Church of St. Andrew, West Kirby," a modernly treated version of Perpendicular shown in a good perspective, with an original and piquant central tower, or rather enlarged flèche, over the crossing, apparently of timber covered with slate, set diagonally to the axial lines of chancel and transepts, and suggested by French work. Mr. Louis Ambler's "Completion of St. Michael's Church, Sutton-in-Ashfield, Notts," is of a more conventional type of Early English work, with broach spire to the tower. A very quaint drawing shows Mr. J. Harold Gibbons's "Mortuary Chapel and Cloisters, St. Cuthbert's Church, Kensington," which looks to have some good work, but being a drawing that *ought* to be near the eye, is, of course, hung at a height at which it can hardly be seen.

A striking design is Mr. Walter Tapper's "Chapel for the Community of the Resurrection, Mirfield," simple, bold, and original, without affectation. To the inquirer as to what "style" it is in, we should say that it possesses style but follows no style. In that it makes use of semicircular arches it might be referred, at a distance, to Romanesque or to Renaissance. It possesses the dignity of the round-arched German work, and the interior suggests study of that period. The chancel screen, on the other hand, apparently of stone with metal grille, is reminiscent of Early French and Italian Renaissance. We can, therefore, only assure our inquirer that the "style" of this design is that of its author, an architect who has studied and assimilated the lessons of old work, and, instructed but not fettered thereby, has produced a modern and individual work of high-class architecture. Mr. Burke Downing's "New Church of St. Barnabas, Mitcham, Surrey," which hangs next, is of quite different character, and yet, in its turn, likewise good architecture—modest in height, no doubt for considerations of cost, yet picturesquely grouped and well detailed, based distinctively on English village church architecture of the fifteenth century, yet modern in treatment. Mr. Edward B. Muff's "A London Suburban Church" is one of the small and delicate drawings stuck on the skirting. The design is that of a single-span nave with processional aisles simply treated, and with a saddle-back tower.

Mr. Frank L. Pearson's "Cathedral School, Cloisters and Library, Truro," are shown in a big drawing whose chief attraction is the cathedral, which forms the background to the buildings that are the ostensible subject. Mr. William H. Coate's "Design for a Church in East Anglia" looks good, though the turret stair to the tower rather, to our mind, detracts from the East Anglian feeling, notwithstanding that such features may be found in that part of England. "All Saints Church, Bedford," by Sir A. W. Blomfield & Sons and Mr. G. P. Allen, is good, with Perpendicular traceried windows of a more correct and conventional type than is the fashion in modern work, and has at the north-west angle a tower with spire. The "Church of the Good Shepherd, Lee: Exterior," by Messrs. F. H. Greenaway & J. E. Newberry, is an example of a cheap suburban church with nave and aisles under one roof rescued from poverty by a good tower. Decorated for a change is the period on which the detail is founded. The Decorated period is also followed by the next drawing, showing in pencil and tinted elevations a quiet and refined design for the "Church of St. Andrew, Purlwell, Yorks," by Messrs. E. B. Hoare & M. Wheeler, which, however, we think is spoilt by the sudden change half-way up of the plan of the tower buttresses from rectangular to diagonal. Mr. William J. Devlin's "Design for Church of the Holy Cross, Crosshill, Glasgow: Interior," is a Classic conception, severe and dignified, with the nave divided into squares by piers with columns between, thus including two bays of the nave arcade in one compartment of the nave. "St. Wilfrid's Church, Bognor: Interior, looking East," by Mr. G. H. Fellowes Prynne, is apparently a study in the polychromatic use of materials, which in this case are red brick with plenty of stone, and green wood panelling to the lower part of piers and walls. The result is rather fidgety in the drawing, but everything would depend in execution on the exact tints of the brick and stone, and the lighting by

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which they were seen. Mr. J. COATES CARTER'S "New Church, Pontypool," is an excellent design in a severe early type of treatment. The design for "St. Chad's Church, Far Headingley, Leeds: New Chancel and Vestries," by Messrs. JOHN GIBBONS & SON, is an excellent composition. On another drawing described "Designs for Church Fittings," by the same architects, is an elaborate, clever, and quite modern design for St. Chad's font and cover, and on the same sheet a pulpit and screen for All Saints Church, Stretford, equally clever. Mr. P. NAPIER HEMY'S "Design for a Church at Ascot" is apparently a first study, quite modernly treated with much originality, which seems to want further consideration and pulling together to render its parts harmonious.

(To be continued.)

THE HISTORY OF WESTMINSTER ABBEY.*

JOHN FLETE was a monk of Westminster from 1420 to 1465, and the only mediæval writer who attempted a history of the Abbey. He has been somewhat eclipsed by the excellent history compiled three centuries later by WIDMORE, who availed himself of FLETE'S labours and supplemented them by a diligent investigation of the treasures of the Muniment Room. Thus it is that FLETE'S work has never been printed until it has now been rescued from its obscurity by Dean ROBINSON.

JOHN FLETE'S intention, as expressed in his preface, was to write the history of his Abbey from the time of LUCIUS, first King of the Christian Britons, A.D. 184, down to the year A.D. 1443, the twenty-second year of the reign of HENRY VI. Modesty possibly led FLETE to fix this year for the completion of his history, for he then became Senior Warden of Queen ELEANOR'S manors, and subsequently occupied other positions of dignity. For some reason not related, but quite comprehensibly through his devotion to the important and responsible duties of his several offices culminating in that of Prior, his history goes no further than the death of NICHOLAS LITLYNGTON in 1386.

The early history of the church at Westminster is briefly given by FLETE, on the alleged authority of an ancient Anglo-Saxon chronicle, which, Dean ROBINSON points out, cannot be much earlier than the middle of the twelfth century. The building of a new church by SEBERT, King of the East Saxons, and its consecration by St. PETER, referred to in the putative Anglo-Saxon chronicle, is described at length and in fuller detail by transcriptions from four narratives—(1) "another ancient chronicle," found in the life of St. EDWARD, by AILRED OF RIEVAULX (A.D. 1163); (2) the life of St. MELLITUS, by GOSCELIN, a monk of St. Bertin; (3) the chronicle of SULCARD, a monk of Westminster in the time of Abbot VITALIS (1072-81); (4) a chronicle called "Liber Regius," which Dean ROBINSON has not been able to identify.

The historian then goes on to quote various Papal bulls and royal and episcopal charters, which he summarises to establish what is probably the main object of his history, the high position of the Abbey of Westminster, and particularly its independence of the See of London, and as to which he says:—"Nunc ergo quia locus iste a tantis nobilibus et sanctis viris, ut praedicitur, dedicatur, honoratur et dotatur, insuper libertatibus, dignitatibus et privilegiis roboratur; et quia ex primitiva fundatione locus iste est regiae consecrationis, regum sepultura, repositoriumque regalium insignium; caput Angliae merito diademaque regni ab antiquo nominatur."

Of the privileges appertaining to the Abbey it would seem that the tithe of the salmon caught in the Thames "a ponte de Stanes usque ad Yenlade ultra Gravesende" (from Staines bridge to Yantlet Creek) was highly valued, and FLETE devotes considerable space to the upholding of this right. The good monks, however, do not seem to have had all their own way in this matter, for the fishermen were offered quaint rewards for bringing in the salmon, being credited with so many candles as given to the church, and permitted to dine from the prior's table when the fish were eaten. There were disputes, too, with the Rectors of Wandsworth, Battersea, Chelsea, and Rotherhithe which led to arbitrations and compositions. Then comes a disquisition on the habits of the salmon and the derivation of its name "salmo a saliendo naturaliter nomen accepit."

Leaving the subject of salmon, FLETE gives an account of the relics and indulgences that helped to make the fame of his Abbey; then his history continues with the lives of the abbots, which are interesting reading, though the editor is at present unable to vouch for the authenticity or to correct the errors of his author. FLETE seems, however, to have been careful to have some authority at least for his statements, and to have avoided going to his imagination for facts necessary to render his history apparently complete, for he says, speaking of the unknown dates of the earlier abbots, "mallem igitur ista sub dubio relinquere quam aliquid mendaciter et sine causa fingere." One of the most interesting details in this part of FLETE'S writings is the reference to the two curtains or dossals that Abbot RICHARD DE BERKYNG (1246) gave to the choir, the inscriptions on which Dean ROBINSON quotes at length from a manuscript found at Gonville and Caius College, Cambridge. The thanks of all Englishmen are due to Dr. ROBINSON for making accessible the history by JOHN FLETE of our national church, the "caput Angliae," and we trust that the Dean may find time and opportunity to further extend his researches until he is able to decide whether FLETE or WIDMORE is right on the points as to which they disagree.

* *The History of Westminster Abbey.* By John Flete. Edited by J. Armitage Robinson, D.D., Dean of Westminster. (Cambridge: University Press. 5*s.* net.)

COMPETITION FOR HOSPITAL AT MOLESLEY.

WE should advise architects not to start on their drawings for this competition, as from the nature of the conditions we think it highly probable that the Competitions Committee of the Royal Institute will disapprove and bar the competition.

The hospital is to be quite a small one, two blocks of six beds each and administration block with bedrooms for a staff of six, laundry, mortuary, &c.

The remuneration is to be 4 per cent. on the architect's estimate, or the accepted tender, whichever is lower, and "should quantities be deemed desirable" by the Urban District Council, "they will allow a further 1 per cent."

No assessor or professional adviser is even suggested, as "the Council reserve to themselves the right to adjudicate upon the plans submitted." These are to be sent in by June 1 next "under motto," but there are no particulars given as to what they are to be, or to what scale they are to be drawn.

ARCHITECTURE: ITS TRUE PRINCIPLES.—IX.

By R. OWEN ALLSOP.

BALANCE.

NOW, if we turn to the subject of balance as distinct from pure symmetry, we open up an easier field for dissertation. Here, in the organic world, we see everywhere a balance of parts. The leaf or flower may not of itself be perfectly symmetrical, but it will be in more or less perfect balance. A tree is perhaps very unsymmetrical, but the arrangement of component masses gives a balance of parts that equally satisfies the eye.

Symmetry may be termed rigid justice—conformable to the principle of an eye for an eye. Balance, rather that of an eye for x pounds. In symmetry the scale will be equally loaded—the pound of gold on either side; whereas the idea of balance—in art matters—might be expressed by an arrangement whereby there is a sovereign's worth either side, but on the one side it is gold, and on the other silver or copper. "Symmetry" understands exact equality—substance, shape, and size.

Thus, in architectural matters we may balance a plain mass with one that is smaller but worth more by reason of the labour bestowed on its enrichment. No balance can result in two similar things the one smaller than the other. Of two western towers, if one were smaller than

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the other we would not have any sense of balance or justice, but the arrangement and form and enrichment of the smaller may make up for its lack in bulk.

Symmetry appeals to the eye, balance to the understanding, the two terms being used in the art sense. Symmetry supposes—indeed, necessitates—an actual, supposed or imagined, axis or central point—that is, an axis or centre mathematically equal in distance from all corresponding parts of the two halves. If the symmetrical object has not a visible axial line or point, it has an imaginary one, such as in a vase, and generally such as may be produced by the revolution of outline round an axis. The eye must seek an axis, as in the case of a composition having wings, the centre by the eye is sought; for, as we have endeavoured to show, two objects, unless connected by a third, cannot form anything but two individual, unrelated units.

The Axial Line.

From what we have considered relative to symmetry and other kindred subjects, we must conclude that in all matters of architectural composition the question of axis, actual or understood, is of the first importance. Practically we know, the whole of design is based on axial lines, even if only constructive, and not appearing actually in the design. From centres we set out widths, measure distances, set our large parts as well as small. The axis of superficial and solid figures may be compared to the central idea, motive or main purpose in other things. Every composition in any art requires first its central idea or main theme, and so in the parts forming this whole composition there is need of actual or an inferred axis. Without such there is no unity, and without unity no individuality. The main effect of symmetry and axial design tends towards the producing of oneness in the whole, and as in life so in architecture, the strength of the community is the sum of strengths of component individuals, and with decay in the individual comes decay in the community. An ellipse may be constructed to contain the area of a given circle. The one is relatively diffuse, the other compact, and compactness is unity, unity is individuality, and strong individuality means force as distinct from that which is feeble, diffuse and scatter-brained. In like manner the contents of a cube may be contained in a parallelopiped. The one is compact, the other diffuse.

It will be seen that symmetry concerns one object—balance concerns two. We employ the terms on their accepted art sense. Symmetry *makes one*; balance makes two (or puts two) *at one*—that is, brings two into harmonious relation—smoothes out antagonistic differences, adjusts conflicting claims. The distinction is important as enabling a clearer idea to be obtained of the relative value of the two terms.

Symmetry of Unity and of Multiplicity.

We cannot give too much attention to the question of exact symmetry, its position in design. We see it to be at once the simplest method of producing ornamental effect and the most erudite if attempt is more to fully explain its whole significance and bearing. The least-cultured housewife arranges the "ornaments" on the parlour mantelshelf in symmetrical array. The clock or other feature considered as best and most imposing is placed in the centre, and the vases on either side must be in pairs—two small ones either side, two large flanking vases.

How universally this instinct is shown indicates some vital and quite sound principle. It is by no means to be dismissed as the crude ideas of uncultured taste. The truth lies deeper. The sense of order that arises from the centre-and-wing arrangement, being so universal, is to be looked for in some great fundamental principle. The idea of the arrangement of the mantelshelf ornaments is first the centre. This is evidently as it should be, and is simply a concrete demonstration of the appreciation of the principle of a central idea or theme in any work.

Whether the symmetrical object be an individual, indivisible unit—as a sphere, heart or trefoil—or a multiplicity of units—as a building, the idea of centrality, condensation, oneness, as contrasted to independence, diffuseness and manifoldness in the idea (apparently) upon which the principle of symmetry rests; for although in the plane representation of the heart form there is no obvious central axis, it is understood; and, more than this, the oneness of the form is derived from symmetry. We have seen that in a composition of centre and wings, the wings always predicate the centre and must, if not thus subordinate, at least always have reference to the centre, either as servants, dependents or guardians. Every symmetrical object therefore challenges the eye to find a central idea, a form or axis; and we must conclude that in the heart or trefoil the centre is the conception of the form itself, and, in the building group, the central feature of the winged composition.

Symmetry of Parts in Asymmetrical Wholes.

From the critical observation of various satisfactorily executed works of architecture we may deduce a general rule that though symmetrifying long elevations is a vain and objectionable practice, the smaller parts—especially the ends of wings and projections—should be rigidly symmetrical. The bad "one-sided" effect of the transepts at Salisbury are an instance of the effect of neglecting this rule. And a further safe guide is to enhance by centre-and-wing principle (or other suitable means) the symmetry of such minor parts of a composition. Where exact symmetry is intended it

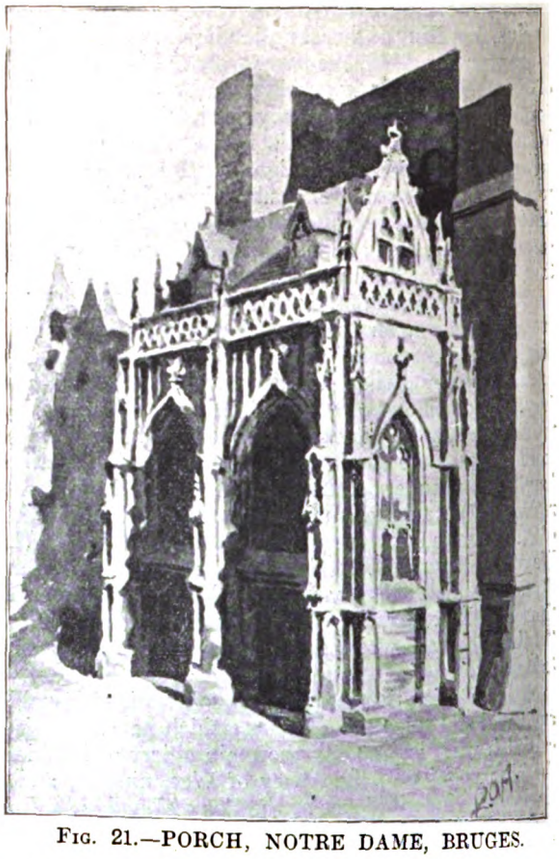


Fig. 21.—PORCH, NOTRE DAME, BRUGES.

should be complete and thorough in all details. The opposite to symmetry being asymmetry, the effect of bipartite design is to enhance—increase in value—by contrast, that which has not this regularity. In the instance of undesirable asymmetry that we have given—the ends of Salisbury transepts—we can see that this principle is just; for the want of regularity in the transepts agrees with that of the long side of the cathedral and no contrast is afforded. That which is embraced in the easy angle of vision (it might be suggested) should be symmetrical, hence the reasonableness of aiming at true (rigid) symmetry in the part.

All compositions wanting absolutely in symmetry of whole are bad unless upon a large scale—*i.e.*, such as the eye cannot examine except by moving the position of the spectator. It must be said that for small buildings

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complete asymmetrical elevations are akin to patchwork composition. No effort of the architect can remedy completely the want of natural balance. The smaller the building the more desirable the symmetry, because we can so easily take in the whole in the normal usual angle at ordinary distances—even close at hand. Hence the poor effect of the average loosely-planned, scrappily-composed suburban house. While the large building suffers somewhere, if unnaturally symmetrified, the small one suffers from lack of symmetry. The cause is clear enough—the smallness of the object.

PLANNING, THE BASIS OF GOOD COMPOSITION.

The need of axial planning—to produce grand monumental architecture—is apparent. The axis induces symmetry. The same plea for symmetry in the composition may be made for symmetry in plan—that it necessitates thought in arrangement, as distinct from the thoughtless aggregation of parts that arises from the patching method. The materialised imaginary axis is the long imposing roof line, the impressive corridor, the massive balanced grouping in place of petty agglomeration of main parts of all sizes and shapes, jutting out here and there without any reason other than that the designer had no thought and no skill to arrange a definite scheme with definite aim.

The difficulty—and hence the scope—of architectural design resides in the manifold requirements to be ful-



FIG. 22.—THE NEST, ORPINGTON.

filled, practical and æsthetic; but we are now principally concerned with planning as the fundamental basis of architectural massing. The long nave roof has its co-relative indication on the plan. The central tower, the centre and wings of the façade are all indicated by the plan and must have some definite relation to this. A good architect can see at a glance the capabilities of a plan to afford scope for composing, and dignified, or at least interesting grouping. It is evidently impossible to produce noble effects, or even pleasing effects, on an ignoble plan. Architecture being a matter of three dimensions, and two of these referable to the plan, we might be tempted to say that two-thirds of architectural design rests in the plan. We all know by experience that no headway can be made with any composition, even if generally grasped by the mind's eye, until the ground, or main, plan is absolutely settled. This consideration will sufficiently stop any possible criticism that composition *per se* is not wanted in architecture so long as we are honest, simple, and structural, for if massing and grouping are based on the plan, they are solid attributes of design requiring study, since they are practical matters the offshoot of other practical considerations. Not a line can be changed in the main walling without affecting the grouping—unless, indeed, the whole affair is a make-believe, with steel girders destroying the truth of the work. Unless the component masses definitely refer to the plan, architectural composition becomes a sham.

Nothing is more definitely one in composition than a simple cathedral. The base of the plan, spiritually and practically, is the cross. The essence of the cross resides not in its arms but the actual crossing. Hence if the two western towers refer to the west gable—as we have seen—and this refers to the nave, and the junction of the nave and transepts marked by a bold tower, this latter becomes properly the dominant object, and indicates the actual crossing of the cruciform plan of a building suited to a religion based upon certain belief primarily associated with a simple cross. Hence in cathedral building for Christian worship the central tower is justified on all points by reasonable arguments. It is not in reality the dominating motive, which is the crossed plan, but it indicates this, and so is subordinate to the general idea.

Taking figs. 21 and 22 to represent respectively examples of symmetry of front and side and absolute asymmetry, the effect of the two masses is no doubt primarily due in great measure to this regularity and irregularity of composition. Yet most critics would pass over the fact. The old "Nest," it may be observed, was recently pulled down. The drawing was made after a portion of the building was removed, and the effect of this alteration was to create the unbalanced appearance evidenced in the rough sketch.

(*To be continued.*)

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE annual general meeting of the Royal Institute was held on Monday last, Mr. Leonard Stokes, Vice-President, in the chair, when the report of the Council for the official year 1908-9 was submitted and, after discussion, adopted.

The report states that since the publication of the last annual report the Council have held nineteen meetings, of which the Council elected in June last have held sixteen. The following committees appointed by the Council have met and reported on the matters referred to them:—Competitions, prizes and studentships, finance, sessional papers, premises, professional questions, Board of Professional Defence, Board of Examiners, Fellowship drawings, charter and by-laws revision, town planning, exhibition of architecture and decorative arts.

The losses by death have been as follows:—Fellows.—Cole Alfred Adams, Ibrahim Shaik Daúd Ahmadi, Alfred Darbyshire, Herbert Davis, William Milner Fawcett, Leslie William Green, Edward Augustus Gruning, Lewis Henry Isaacs, Henry Hill McConnal, James Neale, Francis Haslam Oldham, Edward Augustus Ould, Alfred Henry Paget, Hugh Stannus, John James Stevenson, Frederick Todd, Benjamin Woollard. Retired Fellows.—David Gostling, John Holden. Associates.—Ernest Carritt, Albert Edward Gough, Horace Moger, John Peter, William Candler Reed, Francis Adams Sprules, Isaac Steane, Charles Thomas Whitley. Hon. Corr. Members.—Arnold Guldenpfennig, Alfred Nicolas Normand.

Obituary notices of some of the above have appeared in the *Journal*.

The Royal Gold Medal was awarded last year to M. Honoré Daumet in recognition of his executed works as an architect and for his distinguished services in the cause of architectural education. M. Daumet received the medal in person at the general meeting on June 22, 1908. It has been decided to award the medal this year to Dr. Arthur John Evans, in recognition of the eminent services he has rendered to the history of architecture by his distinguished work of exploration in Crete. His Majesty the King has graciously signified his approval of the award.

The following tabular statement shows the present sub-

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scribing membership of the Institute compared with that at the corresponding periods of 1907 and 1908:—

Year.	Fellows.	Associates.	Hon. Associates.	Total.
1907 . . .	862	1,254	46	2,162
1908 . . .	906	1,288	45	2,239
1909 . . .	888	1,344	46	2,278

During the official year since the last annual general meeting nine Fellows have been elected, eighty-two Associates, and one Honorary Associate.

The Progressive examinations were held in June and November 1908. The Preliminary was held in London, Birmingham, Bristol, Cardiff, Glasgow, Leeds, Liverpool, Manchester and Newcastle-on-Tyne; the Intermediate in London, Bristol, Cardiff, Glasgow, Leeds, Liverpool, Manchester and Newcastle-on-Tyne. The Council desire to record their thanks for the valuable services rendered by the hon. secretaries and examination committees of the various allied societies. The Final and Special examinations were held in London, and Special examinations for Colonial candidates were held in Melbourne and Toronto, when seven candidates were examined and five passed. The results are shown in the following tabulated form:—

	Admitted.	Exempted.	Examined.	Passed.	Rejected.
Preliminary examination	335	68	267	198	69
Intermediate examination	338	10	328	155	173
Final and special examinations	237	--	237	79	158

The total number of candidates was 910. The number of probationers now stands at 2,923, and of students at 961. The Council again have reason to regret that so large a number of students remain on the list without proceeding to the Final examination.

The Special examination for Colonial candidates will be held this year at Johannesburg, Sydney and Toronto.

The Ashpitel Prize was awarded to Horace James Ash, who passed the Final examination in November 1908.

The Council desire to thank the Board of Examiners for the continuance of their invaluable services.

The statutory examinations, qualifying for candidature as district surveyor in London, and for candidature as building surveyor under local authorities, were held in London in October 1908, when eleven candidates presented themselves. Certificates of competency to act as district surveyors in London have been granted to Frederick William Charles Barker, Alfred Ernest Biggs (A.), Henry Thomas Bromley (A.), Richard Thomas Grove, George Arthur Turner and William Ernest Watson (A.), and a certificate of competency to act as building surveyor under local authorities has been granted to George Arnall.

The deed of award of the various prizes and studentships was presented to the Institute at a general meeting on January 18, 1909. At the presentation of prizes on February 1, 1909, an address to students was delivered by the President, and a criticism of the work submitted was read by Mr. Paul Waterhouse (F.). An exhibition of the drawings was held from January 19 to 30 in the Gallery of the Alpine Club, and was visited by 1,332 persons. A selection from the prize drawings is now being sent the round of the allied societies.

On June 23 the annual dinner of the Institute took place at the Whitehall Rooms. The Institute was honoured on this occasion by the presence of M. Honoré Daumet (Royal Gold Medallist of the year), the Hon. Sir Schomberg McDonnell, K.C.B. (Secretary of H.M. Office of Works), the Chairman of the London County Council, and other distinguished guests.

"At Homes" were given by the President on April 28, 1908, when a selection of drawings and photographs representative of the executed works of the late Mr. E. W. Mountford were exhibited; and on February 8, 1909, when an exhibition was held of the work resulting from the tours of some of the travelling students of 1907 and 1908.

Since the issue of the last annual report the following sessional papers have been read before the Institute:—May 23, 1908, "The Architecture of the Bridges of London," by Professor Beresford Pite; November 16, "The Development of House Design in the Reigns of Elizabeth and James as Illustrated by Contemporary Architectural Drawings," by J. Alfred Gotch, F.S.A. (F.); December 14, "The Elements of Design in Internal Decoration," by T. R. Spence; January 18, 1909, "Public Abattoirs," by R. Stephen Ayling (F.); February 15, "Town and Country: Some Aspects of Town-planning," by H. V. Lanchester (F.); March 15, "American Architecture: with especial reference to work at Washington," by Francis S. Swales; March 29, "British Sculpture of To-day," by Marion H. Spielmann, F.S.A.; April 19, "The Architectural Work of the London County Council," by W. E. Riley (F.), architect of the London County Council.

The most important event in the history of the Institute during the year was the granting by His Majesty the King of the new supplemental charter in the month of December. The new by-laws to be applied for under the new charter are now in course of preparation by the Council, and will be submitted to the general body for discussion and approval at an early date.

During the course of the year the Transvaal Institute of Architects and the Architectural Institute of Canada have been admitted to alliance with the Royal Institute. The town-planning committee have carefully followed the progress of the Housing and Town-Planning Bill now before Parliament, and have secured the addition to the Bill of an amendment giving to architectural bodies a locus standi as "persons affected" at inquiries into town-planning schemes held by the Local Government Board. They have also promoted the formation of local town-planning committees by the allied societies, and they are continuing the investigation and study of the problems of town planning.

The Building Act amendment clauses of the L.C.C. (General Powers) Bill, 1909, have been considered by the Council as well as by the practice and science standing committees, and vigorous action has been taken, and is still being continued, with the object of securing such alterations in these clauses as will bring them into conformity with the general opinion of the architectural profession. The views of the Council upon the matter were expressed in a resolution which was forwarded to the chairman of the London County Council (*Journal*, January 23, 1909), and in a letter from the President of the Royal Institute to the chairman of the London County Council (March 5, 1909).

The eighth International Congress of Architects (Vienna, 1908) was well attended by British members. The Institute was represented by Mr. Leonard Stokes and Mr. John W. Simpson. The British contribution to the exhibition of architectural works consisted of a representative collection of photographs of recent English domestic work organised by the British section of the permanent committee. A review of the proceedings of the Congress, by the librarian of the Institute (under whose supervision the British exhibit was arranged), appeared in the *Journal* for June 6.

By the courtesy of the French Ministry of Fine Arts and of M. Jean Hulot, the Council were enabled to demonstrate to English students the methods and achievements of French prizemen in architecture by the exhibition in London last July of M. Hulot's Prix de Rome drawings illustrating his restoration of the ancient Greek city of Selinus. The exhibition, which lasted a fortnight and created much interest, was held at the gallery of the Royal Society of Painters in Water-Colours. A paper descriptive of the work, kindly contributed by M. Gustave Fougères, Professor of Greek Literature at the Sorbonne, and translated by Mr. John W. Simpson, was delivered at the formal opening of the exhibition.

The resignation by Mr. Alexander Graham of the post of hon. secretary of the Royal Institute after ten years of office affords the Council an opportunity of placing on record their profound sense of the great services which Mr. Graham has rendered to the Royal Institute during the whole of this period, and of the untiring devotion which he has displayed in the exercise of the important duties of the hon. secretaryship.

Since the issue of the last annual report the Council have made the following appointments:—

The Institute representative on the Council of the National Trust for Places of Historic Interest or Natural Beauty, Mr. W. A. Forsyth.

The Institute representative on the Engineering Standards Committee Sectional Committee on "Bridges," Mr. Edwin T. Hall.

The Institute representative on the special committee of the International Drawing Congress for the unification of signs and symbols used in drawing, Mr. Francis Hooper.

The Institute representative at the annual convention of the Institute of Architects of Canada, Mr. F. S. Baker.

The Institute representative on the Royal Commission on the Preservation of Ancient Monuments in England, Mr. Leonard Stokes.

The Institute representatives on the joint committee on water regulations, Mr. George Hubbard, F.S.A., and Mr. H. V. Lanchester.

The Institute representative on the Tribunal of Appeal, Mr. John Slater.

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The Institute representative at the Local Government Board inquiry on Poor-law institutions, Mr. Edwin T. Hall.

The Institute representative on the Senate of the University of Sheffield, Mr. J. Alfred Gotch, F.S.A.

The Institute representatives at the conference called by the superintending architect of the L.C.C. to consider the questions raised in Part 5 of the L.C.C. (General Powers) Bill, 1909, Mr. Edwin T. Hall and Mr. John Slater.

The Institute representative on the Court of the University of Liverpool, Sir William Emerson.

The Institute representatives to give evidence before the Board of Trade Committee on Artistic Copyright, Mr. John Belcher, R.A., and Mr. John W. Simpson.

Since the issue of the last annual report the Council have made the following grants:—Architectural Association, 100*l.*; Architectural Association Sketch Book, 25*l.*; Architects' Benevolent Society, 125*l.*; British School at Rome, 21*l.*; W. G. Hunt (Acton competition), 100*l.*; Royal Architectural Museum, 21*l.*; Sheffield Society, 20*l.*

The following have been the President's appointments to assessorships during the official year:—

Aberystwyth .	National Library .	Professor Reginald Blomfield, A.R.A.
Bangor . .	Normal College . .	Mr. John W. Simpson.
Bury . .	Elementary Schools .	Mr. John W. Simpson.
Colchester .	Technical Institute .	Mr. Paul Waterhouse.
Hull. . .	Training College. .	Mr. John W. Simpson.
Ilford . .	Emergency Hospital .	Mr. H. Percy Adams.
Islington . .	Vagrant and Receiving Wards . . .	Mr. Lewis Solomon.
Kirkwall . .	St. Magnus Cathedral Restoration . .	Mr. John James Burnet.
Reading . .	County offices . .	Mr. Mervyn Macartney, F.S.A.
Shrewsbury .	Schools . . .	Mr. Henry T. Hare.
Stoke-on-Trent.	Town hall Extension .	Mr. Leonard Stokes.

Copies of the "Regulations" have been sent to the promoters of the following competitions, together with letters requesting that a copy of the conditions be sent for the Institute Library. In cases where the conditions have been unsatisfactory, letters urging modifications have been sent to the promoters:—

Aberystwyth, National Library.
Appleby and Tebay, Elementary Schools.
Astley Bridge, Branch Public Library.
Banbury, Elementary School.
Bellshill, Bothwell, Council Chambers.
Beverley, Baptist Church and Schools.
Blackpool, Central Public Library.
Bournemouth, Branch Library.
Brighouse, Secondary Schools.
Brighton, Assistant Medical Officer's Residence.
Bristol, Royal Infirmary Extension.
Bury, Elementary School.
Bury, Secondary School.
Cardiff, County Hall and Offices.
Cleckheaton, Secondary and Technical School.
Colchester, Technical Institute.
Disley, Council Schools.
Dolgelly, Free Library.
Eastleigh, Concert Hall.
Elland, Mixed Schools.
Glamorgan, County Hall.
Great Lever, Branch Public Library.
Gorseinon, Church.
Grimsby, Town Hall Extension.
Guernsey, County Hospital.
Halliwell, Branch Public Library.
Liscard, Library.
Manchester, Congress Church House.
Merthyr Tydfil, Y.M.C.A. Building.
Middlesbrough, Library.
Moseley, Mixed School.
Motherwell, Parish Council Chambers.
Nantwich, Council Schools.
Pontardawe, Guardians' Offices.
Pontypridd, Union Offices.
Reading, County Offices.
Romford, School.
Rowley Regis, Public Libraries.
Shrewsbury, Secondary Day School.
Southbank-in-Normanby, Town Hall.
Stockport, Schools.
Swansea, Cottage Extension.
Swinton, New Schools.
Truro, County Offices.
Tiverton, Higher Grade Schools.
Whitehaven, Schools.

The Council by publication in the *Journal* and the professional Press have advised members of the Institute not to take part in the following competitions:—Blackpool Central Public Library (advice subsequently withdrawn), Nantwich Council schools, Southbank-in-Normanby town hall, Stanley District Council offices.

The Council have the pleasure to report the continued financial prosperity of the Institute, and to point to the balance of 1,841*l.* 14*s.* 4*d.* of income over expenditure. The sum of 4,213*l.* 19*s.* 10*d.* has been invested, as against 3.035*l.* 19*s.* 7*d.* last year. The invested capital is now over 26.000*l.* The statement of income and expenditure and the balance-sheet for the year ending December 31, 1908, and the estimate of income and expenditure for the current year, are appended to this report.

The Board of Architectural Education reported:—

The Board have held five meetings since their last report.

The list of books recommended to students referred to in the last report has now been issued. The method of teaching architecture in schools subsidised by Government has been considered by the Board, and a committee has been appointed to draw up a memorandum on the subject for discussion by this Board before communicating thereon with the Board of Education. The attention of this Board has been directed to the fact that the L.C.C. School of Building at Brixton now includes a Day Technical School, admission to which is restricted to boys between thirteen and fifteen years of age who have passed the sixth standard of an elementary school, and the Council of the Institute, on the recommendation of the Board, have communicated with the London County Council suggesting that while training given in this school may be most useful for those intended for the building trades, it differs materially from that recommended by the Board for the education of architects. The question of the advisability of recommending the Council of the Institute to grant exemption under certain conditions from the Final examination to students of schools of architecture at the Universities of Liverpool, Manchester and Sheffield; the Architectural Association, London; King's College, London; and University College, London, has been before the Board and has been referred to a committee appointed by the Council of the Institute to consider the whole subject of the Institute examinations.

The following modifications in the Intermediate and Final examinations recommended by a joint committee of the two Boards will come into operation at the summer examinations this year:—

The Intermediate.

The following specific subjects will be omitted from this examination in future:—

1. Classic ornament.
2. The characteristic mouldings and ornament of each period of English architecture from A.D. 1000 to 1550, with their application.
3. The orders of Greek and Roman architecture; their origin, development and application
4. Outlines of the history of Mediæval and Renaissance architecture in Europe.

Instead of the above, two papers will be set on (1) the General History of Architecture; and (2) the Purpose of Architectural Features in Relation to the Buildings in which they occur.

Answers to be accompanied by explanatory sketches.

The Final and Special.

The following specific subjects will be omitted from the examinations in future:—

Subject 11.—The Principal Styles of Architecture: their Features, Mouldings and Ornament. (i) The Characteristic Mouldings, &c., of the Special Style selected by the student; (ii) The Characteristic Mouldings, &c., of the Principal Styles of Architecture.

Instead of the above the following papers will be set:—

Morning.—The Principles of Architecture: their Theory and Application. Illustrated by drawings.

Afternoon.—A written thesis. Illustrated by sketches.

The amended report of the Diploma in Architecture Syndicate at Cambridge University was considered by a committee of the Board, who suggested certain modifications therein, and on the recommendation of the Board the Council forwarded the said suggestions to the Syndicate.

During the past year the Visitors appointed by the Board have visited the Architectural Association Schools; King's College, London; University College, London; Liverpool, Manchester and Sheffield Universities. The Visitors have reported satisfactory progress in these schools.

THE ARCHITECTURAL ASSOCIATION.

THE concluding meeting of the present session of the Association was held on Friday evening last at Tufton Street, Westminster, Mr. Walter Cave, president, in the chair.

Messrs. B. H. Jackson, S. H. Reeves, F. C. Anson, J. Early Smith, M. C. Broad, T. F. H. White and C. J. Esch were elected members.

The HON. SECRETARY announced that the annual dinner would be held on May 12 at the Georgian Hall, Gaiety Restaurant; he also reminded members of the first summer visit on May 15 to Maidenhead.

On the motion of the PRESIDENT votes of thanks were passed to Mr. John J. Burnet for his donation to the library of Messrs. Collignon and Pontremoli's book on Pergamos; to Mr. James Williams for a most generous gift of two working drawings by the late George Devey; and to Messrs.

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J. G. N. Clift and A. C. M. Edwards for a number of lantern slides.

The PRESIDENT then read the scrutineers' report on the election of officers for session 1909-10. The report stated that 350 voting-papers were received—a decrease of fifty-five on the number returned last year—and that three were rejected as invalid.

The results were as follows:—President, Mr. Henry Tanner; vice-presidents, Messrs. F. Dare Clapham and C. Wontner Smith; ordinary members of Council, Sir A. Brumwell Thomas, Messrs. Gerald C. Horsley, Arthur Keen, F. Winton Newman, R. Frank Atkinson, Horace Field, G. Gilbert Scott, Baxter Greig, Herbert A. Hall; ex-officio member of Council, Mr. Walter Cave (retiring president); hon. treasurer, Mr. Henry T. Hare; editor of the *Architectural Association Journal*, Mr. G. L. Elkington; hon. librarian, Mr. Percy May; hon. secretaries, Messrs. Maurice E. Webb and Edwin Gunn; hon. assistant librarians, Messrs. W. D. Cathcart and A. J. Perrin.

A hearty vote of thanks was accorded to Messrs. R. J. Buck, W. B. Dukes, G. D. G. Hake, R. Lowry, H. L. Samson and E. J. Tanner for acting as scrutineers.

It was also announced that the A.A. Athletic Club meeting would be held on Saturday afternoon, June 5, at Stamford Bridge.

Mr. C. WONTNER SMITH read a paper, illustrated by sketches and lantern views, on—

Bruges and the Neighbourhood.

The subject of my paper this evening, he said, was suggested by the visit paid last year to Belgium by the Architectural Association on the occasion of our annual excursion, when a very enjoyable week was spent in visiting the principal towns in the vicinity of Bruges, which we made our headquarters.

These old Flemish cities are, of course, well known to many of you. Belgium is easily accessible, and, possessing many architectural attractions, forms a splendid ground for study. To the majority, therefore, I can only recall scenes already familiar, but those who have not been as yet to Belgium may find a short description of the principal cities of some interest, and I propose to sketch briefly the outlines of their history, mentioning the best-known buildings and architectural features, merely giving you my impression of them, with no attempt at an exhaustive criticism, which I do not feel competent to undertake were there even sufficient time at my disposal for the task. Interesting as they are, it is not within the scope of this paper to deal with the origin and development of these cities, which in the Middle Ages formed the great commercial centre of Northern Europe, but before proceeding further with the subject, I should like to mention a few of the more important facts concerning their earlier history. Belgium was originally peopled by a race of Celtic origin, and they were the last of the northern tribes to withstand the Roman invaders, although eventually crushed. After the power of Rome was finally broken, the first Flemings descended on the shores of Northern Europe. These men were of the same race as our own Saxon forefathers, and men of the same spirit, hating slavery and oppression, and content only so long as they retained their freedom. They were quick to resent any attempt to reduce them to serfdom, and consequently the country during the Middle Ages was the scene of perpetual warfare. They alone among the nations of Europe succeeded in retaining any degree of independence.

There is little to learn from history about this part of Europe from early times till the ninth century, when Baldwin of the Iron Hand, the first Count of Flanders, took up his residence upon a small island situated between the rivers Boterbeke and Roya. This place was Bruges, destined in after years to become one of the most important cities of the Middle Ages. Baldwin was the real founder of Bruges, although it existed before his time, probably in the form of a fortified camp. The old Bourg was pulled down, and Baldwin erected a new fortress on the site now occupied by the Hôtel de Ville and Palace of Justice. Around this was grouped Baldwin's own residence, the chapel, the court prison, and on the north side the sanctuary, in which were placed the relics of St. Donatian, which had been given to him by the Archbishop of Rheims. Of the Bruges of Baldwin's days, all that now remains is the crypt underneath the Chapel of the Holy Blood, situated on the west side of the Hôtel de Ville. The two streams by which Bruges was built still exist; the Roya runs in the same course as it did then, but it has been tunnelled over and built upon in the course of the intervening centuries. The Boterbeke has long since been diverted, and now only skirts the town. Bruges passed through many vicissitudes between Baldwin's days and the fifteenth century, when it reached the summit of its prosperity. Apart from its other claims, the city must have special interest for us. Its rulers have been closely associated with those of our own country, and many well-known figures of English history have had reason to be grateful for the shelter obtained within its walls—the wife of Canute the Great, the sons of Earl Godwin, Hereward the Wake, St. Thomas à Becket, and in the seventeenth century Charles II., to mention only a few of the number who it is known resided in, or at any rate, visited the city. I will not, however, trouble you with a lengthy account of its history through the Middle Ages. The source of its prosperity was partly due to its geographical position and extensive trade. *(To be concluded.)*

ILLUSTRATIONS.

WELLINGTON COLLEGE.—PRINCIPAL FRONT TO GREAT HALL—THE GREAT HALL.

THESE buildings were carried out in 1906-7, and were opened by H.M. the KING on June 18 in the latter year. They consist of a dining-hall capable of seating 350 boys; an eastern wing containing a mess for the masters consisting of ante and common rooms, billiard and reading rooms, spare bedrooms, &c. The western wing contains the matron's department, with linen stores, packing and unpacking rooms, and sewing rooms, together with quarters for the matrons and their maids. On the north side are the kitchens, sculleries, larders, and other offices. A corridor or cloister runs along the front or south side of the building, and connects the new block with the Combermere and Hardinge dormitories on the east side and with the main college buildings on the west. The ground available for the building was strictly limited on all four sides, and consequently certain rooms and offices which would otherwise have been on the ground floor were of necessity relegated to the basement—*e.g.*, the servants' hall, steward's room, and stores and offices, &c. The dining hall is covered with a high-pitched roof of steel construction, ceiled internally with an elliptical plaster ceiling, and the walls are panelled in oak for some 8 feet in height. Fletton bricks were used in the construction of the walls, the facing externally being in red bricks. Monk's Park Bath stone was used for all external stonework. The whole of the roofs are covered with green Westmoreland slates. The contractor was Mr. J. B. SEWARD, of Wokingham. The design was the result of a competition limited to four architects, the successful competitor being Mr. CHARLES J. BLOMFIELD, from whose design and under whose direction the work was carried out.

HOWE COOMBE, WATLINGTON.

THE illustrations of above, which we publish to-day, are the architect's first rough studies for the house, which in a rather more extended form was built in 1907-8 for A. H. PAWSON, Esq. The house is externally of flint and brick, with tile roof, and the windows have metal casements with leaded lights. The architect is Mr. T. FRANK GREEN, A.R.I.B.A.

ST. SWITHUN'S, HITHER GREEN, S.E.—INTERIOR, LOOKING EAST.

THIS church was one of four built by the Lewisham Church Extension Association; the nave and aisles were built in 1892 by Messrs. PARMENTER, of Braintree, Essex. The transepts, chancel, morning chapel, vestry, &c., were built in 1904 by Messrs. MAIDES & HARPER, of Croydon. The brickwork is all of Wrotham bricks, and the stonework of Bath stone. The whole of the stonework was limewashed on completion. The choir stalls and fittings generally are at present temporary. The architect was Mr. ERNEST NEWTON, of 4 Raymond Buildings, Gray's Inn.

BISHOPSTONE CHURCH, WILTS.—SOUTH TRANSEPT.

THESE sketches by Mr. E. GODFREY PAGE speak for themselves as illustrating distinctive and typical examples of English church architecture.

SALISBURY CATHEDRAL.—INTERIOR OF NAVE.

THE history of Salisbury Cathedral is well known to all our readers, and Mr. E. GODFREY PAGE's sketch shows an architect's rendering of the design of the nave.

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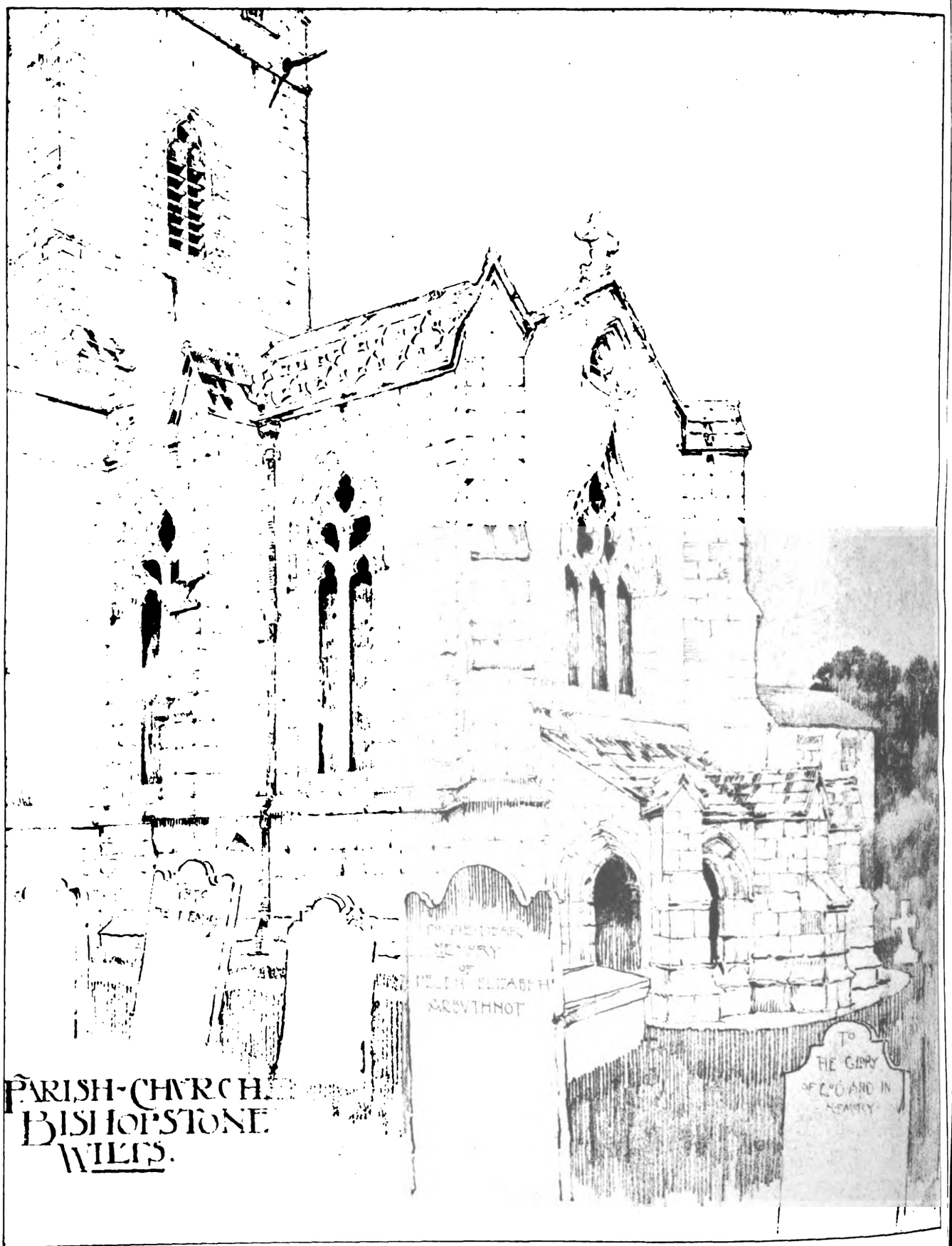


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BISHOPSTONE CHURCH, WILTS: SOUTH TRANSEPT

Drawn by E. GODFREY PAGE, A.R.I.B.A.

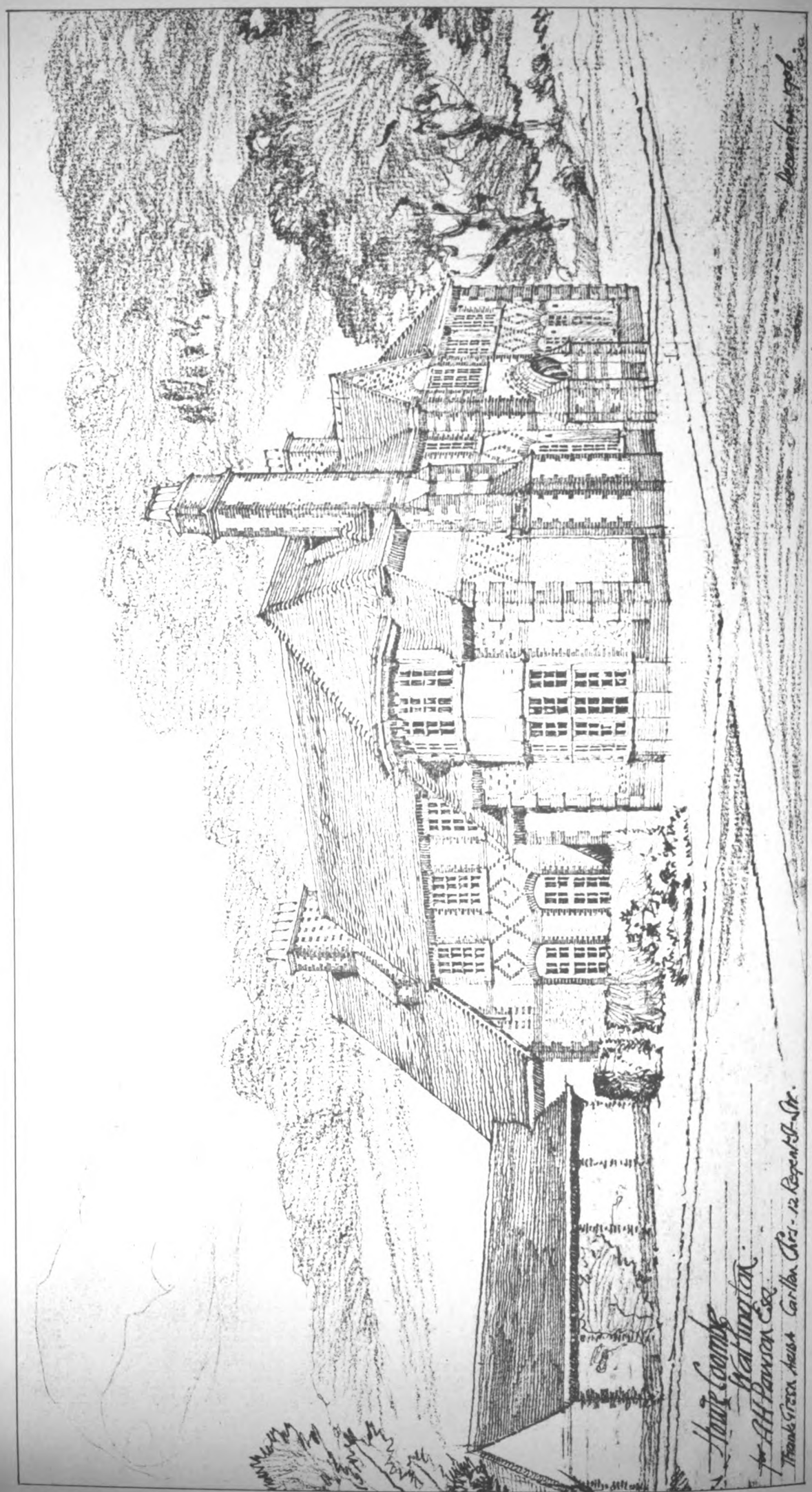
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ST. SWITHUN'S, HITHER GREEN, S.E.

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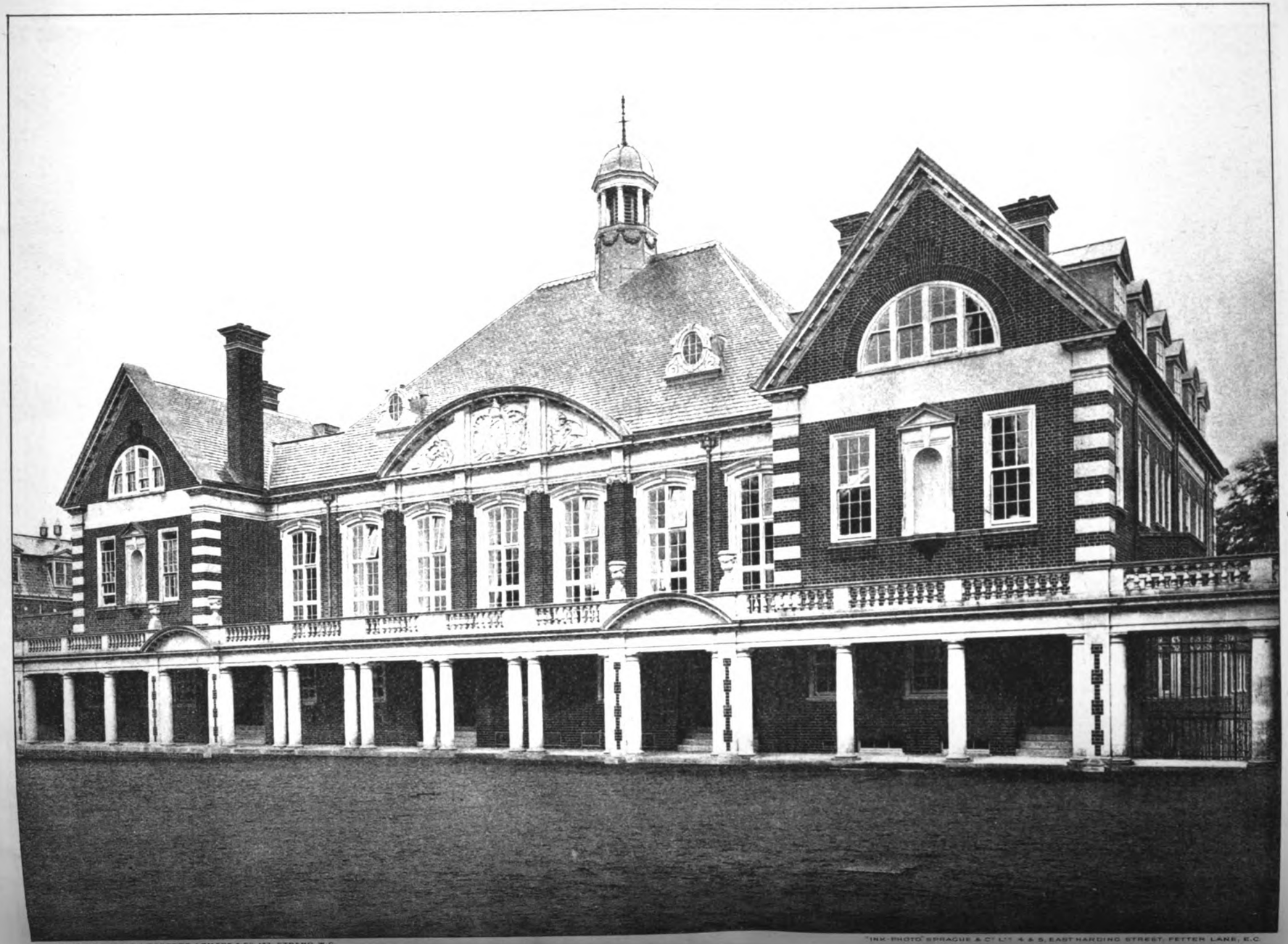
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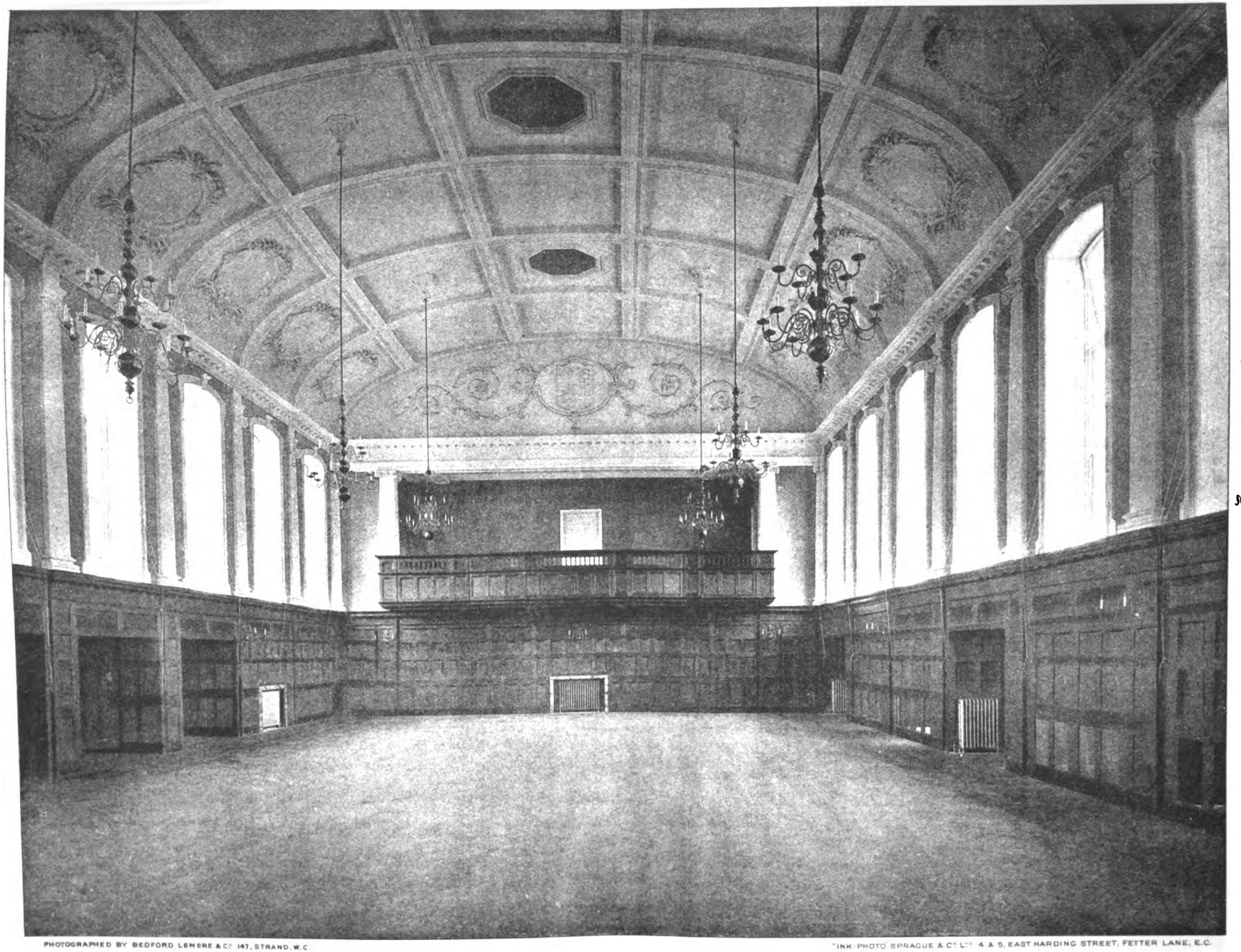


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WELLINGTON COLLEGE: PRINCIPAL FRONT TO GREAT HALL.

CHARLES J. BLOMFIELD, F.R.I.B.A., Architect.

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WELLINGTON COLLEGE: THE GREAT HALL.

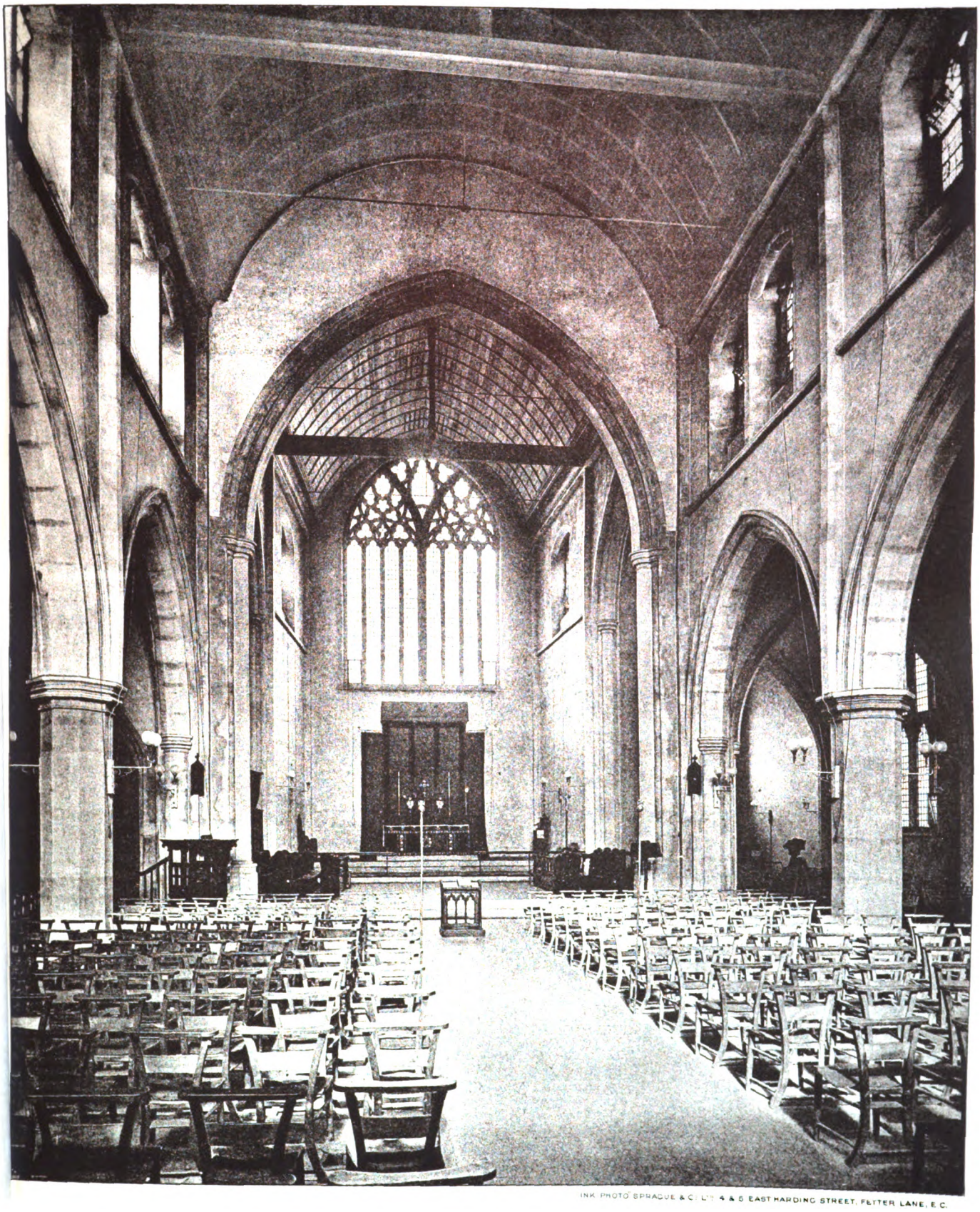
CHARLES J. BLOMFIELD, F.R.I.B.A., Architect.

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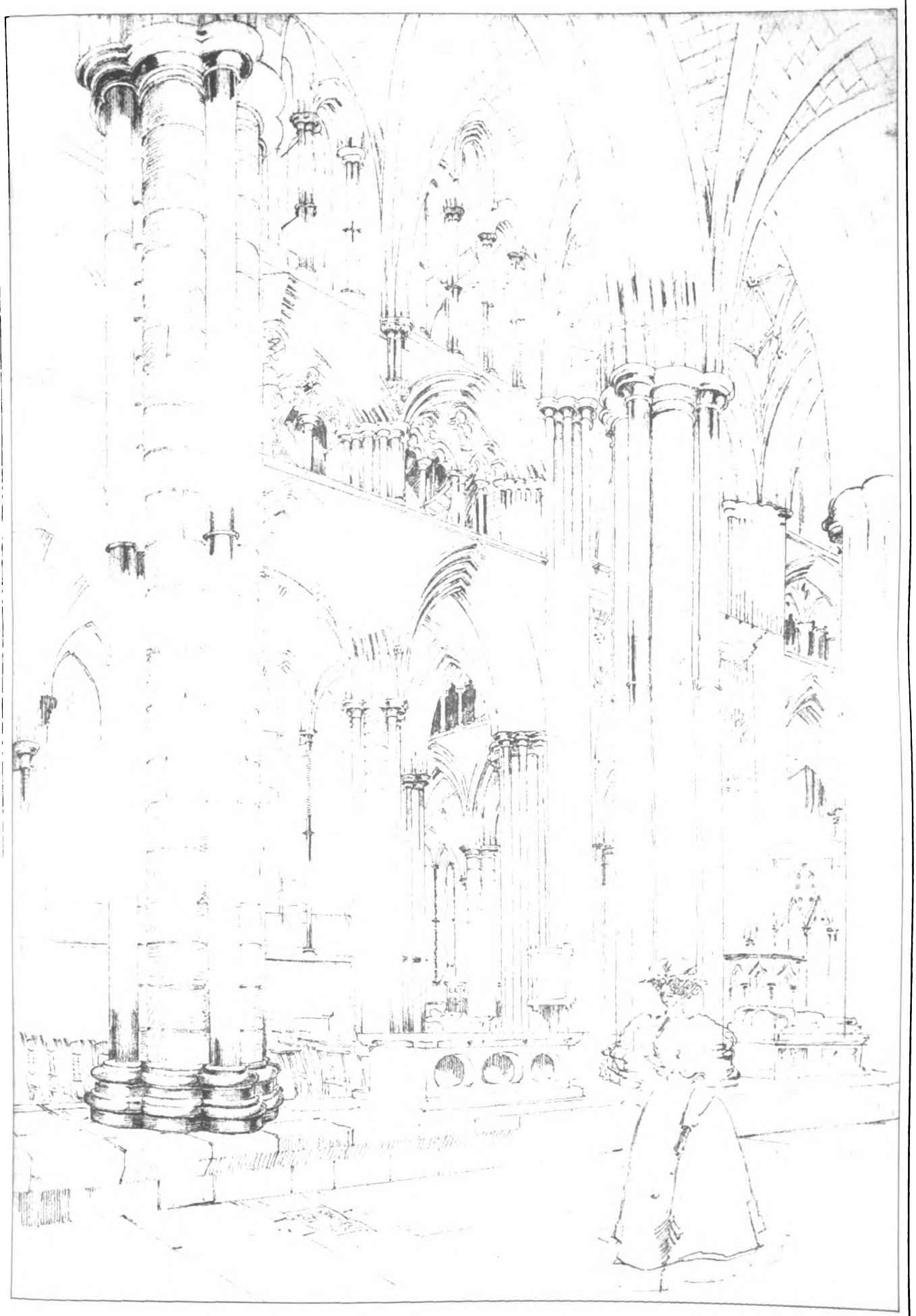
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ST. SWITHUN'S, HITHER GREEN, S.E.: INTERIOR, LOOKING EAST.

ERNEST NEWTON, Architect.

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SALISBURY CATHEDRAL: INTERIOR OF NAVE.

Drawn by E. GODFREY PAGE, A.R.I.B.A.

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THE DANGERS OF BREEZE CONCRETE.*

(Concluded from last week.)

Breeze Sample No. 3.—Described as "coke breeze," consisted of coke and clinker, with a little coal. The coke varied from 2 inches diameter to fine dust. About 48 per cent. passed through a ¼-inch sieve; the remaining 52 per cent. sorted over gave 40.6 per cent. coke, 8.6 per cent. clinker and 2.64 per cent. coal. These results were also mainly negative. The coal being such a small fraction, it was not possible to make such extended experiments as one would wish, but so far as they go they show that this particular coal—a species of anthracite—was practically harmless.

Breeze Sample No. 4.—Described as "furnace ashes." This sample was very damp when received, and had to be dried before it could be treated. About 26 per cent. passed through a $\frac{1}{10}$-inch sieve and 22 per cent. through a ¼-inch. The remaining 52 per cent. was sorted out into coke about 15 per cent., coal 1.5 per cent. and clinkers 35½ per cent. Each of these five fractions, tested with the two cements as before described, again gave practically negative results.

Breeze Sample No. 5.—Described as "gasworks clinkers," consisted of clinkers only, ranging in size from 4 inches diameter downwards. They were crushed to pass a $\frac{1}{20}$-inch sieve as before described, and tested in the same way as previous samples, but with negative results.

All the foregoing samples having given negative results, attention was next directed to samples of "breeze" which the contractors supplying them described as "sometimes used for floors, but which they neither used nor recommended"; Nos. 8, 9 and 10, moreover, were described as "such that would not be allowed by a clerk of works for fireproof flooring," but the author found them to differ very little indeed from the ingredients found in many samples of breeze concrete taken from important works.

Breeze Sample No. 6.—Described as "ashes or furnace refuse." About 21½ per cent. passed through a $\frac{1}{10}$-inch sieve and 15½ per cent. through a ¼-inch sieve. The remaining 63 per cent. after sorting gave roughly 34 per cent. coke, 27 per cent. clinker and 1 per cent. shaley matter.

Treated as before, the results were again negative.

Breeze Sample No. 7.—Described as "ashes or furnace refuse." About 16 per cent. passed through a $\frac{1}{10}$-inch sieve and 17 per cent. through a ¼-inch sieve, the residue of 68 per cent. on the ¼-inch sieve giving 32 per cent. clinkers, 23 per cent. coke and 13 per cent. coal.

It will be noticed that this sample contains a considerable quantity of coal, whereas No. 6, a material described by the suppliers in exactly the same terms, contains none; this coal does not appear to have exerted any deleterious influence upon the specimens, probably due to its being of an anthracitic rather than of a bituminous nature, but this point will be dealt with more fully later on.

Breeze Sample No. 8.—Described as "sample of coal ash straight from furnace of paper-mills, burnt from coal only." This sample was greyish-white in colour, and contained a considerable quantity of clinkers; the clinkers being more or less friable probably accounts for the larger proportion passing through the sieves. About 43 per cent. passed through a $\frac{1}{10}$-inch sieve and 12 per cent. through a ¼-inch sieve. Of the 45 per cent. remaining, about 20 per cent. was clinker, 23 per cent. coke and 1½ per cent. coal. Although the specimens left entirely in air developed little or no expansion, all the fractions except the coke and clinkers showed rather marked expansion in water, the coal being very much the worst. Unfortunately the quantity of coal found was so small that it was only possible to try it with one cement, but with the other fractions the results obtained with the two different cements practically corroborate one another, although cement A develops rather more expansion in each case than cement B.

Breeze Sample No. 9.—Described as "sample of ashes dropped from the firebars of furnace from waterworks, from coal and coke." This sample was nearly all fine material, 42½ per cent. passing through a $\frac{1}{10}$-inch sieve and 31 per cent. through a ¼-inch sieve. Of the 26½ per cent. of material remaining on a ¼-inch sieve, 8.3 per cent. was clinkers, 7.3 per cent. coke, 7.48 per cent. coal, with a little ash and a few stones. The water-test bars from all the fractions showed enormous expansion, the ¼-inch, $\frac{1}{10}$-inch and the average expanding 4 or 5 per cent. within the first three or four days, and subsequently swelling so much as to break and render further measurements impossible. The coal fraction expanded 3 per cent. within a week, increasing to 4 per cent. in twenty-eight days, after which it appeared to remain practically constant. Several of the air specimens, more especially of the fine material passing the $\frac{1}{10}$-inch sieve, showed rapid expansion for the first day or two, and then remained practically constant, with, if anything, slight subsequent contraction. The results obtained with the two different cements were practically identical, and corroborated one another fairly closely. The special value of the results obtained with this particular sample of breeze is that it shows very clearly that some kinds of ashes and furnace refuse are even more dangerous than coal.

Breeze Sample No. 10.—Described as "rough ashes from furnace of electricity works from coal only." About 14½ per cent. of this material passed through a $\frac{1}{10}$-inch sieve and 30 per cent. through a ¼-inch. Of the remaining 55½ per cent., 43½ per cent. was clinkers, 5½ per cent. coke, 4½ per cent. coal and a few stones. Only the finer material passing a $\frac{1}{10}$-inch sieve developed any appreciable expansion—i.e. about ⅓ per cent.—which it attained in about a month, and thereafter appeared to be constant. Several of the other fractions showed measurable though negligible expansion, ranging from .002 to .09 per cent.

A noticeable feature of the foregoing experiments is that many of the specimens which showed very marked expansion when placed under water as soon as set, expanded very much less when left entirely in air. It therefore seemed a point worth determining as to whether exposure to damp or moisture would in any way affect these air-set specimens at the end of the three months' tests—i.e. after they had become thoroughly seasoned. One of the duplicate air bars from each series was therefore placed under water, the time elapsing between the date of moulding and placing under water ranging from 91 to 292 days. Immersion had practically no effect upon those specimens which had previously shown no expansion when kept under water, but caused almost immediate expansion of a very serious nature with those fractions of breeze which had previously developed expansion when placed under water in the first instance. This clearly shows that the expansive agent, whatever it may be, is more or less dormant in the dry air-set block, and only requires to become damped to constitute a serious element of danger.

Referring now to the chemical aspect of the question, it was intended when the experiments were first commenced not only to analyse each fraction of each sample, to ascertain if it contained any deleterious constituent, but also to analyse each mortar, both immediately after gauging and again at the end of the experiments, to try and ascertain if and when any expansion had occurred, whether there was any marked chemical difference between them which would enable the cause of the expansion to be detected, and thus serve as a guide in the investigation of actual cases of failure. After analysing some thirty-six samples with entirely negative results, this idea was abandoned as involving too prodigious an amount of labour without any likelihood of corresponding reward; seeing, however, that some of the coal fractions caused enormous expansion while others caused practically none, they were examined chemically, with the view of ascertaining the cause of this marked difference. The results showed that the coals from breeze samples Nos. 8 and 9 were highly bituminous, containing 35 per cent. and 33½ per cent. respectively of volatile matter, while those from samples Nos. 7 and 10 were more of the nature of anthracite, containing only 4 per cent. and 3 per cent. respectively of volatile matter. This indicates very clearly that bituminous coal is highly dangerous, while anthracite appears to be harmless. Apart from coal, the only analysis of the other fractions calling for comment is the fine material passing the $\frac{1}{10}$-inch sieve of sample 9, which was found to contain 3¾ per cent. of SO_3, which is doubtless partially responsible for the high expansion shown by this fraction, aggravated no doubt by the presence of some fine coal.

Taken as a whole the experiments as far as they go seem to point to the fact that as regards subsequent expansion there is not much danger to be apprehended from good clean coke or clinkers, or even anthracite coal, but that some kinds of ashes and furnace refuse are highly dangerous, while any considerable quantity of bituminous coal is absolutely fatal. One noticeable feature of the experiments, however, was that most of the coke breeze mortars had a tendency to more or less seriously attack the iron moulds in which the Bauschinger bars were made, causing them to rust during the short space of twenty-four hours between the

* A paper read before the Society of Architects by Mr. D. B. Butler, A.M.Inst.C.E., on April 22.

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moulding of the specimens and their removal from the moulds; the author is unaware if such results have been found to any appreciable extent in actual practice, but samples of breeze concrete sent him for examination a short time ago showed distinct marks of considerable rusting having taken place where the concrete had been in contact with the rolled joists. If such prove to be the case, it might in the end prove a very serious matter, as affecting the life and strength of the steelwork.

Altogether the experiments previously described represent some two years' work, and include the preparation of about 300 testpieces, involving some 5,000 measurements, to say nothing of the sifting, sorting and preparation of the breeze samples; the author is only too conscious of the fact that they are far from reaching finality; indeed, they only touch the fringe of a wide field of research, in which there is a vast amount of work to be done; having ascertained, however, that certain materials constitute a serious source of danger, and probably account for many of the "breeze" concrete failures which he has met with, he trusts that the danger signals most unmistakably displayed by the foregoing researches may prove of value to his hearers and tend to prevent the recurrence of such failures in the future.

Since the inception of these experiments the following extract from the *Tonindustrie-Zeitung*, dated April 25, 1908, shows that the importance of the subject has at all events begun to be appreciated in Germany:—

"*Verwendung von Kohlenschlacke zur Herstellung von Beton.*

"Der Minister der Offentlichen Arbeiten hat am 25. März 1908 folgenden Runderlass an die Regierungspräsidenten versandt:—

"'Nach Anhörung des Deutschen Ausschusses für Eisenbeton empfehle ich, Ew. Hochwohlgeboren, die Verwendung von Kohlenschlacke zur Herstellung von Beton, des sogenannten Schlackenbetons, bezuglich der Ausfuhrung von Eisenbetonbauten allgemein, also auch fur die sogenannte Zugzone in Decken und Balken zu verbreiten. Die Verwendung der Schlacke zur Herstellung von sonstigem Beton, sogenanntem Stampfbeton, wird nur da zuzulassen sein, wo die Gefahr, die tragende Eisenteile mit derartigem Beton in Beruhrung kommen oder Menschen von herabfallendem Putzmörtel getroffen werden können, ausgeschlossen ist.'"

The purport of the above, somewhat freely translated, is as follows:—

"*Use of Coal Residues for Concrete.*

"The Minister for Public Works has on the 25th March 1908 issued the following circular, addressed to the Presidents of the Government:—

"'After having received the report of the German Board on reinforced concrete, I recommend the prohibition of the use of breeze as an aggregate for concrete for the erection of reinforced concrete buildings in general, also in ceilings and beams wherever tensile stresses may occur. The use of breeze for other kinds of concrete will only be admitted in such cases where there is no danger of its coming into contact with the supporting ironwork nor of people being hurt by the falling concrete.'"

Professor HENRY ADAMS, in proposing a vote of thanks to the author of the paper, said Mr. Butler was a well-known expert on all questions relating to cement, and therefore his opinion was authoritative and useful. There were many points in the paper that might be open to discussion. In the first paragraph the author spoke of the expansion of mass concrete causing failures. That is, he said, a very serious matter to architects when dealing with large floor spaces, as in warehouses, hospitals and other extensive buildings. The mischief is only partially prevented by the use of expansion boards, and although in some cases it has been found to be due to the cement, the author had shown them that it was undoubtedly due in most cases to the coke breeze. He thought he was justified in saying that reliance was placed upon the material in consequence of the report of the British Fire Prevention Committee that coke breeze could resist the action of fire so well, and architects had consequently used it largely. He personally was very doubtful at the time of the tests as to the accuracy of the experiments, for they were using a combustible material and expecting it to resist fire. The author in his paper gave an example of coke breeze concrete used for a boiler setting actually taking fire. The co-efficient of expansion of glass and cement were referred to. If the cement expanded so much more than glass, he would have expected to see the bottoms burst off the bottles; instead of that it seemed to be a small portion was broken off the side, and not so much at the end. The results generally showed that the expansion under water was negligible, and that air-set concrete contracted. One would have expected, however, a fireproof floor to expand rather than contract, whereas the small tests showed the opposite result. Further on in the paper it was shown that a test block set in air would be subject to expansion if it got moist, and the speaker inferred therefore that a fireproof floor would remain constant until moisture reached it, and he supposed it would contract again when the moisture left it. It was important to notice the remarks about the tendency of coke breeze mortar to cause rusting of the iron moulds. The Concrete Institute had that as one of the questions under consideration—the corrosion of metal in concrete—and the results of the experiments undertaken by Mr. Butler afforded some direct and useful evidence upon this point.

Mr. E. J. SADGROVE seconded the vote of thanks. The paper, he said, mentioned some instances of coke breeze being used as a fireproof material, but he had himself given up using that particular aggregate some years ago, for he had actually seen men engaged in the construction of a building in which it was employed using the material as fuel for cooking their dinners. He would not care, therefore, to use coke breeze for fireproof roofs or flats. One thing he could not understand was the fact that breeze was intended to be anything else but coke breeze, and it had always seemed to him that some other light material should be used.

Mr. H. G. BAMBER, referring to the analyses that had been given in the paper, said he had hoped, knowing of the considerable number of failures that had taken place when breeze concrete was employed that Mr. Butler would have been able to give some reasons, probably chemical ones, for the failures. He believed that a sulphur compound was present in the coke in combination with some other material in the form of sulphide, and any compound, either in cement or the aggregate used in the cement, which was of an unstable character and could form a compound when placed in the composition, was dangerous to employ as a building material.

Mr. MAX CLARKE, F.R.I.B.A., said he was not a chemist, nor was he a cement expert, but he was one of those unfortunate people who had had some considerable failures with coke breeze concrete, and he had seen in other cases worse failures than he had experienced. That was some years ago, and consequently he tried to find out what was the cause of failure. He went therefore to a gas works and made some investigations on his own account. He tried to find out what a great many architects did not know—the difference between "pan" breeze and "coke" breeze. His definition for "pan" breeze was the material which fell into the water pan under the furnace during the process of making gas, and he defined "coke" breeze as the material that was drawn from the retort after the gas was extracted. The results of his experiments seemed to confirm the remarks made by his friend Mr. Bamber as to the sulphur being at any rate one of the causes of expansion of concrete made with breeze. Since those experiments he had avoided so-called coke breeze. He did not agree with the speakers who stated that it was an inflammable material, because he was almost certain that it was not. He had in the office a sample of coke breeze that was experimented on at the British Fire Prevention Committee's station. It was in position underneath an iron joist, and was about 2 inches thick, and was subjected to more than 1,500 degrees Fahrenheit of heat. On the side which was in contact with the joist there was not the slightest difference. They found at those experiments that the coke breeze floors became as it were more incandescent than the other floors, but they did not show the slightest tendency to flame and the concrete in the centre was just as good as when first put up. Be it what it might that caused the expansion, he not being a chemist thought it was the sulphur, and he thought he saw on one of the bars shown on the screen certain white marks, and he believed that those marks were due to sulphide. He was personally indebted to Mr. Butler because that was the first time he had heard the matter thoroughly discussed publicly. He had himself been experimenting for years, and there were tests still in progress, but the results could not be known yet. The lecturer said that the expansions shown on the screen were negligible, but he maintained that that was not so. Suppose he said one had an expansion of a foot in a warehouse floor, say 100 feet long, the danger would be considerable, and even if the expansion was $\frac{1}{10}$ per cent. it would cause serious damage. He then drew the attention of the meeting to a drawing of a small strong room about 19 feet long and an average width of 6 feet; it had a coke

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breeze roof 14 inches thick, and between the coke breeze and the wall was a 1¼ inch space all round. The walls were 14 inches thick with two courses of hoop-iron in each joint of the brickwork. At the end of nine months the detached end had expanded and cracked the walls to the extent of about ¾ inch. He had the case in his mind of a large warehouse about 150 feet long and 60 feet wide, and only one storey high. The people wished a floor put in about ten feet from the ground, and there were some small steel joists supported on longitudinal joists and stanchions. The coke breeze floor was isolated on two sides and one end, a 60 feet length sticking out. It was exactly 60 feet long when put up, and four months afterwards it was measured and found to be 60 feet 4 inches long. It was more or less cracked all over, and as it supported liquor tanks for a special purpose the floor was always more or less damp. Those experiments perhaps showed that once concrete became damped there was failure. He had, he said, put in concrete floors 150 feet long and they showed no cracks whatever. He had tried to get pure coke breeze, and found it was practically an impossibility. If they could have the coke breeze broken up and washed, he thought they would get more reliable material than that which at present went by the name of coke breeze, but even then it might not be reliable.

Mr. MARSH, of the Metropolitan Water Board, said he did not personally have large dealings with coke breeze. The structures he undertook were all of an engineering character in which harder and heavier aggregates were used in the cement work, but he wondered why destructor clinker was not tried. He had always known that concrete when set in air contracted, and set in water it expanded, and he was certain that any of the ordinary engineering aggregates with concrete, if set in air, would contract.

Mr. H. E. HAWKER said his experience of coke breeze had been contraction and not expansion. Floors and roofs made up of that aggregate served well for a certain time, six months perhaps, and then cracks became visible. To get over the difficulty he had used expanded metal, introducing it in the ordinary breeze floors. Bent wire round the joists was also a good method.

The CHAIRMAN, in putting the vote of thanks to the meeting, said it seemed to him the moral of the whole lecture was that when coke breeze was specified they should see that they got it, for they had seen by the results of the experiments that it was the materials which were not breeze that caused all the trouble. They had heard some remarks as to coke breeze not being a fire resistent. The diagram they had seen during the lecture represented experiments with very small samples, in fact, laboratory tests rather than practical ones. The British Fire Prevention Committee had tested a hut built of the material, subjecting it to fire for more than thirty-six hours up to a temperature of 2,000 degrees, and with intervals of hot and cold, and yet the roof remained sound.

ASPECTS OF APPLIED ÆSTHETICS.—II.

THE second of three lectures at the Royal Institution was delivered by Mr. James Paterson, A.R.S.A., R.W.S., R.S.W., last week. It was entitled "Landscape, Old and New." The following is a condensed account:—

Landscape, or landshape, a word which occurs in practically the same form in all Indo-European languages, is defined in a not yet obsolete dictionary as "a portion of land or territory which the eye can comprehend in a single view, including all the objects it contains," and secondarily, "a picture representing a tract of country with the various objects it contains."

This is surely a very prosaic and unsatisfactory explanation of what is suggested to even the most limited imagination by the word landscape, whether it refers to the outspread book of nature or to its interpretation by means of art. Few indeed are the individuals who do not take some interest and derive some pleasure from contact with what lies outside of themselves in the visible world. To many the pleasure is largely unconscious; but any attempt to analyse the real sources of enjoyment will convince the most unsophisticated the sources are complicated and, in a majority of cases, very different from what is imagined. City dwellers especially, for whom the country is commonly associated with freedom from restraint, change of scene, and absence of worry think, when on a holiday, they are under the spell of æsthetic influences. Opportunities for sport or active exercise, the stimulus of purer air, even, nowadays, the intoxication of more and more rapid locomotion, are by many confused with the enjoyment of nature's beauty. To others the scientific aspects of things are the true sources of pleasure. Or the interest may arise from thoughts quite unconnected with any visual charm the scene may possess. Analogous to this is the uplifting of spirit aroused by outspread country seen from a commanding point of vantage, though even here very many people are mainly gratified by the unusual exercise of their visual powers, and confuse the unexpected and joyful perception of rarely seen and distant objects with the thrill of emotion aroused in the real lover of nature through some of its simpler manifestations.

Is the perception common of the rare beauty of contour of some nameless hill? Are we sensible of the subtle line of an unknown coast? Do we see with any understanding of its grace the branching of fragile stems against a featureless sky, or the interwoven tracery of vanishing cloud forms in the gathering dusk? What of the infinite gradations of tone in nature? Perhaps a still rarer pleasure hides in the semi-veiling of the forms and shapes of things through sudden shadow or departing light, or when a wind from the west seems to set in motion all beneath the sun, so that nothing is still. What of the delight in colours, so various and entrancing? All unconscious of sources of the keenest pleasure in the common features of things about us we leave the book of nature unopened or trouble not to read in it.

To severely practical people the elusiveness of nature's beauty is confusing and even repugnant; they are annoyed if they do not see distinctly everything within the range of vision. The necessary conditions are seldom coincident with the greatest visual beauty. In recent years photography has increased the popular prejudice that clearness of vision is equivalent with beauty. The photographs of the ordinary landscape are full of facts of a kind, but they are not even approximately true, as will be apparent to anyone who compares them critically with the scene represented. There is reason for thinking that the pursuit of photography, though apparently leading multitudes to regard with some attention the superficial appearance of objects out of doors, has had a somewhat deleterious effect upon the real perception of beauty in landscape; moreover, it renders many impatient of the difficulties attendant upon a more intimate study of nature's varied features.

When we realise the strength of the appeal of landscape and its perennial nature, it seems surprising that the step from admiration to representation was not achieved earlier. It was not till the fifteenth century that the art of landscape painting was evolved, its earliest form being probably in map drawing. Among the giants of the Renaissance the new art showed rapid development, and though mainly used by them as a background for figure compositions it gradually won a place of sufficient interest to warrant serious study. In France, the Netherlands and Spain, appeared artists such as Rembrandt, Velasquez and Claude, who showed the deepest sensibility to the power of nature to arouse emotion. As to Great Britain, Richard Wilson, the last of the ancients, Gainsborough, Turner, Constable, Crome, and many other familiar names bring landscape painting almost to our own day.

In the evolution of landscape painting how various have been the developments! Although we cannot tell what may be in store, changes in point of view and execution are as certain to come in the future as they are evident in the past. No living art can stand still. In modern times the art of landscape painting has been revolutionised.

In the beginning, drawings of objects in nature were made simply to give information. Trees and other features were represented by symbols without any reference to real resemblance. Gradually clearer ideas as to the possibilities of depicting facts gained upon draughtsmen, and there dawned a feeling for arrangement and for colour. But generations of artists succeeded one another before an attempt was made to produce a picture dependent for its main interest upon a rendering of the landscape by itself. Figure painters thought less of natural effect than of significance and fine decoration. Landscape proper achieved emancipation in the seventeenth century and in the two hundred years following (especially in the northern countries of Europe) reached a culmination of grandeur, charm, and dignity which can never be surpassed.

The greatest masters have recognised that it is impossible to invent what is not found in Nature or suggested by it. Nature is the storehouse from which the artist must draw his material. The phrase "To hold the mirror up to Nature" is misleading in the last degree. The artist is born to pick and choose and group with science these elements that the results may be beautiful.

Truth in a picture can only be relative. The forms of

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things are really visible to us only in light and shadow and colour. There is no such thing as outline; what we call an outline is where one tone of colour ends and another begins. The range of coloured light in Nature is far beyond our means of accurate representation. All have seen dazzling sunlit cumulus clouds rising majestically against what appears as a dark blue sky, but the clouds cannot be represented by pure white paint, the highest note in our scale of pigment; they are full of colour, and yellow and red added to our white paint detract from its lightness. The blue sky, again, though dark by contrast with the clouds, is full of light and is far paler in tone than the lightest object in the landscape should the sun not be clearly shining upon it. The landscape itself, however dark it may seem, has infinite gradations in its darkness, and if we try to follow these gradations with our most sombre colours, we reach the lower end of our scale long before the deeper tones in Nature have been indicated.

The darkness of the older pictures of landscape is not entirely due to age. Their authors were concerned with composition, style, dignity of presentation, and strove for decorative effect both in form and colour; the latter, whatever the subject, restrained and restful in schemes of drabs, blues and browns and greens. So accustomed had artists and public alike become to this treatment of the coloured tones of Nature that when, early in the nineteenth century, a new perception of the possibilities in artistic statement of natural phenomena dawned upon Constable, his works were received with derision. Tradition handed down from generation to generation had so blinded people's eyes that these pictures were really not understood, and condemned as lacking in the qualities which they pre-eminently possessed; above all, approximate truth to Nature's lighting.

The brown convention survived almost to our own day. It died hard. The pictures were restful to the eye, pleasantly uniform in aspect, admirably fitted to take their places quietly as articles of furniture in the most refined households. Decorative qualities are essential to all fine art—pictures form no exception; but he who can find no room for such in his scheme unless they are produced under the old limitations as to colour shows a slight misunderstanding of the possibility of helpful environment. There is at present a fashion to banish the picture from the homes of our great middle class. Architect and decorator combine to so cover the walls of the public rooms with panelling and other structural features there is no space for more than a brass plate. Some years ago a man who had fine modern pictures was showing them to a well-known architect, who made the suggestion that for the price of one of his Corots he would transform his drawing-room into as complete a work of art as any of his cherished landscapes. The commission was given, the room was transformed, the result was much admired; but the pictures had to go; they were no part of the scheme and interfered with it. After a year their former owner found he missed his quondam friends, and, visiting the dealer to whom he had sold them, explained his feeling of loneliness in his lovely drawing-room, where, even at the risk of injuring the decoration, he felt he must have his pictures again. Panelling in wood forms a pleasant and durable treatment of wall spaces, but indiscriminately used, and cut up, as it often is, into distractingly small sections, it is not a suitable background for pictures. The result in too many modern rooms gives an impression of anonymity; no opportunity remains for the inmates to show their idiosyncrasies of taste; one might mistake such on entering for the board-rooms of insurance companies or the restaurant of an hotel. The renaissance of the minor arts and crafts within the last twenty years has been phenomenal, and has added a much-needed grace to modern life; but the possessor of pictures, who has acquired them for the satisfaction of his own inclinations, is provided with an element of enjoyment in his home which no bric-à-brac nor other decoration can supply in anything like the same degree.

In conversation with a distinguished architect a landscape painter was advised to dispense with the production of canvases destined for no place in particular, and train himself instead to execute work of a character to fit in with schemes of decoration designed by those in the sister profession. The reply was forcible and to the point:—"What we are trying to do is to make pictures which it will take the best architect all his time to design a good enough wall space for them to hang on." There is much need for the training of thoroughly qualified intelligent artificers to carry out the ideas of the architectural profession, but it would be a fatal day for vital landscape art in England if the free expression of emotion by means of pigment were rendered impossible. Far too many poor pictures are produced; they will disappear in time and be forgotten: but there is always the possibility that a veritable creation may result from an artist's labour. It is this hope which sustains him in his struggle, be the hope never so long deferred.

The difficulties in the modern landscape painter's art have been enormously increased by the modern's desire to express himself in colour bearing some resemblance to those in Nature, and to suggest, if not to indicate, Nature's own light. When a student loses touch with Nature he is in a perilous state. No definite course of life study can be specified. But to paint landscape and find out for oneself its possibilities it is well not to flirt with a new neighbourhood each recurring summer, but to (metaphorically) marry some well-chosen place and live with it spring, summer, autumn and winter, seeking not the obvious picturesque, but allowing Nature's features to find their way to the heart and thence issue in sentient artistic expression.

There is a wide field of subject matter for the landscape painter. By common consent our own land is one of the most richly dowered with beauty, the very fickleness of the climate giving it an added charm. One would expect a painter to feel and render the character of his native country with greater success than that of strange places, but the unexpected is always happening in art, and in this matter no such rule can be laid down, especially in these days of convenient travel. Many landscape painters find a stimulus in the new and unaccustomed aspect of foreign places. It is not in the most awe-inspiring scenes of nature that the great masters have found their material; inaccessible mountains, cataracts foaming from giddy heights, the fury of tempestuous seas, supply motives better suited it would seem to the musician or the poet than to the painter, however deeply he may be moved by them. The wild and uninhabited parts of the earth appear to lack what gives the necessary stimulus. Why this should be is interesting psychologically; perhaps the most potent reason for the almost universal choice of the less grandiose phenomena is that however much the artist may wonder and admire he must not be dominated by nature. He is the master, not the servant. What we ask of him is what he feels and sees expressed in terms of beauty, not a craven chronicle of facts, however sublime in their scientific bearing, however faithful in their archæological correctness. Hence we find the simplest materials seen and interpreted by genius becoming masterpieces which will endure for ever. Chardin so painted some apples and a pewter jug that we receive a new inspiration of what vision may be. In a little Cotman we may see some mean buildings so persuasively rendered in colour and quaint light that the elaborate classical landscape hard by seems paltry in comparison. Whistler, like a great violinist with muted strings, has left us the haunting beauty of summer night. Corot, with a few stunted trees and an apparently featureless horizon, creates a vision of the world at dawning which seems almost to breathe the spirit of the moment. A landscape by Matthew Maas again, the subject so simple as to almost beggar description, the result arresting in its marvellous impression of muffled silence. All these were great painters, all were misunderstood during a great part of their lives, the result of obeying their own instincts, their own individual method of looking at things.

Herein lies the root of the matter; all vital landscape painting exists only and simply as the interpretation of nature by one man, not in response to a public demand, in no way influenced by what the public wants, refusing what is clamorously asked. The world's wishes in these matters are met in the travesty of all the arts, the temptation to give what is wanted comes with no veiled appeal, and we need not look far for examples of men nearly great succumbing to it. A man must live, they say to themselves; wife and children have the first claim; nobody cares for what we delight in; we shall give them what they want.

There is nothing entirely new in this experience. Innovators have always been forced to wait for understanding and recognition in all departments of human activity till they have educated a public sufficiently large to make a livelihood possible. The tragedy is too often repeated of the public learning its lesson when the despised innovator can no longer benefit by its appreciation, having sunk into his grave soured and embittered by frustrated hopes of recognition. The ingrained conservatism of mankind exacts this toll, and from its most gifted sons, and treating them much as the Jews treated their prophets of old, persecutes or rather neglects them in their lives, and builds monuments to their memory.

We are apt to imagine that such things happened long ago, but are impossible in this enlightened age. Within the

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last few years there have been examples to the contrary, and it is certain that at the present moment many such lie not beyond our reach.

Whistler denied that there ever was an artistic period in the history of the world; at no time, he states, was there an art-loving nation. More's the pity! But in the far off fruition of all things, surely beauty will come to its own!

Meantime we hold the field, and play our part more or less well or ill, as the case may be, by ourselves and with our generation. We were never intended to succeed in anything, said R. L. Stevenson, only meant to keep on trying. Let us give ourselves a chance then in the finer things that last. The younger people should cultivate a feeling for simple things, and not be afraid to be original in the quest of enjoyment. Forget, perhaps, the task-work learned at school, but sometimes, at least in country walks, let nature appeal to the heart as a whole. Never mind for a day what is the scientific name for the rock which forms a range of cliff, but see how sheer and sweet it is between the sun and the sea. Do not trouble to remember whether those filmy clouds are cirrus or cumulus, but rejoice in the grace of them and marvel at their vanishing. Should all nature be in a whirl of movement, spare complaints of the wind and the rain and sing in tune. Or again, if you have hitherto failed to take any definite interest in pictures apart from their subject, go to an exhibition some morning when it is not crowded, and, without consulting the catalogue, walk quietly round till you come to something which seems strange to you. Consider it receptively, first from a distance, then nearer if you like. Do not try to find fault, nor be in too great a hurry to audibly admire. Most likely many weeks' or months' work went to the designing and making of it. Give it time to penetrate with its message.

The result will most likely be surprising.

ESSENTIAL FORMULÆ IN STRUCTURAL ENGINEERING.*

(Concluded from last week.)

THE finding of the position of the neutral axis is probably the most difficult of the several operations necessary in the calculation of a reinforced concrete beam, and in ordinary calculations the position arrived at is only hypothetical, for the neutral axis in such beams varies in position according to the extent of the loading of the beam and the consequent variations in the moduli of elasticity of both materials. The old beam theory that sections remain plane sections both before and after bending is generally accepted for the purpose of practical calculations for reinforced concrete beams. Many authorities, indeed, question its exact theoretical applicability to such beams, but almost all admit that the results of calculations on such basis are sufficiently near for practical purposes. The position of the neutral axis varies in accordance with the ratio of the area of steel to the area of the concrete, and also in accordance with the ratio of the moduli of elasticity of the two materials. In practice, however, the ratio between the two moduli being taken as constant the position of the neutral axis in any particular beam of fixed sectional area varies only in accordance with the ratio of the area of the steel to the area of the concrete, or to, as it is more often termed, the percentage of reinforcement, any increase in the area of the steel causing the neutral axis to become closer to the steel.

The calculations for finding the position of the neutral axis are so involved that a formula becomes an almost essential aid. But recourse to calculations for finding the neutral axis will rarely be necessary in the case of beams not connected to slabs, for the values of k for varying percentages of reinforcement are given in the report of the R.I.B.A. Reinforced Concrete Committee and in most reinforced concrete text-books, k being the proportion of the depth (measured from the top) at which the neutral axis is situated.

The values of k given in the R.I.B.A. report for a few ordinary percentages are:—

0.7	per cent. or	.007	ratio of steel to concrete		.365
1.0	,, ,,	.010	,, ,,	,,	.417
1.5	,, ,,	.015	,, ,,	,,	.483
2.0	,, ,,	.020	,, ,,	,,	.530

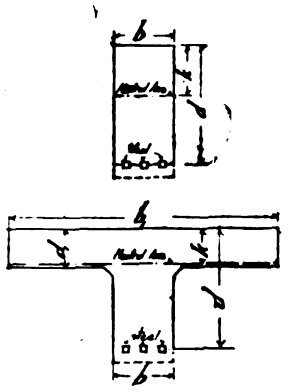
When, however, a T-beam, in which the floor slab assists the ordinary rectangular beam, is dealt with, the depth of the neutral axis does not vary in any fixed proportion with the amount of reinforcement. The use of a formula in this case is therefore necessary, and as the formulæ applicable to T-beams are derived in a similar manner to that applying to ordinary rectangular beams, all three are given.

* A paper presented at the general meeting of the Institution of Municipal Engineers, held at the Building Exhibition, Olympia, April 24.

Essential Formulæ (3).

rectangular beam $k = \sqrt{(p^2 m^2 + 2pm)} - pm$

T-beams $k = \sqrt{\frac{2A_t m}{b_1 d} + \frac{A_t^2 m^2}{b_1^2 d^2}} - \frac{A_t m}{b_1 d}$



T-beams where the neutral axis comes *below* the slab.

$$kd = \frac{b_1 d_1^2 + 2A_t md}{2b_1 d_1 + 2A_t m}$$

the distance previously $\frac{1}{3}\,kd$ equalling $\frac{d_1}{3} \times \frac{3kd - 2d_1}{2kd - d_1}$

when (the above being the R.I.B.A. Committee's symbols)—

k = the proportion of the depth of the beam (measured from the top) at which the neutral axis is situated.

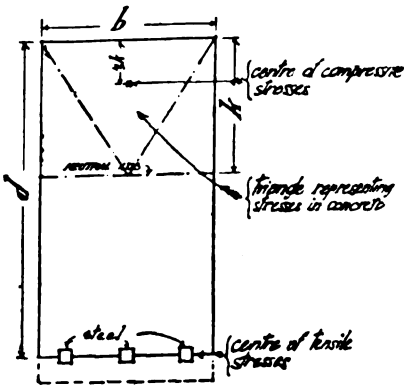
b = breadth of beam
b_1 = breadth of the portion considered as the table of the T
d = total depth of beam
d_1 = depth of slab
A_t = area of steel in tension

} The same units of length and area being respectively used throughout.

$p = \frac{A_t}{bd}$ = ratio of section of metal to section of concrete (often termed the percentage of reinforcement)

$m = \frac{E_s}{E_c}$ = ratio of moduli of elasticity of steel (in tension) and concrete (in compression)—usually 15.

The position of the neutral axis having been ascertained, it will be well to note the position of the centres of the tensile and compressive stresses in the beam. As regards the steel, the centre of the tensile stresses will obviously coincide with the centre of gravity of the metal. As regards the concrete, the stresses, as in the case of all rectangular beams, vary from zero at the neutral axis to maximum at the outermost layer, and may be represented in the form of a triangle, and the centre of such compressive stresses is situated at the centre of gravity of this imaginary triangle, which is to say, one-third the height of the triangle or one-third k.



Coming now to the method of calculating the strength of beams of reinforced concrete, in ordinary cases it will be found that the beams are not merely supported beams, but that they are to some extent either fixed at the ends or continuous over supports, and in practice where loads are dis-

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tributed it is a general custom to allow for a bending moment of $\frac{WL}{12}$ at the centre and $\frac{WL}{24}$ at the supports. In the case of slabs the bending moment will be $\frac{WL}{12}$ if the slab is reinforced in only one direction and $\frac{WL}{16}$ if reinforced in both directions.

The R.I.B.A. Reinforced Concrete Committee give the following formulæ for working out rectangular beams:—

$M = A_t t (d - \frac{1}{3} kd)$, which is the moment of resistance of the steel, and $M = \frac{1}{2} A_c c (d - \frac{1}{3} kd)$, which is the moment of resistance of the concrete.

When A_t = area of steel in tension, A_c = area of concrete in compression, M = bending moment, t = unit tensile stress in the steel, c = unit compressive stress in the concrete, the same units of force, length and area being taken throughout.

But the use of special formulæ here is not essential, although when the subject is thoroughly understood it greatly conduces to ease and quickness of working. Until a thorough understanding is reached it is well to work on more general lines. It is the old case of the moment of resistance having to be equal to the bending moment. And this moment of resistance in the case of the steel is simply the area of the steel multiplied by the distance between the centres of the tensile and compressive stresses (which result gives in effect the section modulus of the beam as regards the steel), and multiplied again by the safe unit stress of the steel. In the case of the concrete the *moment* of resistance is the area of so much of the concrete as is on the other side of the neutral axis, multiplied by the distance between the centres of the tensile and compressive stresses (which result gives a figure equal to twice the section modulus of the beam as regards the concrete), and multiplied again by one-half the safe unit stress of the concrete. The reason why one-half the safe unit stress has to be taken in the case of the concrete is that, as previously stated, the stresses in the concrete vary from zero at the neutral axis to the maximum at the outermost layer, whereas those in the steel are practically uniform, and in considering the resistance of the concrete the mean stress on the whole of the concrete above the neutral axis has been considered. But if this mean stress on the concrete is allowed to reach the safe unit stress, the extreme stress at the outermost layer, which is exactly double the mean stress, will consequently be double the safe stress of the material, which, of course, must on no account be allowed.

To persons so well conversant with mathematics and with the theory of this special subject as to be able to think in formulæ, all this rather lengthy treatment of the elements reinforced concrete beam design may appear useless and unnecessary. But I believe that there are not a few persons —I unblushingly number myself with them—who prefer to talk and think of a spade as a spade without wrapping it up in some disguise of x and y. A formula undoubtedly constitutes a most valuable form of expression—when you understand what it means, but not until then. And I believe a lack of appreciation of the true meaning of reinforced concrete formulæ is responsible for that unfortunate kind of half belief that in the case of this material some special principles of mechanics apply. The most lucid explanation in Gaelic is hardly likely to convince a Londoner, nor will the most beautiful exposition based entirely on symbols be of much value to the man who is of a practical rather than a mathematical turn of mind.

In addition to the compression and tension in beams of any material, there is also the shear to be considered. This can easily be obtained without formulæ, the shear at the supports being equal to the reactions, and the shear at any other point being equal to the amount of the nearest reaction minus any load or loads between such point and this reaction. Reinforced concrete beams have been found to fail by what is termed diagonal tension due to shear. The amount of the diagonal tension at any point may be ascertained by finding the resultant of the vertical and the horizontal shear. These shearing stresses, of course, being equal to one another, the resultant is at an angle of 45° with the direction of either of them, and amounts to the stress multiplied by $\sqrt{2}$.

In practice, to obtain the amount of the diagonal tension to be taken up by the steel, it is necessary to consider only so much of the shearing stress as is in excess of the safe resistance of the concrete to vertical shear.

Allusion has on several occasions been made to allowable safe stresses. These in the case of a few everyday materials are generally accepted as being about in accordance with those given in the following table:—

—	Tension.	Compression.	Shear.
	Per square inch.	Per square inch.	Per square inch. With grain.	Across grain.
	lb.	lb.	lb.	lb.
Timber (deal) ...	800*	800*	40	250
„ (oak) ...	900*	1,000*	100	600
Concrete of the very best quality, mixed in the proportions of 1 Portland cement, 2 sand and 4 of aggregate ...	50 tons.	500* tons.	at least 60 tons.	
Cast iron ...	1½	8	2	
Wrought iron ...	5	4	4	
Steel	7 (7½ tons is often taken).	7	5	

In dealing with this question of beams, semi-beams or cantilevers are intended to be included, and it should be remembered that beams are not only horizontal, but very often vertical. There are particularly several kinds of vertical cantilevers met with in ordinary construction. Among these are walls retaining either earth or water, although sometimes such walls are held both at the top and bottom, and thus become beams. High chimney shafts and high enclosure walls subject to wind pressure are other examples of vertical cantilevers.

The methods of obtaining the overturning or bending moment, in the case of structures subject either to wind or water pressure, are in no way in dispute. In either case it is the external forces acting at the centre of application multiplied by the distance of such centre of application from the base of the wall. In the case of wind pressure, this centre will be at the centre of gravity of the area acted upon by the wind. In the case of water, where the pressure varies from zero at the top to maximum at the bottom, and may be graphically illustrated in the form of the triangle, the centre of pressure is at one-third the height of such triangle.

When, however, earth is dealt with, there are numerous formulæ, none of which appear to meet with absolute acceptance, but Rankine's formula is undoubtedly the most well recognised.

***Essential Formulæ* (4).**

For a bank with a flat top $P = \frac{wh^2}{2} \times \frac{1-\sin\phi}{1+\sin\phi}$

For a bank with a sloping top $P = \frac{wh^2}{2} \times \cos\theta \frac{\cos\theta - \sqrt{\cos^2\theta - \cos^2\phi}}{\cos\theta + \sqrt{\cos^2\theta - \cos^2\phi}}$

when P = the total pressure of earth acting parallel to the surface at a point situated at one-third the height of the wall; w = weight; h = height; φ = angle of repose of earth; θ = angle of slope of top of bank. The same units of force, length and area applying respectively throughout.

It is clear that without some symbolic representation Rankine's method of obtaining the pressure of retained earth would be most difficult both to remember and to apply. The amount of the earth pressure having been obtained, the wall can be worked out as a vertical cantilever. Where the wall has a flat top it is also possible to obtain a satisfactory solution of the problem by means of graphics.

When the resistance of the wall to the pressure is being considered the question arises whether any tension on the joints is to be allowed. In theory, tension is considered undesirable, but in practice a small amount of tension is often allowed. The moment of resistance of the wall having been ascertained just in the same manner as that of an ordinary rectangular beam, if no tension whatever is to be allowed the unit tensile stress found by equating the moment of resistance to the bending moment must be neutralised by, and must consequently never exceed, the unit compressive stress due to the weight of the wall. If it is decided to

* These are stresses in direct compression and tension. The allowable "beam stresses" in both compression and tension are 1,200 lb. in the case of deal, 1,500 lb. in the case of oak, and, in comparison only, 600 lb. in the case of concrete.

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allow tension, the amount by which the intensity of the tensile stress exceeds the intensity of the compressive stress should not be more than the safe tensile resistance of the material forming the joints. Where a graphic solution of the problem is attempted, in this case, as is well known, there will be no tension in the joints if the resultant formed by the composition of the forces due to the pressure and to the weight of the wall does not fall outside the middle third of the base.

High chimney shafts, whose stability can be calculated in an exactly similar manner, with the difference that the overturning moment is more easily ascertained, are almost invariably designed on the basis of there being no tension on the windward side, a policy with which few engineers will disagree, although many may question the necessity of allowing for such high wind pressures as 40 lb. to 50 lb. per square foot on the narrow surface offered to the wind by an ordinary chimney shaft.

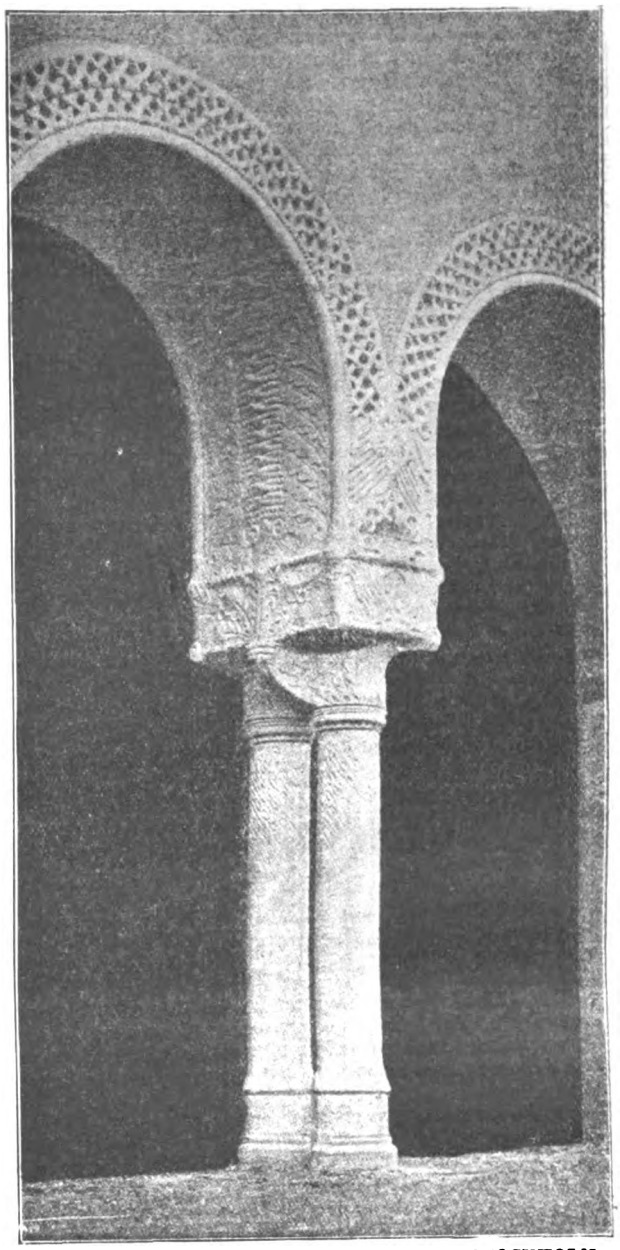
BEAM STANCHIONS.

Cases not infrequently occur in practice where a member acts as a tension or compression member, and also as a beam or cantilever subjected to cross-strain. A steel tie beam of a roof, carrying a ceiling suspended at intervals throughout the "span" of the tie beam, is an instance of tension combined with cross-strain being produced. Stanchions forming part of a retaining wall, and also bearing a load, and principal rafters carrying purlins at points intermediate between the struts, are instances frequent in occurrence in which allowance has to be made both for compression and cross-strain. The logical method of obtaining the maximum stress on such members is to add to the tensile or compressive stress, due either to direct pull or load the additional tensile or compressive stress due to the cross-strain. The total tensile or total compressive stress, as the case may be, is thus obtained. In the case of members subjected in the first instance to direct tension, the total tension may, of course, be allowed to reach the safe tensile stress of the material. Dealing, however, with compression members subject also to cross-strain, the greatest stress which may be allowed is a much more variable quantity. Consider, for instance, the case of a steel stanchion stressed in this manner. Treating the member as a beam only, a stress of at least 7 tons is allowable, but considered as a stanchion, the allowable stress will be based on the ratio of length to least radius of gyration, and in practice will often be about $2\frac{1}{2}$ to 3 tons per square inch. An absolutely safe course would be to design the member so that the safe compressive "stanchion stress" should not be exceeded, but in most cases this would produce heavy and extravagant construction. The case is one for the exercise of some little judgment. Where the stresses due to the direct load are very much greater than those due to the member acting as a beam, it will not be well to exceed the safe stress calculated on the stanchion basis. But where almost the whole of the stresses are due to beam action, a safe stress approximating 7 tons may be allowed.

The above cases of beam stanchions are in effect exactly similar to that of a stanchion bearing an eccentric load. Here, as before, the compressive stresses due to the load, considered as central for the purpose of this part of the calculation, and to the bending tendency occasioned by the actual eccentricity of the load, should be added together, and should not be allowed to exceed the safe stress of the material based upon the ratio of the length of the stanchion to its least radius of gyration.

Probably it may be said that while proposing to treat of "essential formulæ" I have often strayed some little outside the narrow course to which I might appear committed by the choice of such a title. But a paper rigidly confined to the postulation of a half dozen formulæ would be but a barren enterprise, although in the hands of a capable enthusiast in this direction it might offer an excellent opportunity for a display of mathematical gymnastics, to the great edification of the author and the awe of the average audience. I have rather attempted to deal with the subject from a practical standpoint, giving formulæ where such are necessary, but not otherwise, and also including a reference to the safe stresses on a few common building materials, in order that my paper may not merely constitute a tilt against the serried ranks of redundant formulæ, but may also contain some information of general value.

Mr. J. S. Gibson has taken into partnership Mr. F. P. Skipwith and Mr. W. S. A. Gordon, and their business will be carried on under the name of Messrs. J. S. Gibson, Skipwith & Gordon, architects, 5 Old Bond Street, W.



DETAIL IN THE EXHIBITION BUILDING, STOCKHOLM.
FERDINAND BOBERG, Architect.
(From *Byggnadstidnungen.*)

OUR CONTEMPORARIES FROM OVER-SEAS.

THE *Berliner Architekturwelt* is chiefly occupied with illustrations of the new club-house of the Berliner Lehrervereins, which occupies a site extending from the Alexanderstrasse to the Kurzestrasse. This building is an out-and-out specimen of "new art" design, in which dignity of line is overborne by fussiness of detail. Being "new art," one must not censure the character of the detail, but there is a great deal too much of it.

La Construction Moderne gives three large scale photographs of detail from the ill-fated cathedral at Messina, the examples being the great portal and a window of late fifteenth-century date.

Byggnadstidnungen has some interesting illustrations of details of the buildings in which is to be held this year at Stockholm an exhibition of Swedish industrial arts and crafts, a specimen of which we reproduce. We also give from the same source an illustration of a new church at Arvika. These two examples show how modern Swedish architects are producing excellent artistic work based on their old national art, but without slavish copyism.

The American Architect illustrates the fifteenth annual exhibition of the T-Square Club of Philadelphia, which gives us an opportunity of seeing the sort of work which is there being done in domestic architecture. Some of Messrs. Bliss & Faville's contributions to the new San Francisco are illustrated—namely, the Hôtel St. Francis and the Columbia Theatre.

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The Engineering Record (New York) contains a quite useful *résumé* of the various methods of employing stirrups in reinforced concrete beams, with criticism of the advantages of different types. A remarkable piece of underpinning of a building eight storeys high in Broadway, New York, is described and illustrated. As the building underpinned has concrete foundations carried down to 25 feet below the street level and supported on piling, the underpinning was somewhat difficult, to protect it from injury by its new neighbour, a twenty-two storey steel-frame building, whose foundations are to be carried down 50 feet or more to the gneiss rock. The problem was not rendered easier by the fact that the soil under these buildings is fine quicksand.

LAW REPORTS.

AT the West London Police Court, before Mr. Garrett, magistrate, on April 28, the case of S. F. Clarkson *v.* Larter (Sections 70 (1) (*c*) and 145 of London Building Act, 1894) was heard.

The defendant had put up, without notice to the district surveyor, a partition dividing a large room on the second floor at No. 14 Norland Square.

Mr. Pierron, who appeared for the district surveyor, argued *inter alia* that as Section 70 (1) (*c*) of the London Building Act might be contravened the district surveyor ought to have received notice, and that the case was frequently occurring.

Mr. G. F. Darker, who defended, stated that there was actually no contravention of the Act, and that accordingly there was nothing for the district surveyor to supervise.

The magistrate decided that notice should have been given to the district surveyor under Section 145 of the London Building Act, 1894, and fined the defendant 1*l.* with costs.

Correspondence

[The Editor will not be responsible for the opinions expressed by Correspondents.]

St. James's Park Proposed Alteration.

SIR,—Now that we have a plan of this scheme, accompanied with Mr. Speaight's own observations upon it, which are published in the current number of the R.I.B.A. *Journal*, a few observations by way of criticism may not be uncalled for.

St. James's Park, as it at present exists, together with the Horse Guards Parade, are expressive of a Royal demesne with pleasure grounds, an open space once devoted to tilting and other sports, and the quarters for the Royal bodyguard, all as adjuncts of St. James's Palace itself, the whole layout and disposition of the parts being just what it always has been in the past. How inappropriate, then, must Mr. Speaight's scheme of revolution appear which entirely disregards these circumstances! And how incongruous must be the result of imposing rigid symmetry where there is next to nothing to suggest it. Had Buckingham Palace been placed axially with the Horse Guards, then there might have been some meaning in a symmetrical treatment; but such is not the case, and the consequence of designing a scheme on uncompromising lines, however ingenious in itself, is here quite out of place, amounting as it does to a denial of all historical and architectural meaning. St. James's Park has many beauties of a natural order, and little, if anything, can be done in this instance by architectural treatment by way of improvement.—Yours, &c.,

R. W. COLLIER.

Designing a Steel Box Girder.

SIR,—In the last issue of your weekly, I notice there is an article by Mr. Henry Adams on the designing of a steel box girder, the theory of which is most lucidly explained. However, the type of beam he has been theorising upon is one which, so far as I know, is impossible of execution; the point I refer to is, how can the four angle irons in the box of the girder be rivetted both to webs and flanges? It would be possible to rivet two of the angles on a vertical axis to both flange and web, and the remaining two either to web or flange; this would leave a girder unsymmetrical, and of unequal strength at any section.

It seems strange that this point should not have been noticed by any of the engineers to whom the lecture was delivered.—Yours faithfully,

J. MYRTLE SMITH, A.R.I.B.A.

Conference on Taxation of Land Values.

SIR,—The Land Tax proposals contained in the Budget will, if adopted, most seriously affect a class of property-owners who already bear more than their fair share of imperial and local burdens. It is therefore incumbent upon all who are interested in land to make their opinions known without delay, and I beg you to allow me to inform your readers that the British Constitution Association has decided to convene a conference of representatives of organisations connected with land to consider the Land Tax proposals of the Budget.

The Conference will be held at the Whitehall Rooms on Friday, May 14, under the presidency of Lord Balfour of Burleigh. Professional, trade, or other organisations connected with land may obtain full particulars on application to the Honorary Secretary, 23 Charing Cross.—I am, &c.,

MARK H. JUDGE.
Chairman of Committee.

British Constitution Association: May 5, 1909.

GENERAL.

Two Hundred and Fifty-five Masons and Workmen are engaged on the new Liverpool Cathedral, the building of which is proceeding without any delay. A height of 65 feet, it was reported to the building committee on Monday, has been reached with the lady chapel, and an average height of 33 feet on the choir. A large portion of the roof in the lady chapel has been completed. The committee also considered and approved the designs for different items of furniture, including the organ for the lady chapel, which will be the first part of the new cathedral to be completed.

Among the Wills proved last week are:—Mr. Edward Augustus Lyle Ould, F.R.I.B.A., of Richmond House, Chester, of the firm of Messrs. Grayson & Ould, architects, of James Street, Liverpool, 24,038*l.* gross, the net being 23,733*l.* Mr. Alfred Henry Paget, F.R.I.B.A., of 1 West Walk, Leicester, architect, who died March 14 last, aged sixty-one years, left estate of the gross value of 19,873*l.* 2*s.* 9*d.*

The Sum Required to secure Lord Leighton's picture "The Death of Brunelleschi" for the permanent collection preserved in Leighton House for the public is 250*l.* Donations amounting to 208*l.* have already been given. A special effort is to be made to complete the purchase this month.

The Bristol Society of Architects held their annual general meeting last week at the Fine Arts Academy. The election of Council and officers for the ensuing year included the following appointments:—President, Mr. Mowbray Green, F.R.I.B.A. (Bath); vice-presidents, Mr. H. Dare Bryan, F.R.I.B.A., and Mr. G. H. Oatley: members of Council, Messrs. G. C. Awdry, F.R.I.B.A., W. L. Bernard, F.R.I.B.A., R. C. James, F.R.I.B.A., W. S. Skinner, F.R.I.B.A., F. W. Wills, F.R.I.B.A., and J. Foster Wood, A.R.I.B.A.; associate members of Council, Messrs. C. F. Dening and G. C. Lawrence, A.R.I.B.A.; honorary secretary and treasurer, Mr. T. H. Weston, F.R.I.B.A.

The Lord Provost's Committee of Edinburgh Town Council recommend the provision of workshops for craft classes at the Edinburgh College of Art on ground available to the west of the existing building. The estimated cost is 3,000*l.*

In Connection with the Royal Commission on Ancient Monuments in Scotland, Dundee finance committee has remitted to the town clerk to call in, if so advised, expert opinion, and to make the necessary report.

The Sheffield Society of Architects and Surveyors held their annual general meeting in the general lecture-room at the University last week, the president, Mr. W. C. Fenton, in the chair. The accounts and annual report of the Council were received and adopted. The ballot for officers resulted as follows:—President, Mr. W. J. Hale; vice-president, Mr. J. B. Mitchell Withers; treasurer, Mr. F. Fowler; hon. secretary, Mr. J. R. Wigfull; Council, Messrs. H. Coverdale, C. B. Flockton, H. L. Paterson, A. E. Turnell, A. F. Watson, E. Winder, W. G. Buck, C. F. Innocent, and H. I. Potter. The past-presidents are also members of the Council.

Mr. Mark H. Judge and Mr. Max Judge, in consequence of the death of their partner, Mr. Leonard Judge, have taken into partnership Mr. Guy Wilfrid Hayler, and the firm will be conducted under the title of Mark H. Judge, Son & Hayler, architects, sanitary surveyors and engineers.

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THE WEEK.

THE report given by us on another page of the discussion by the Berks County Council of the objection by the Council of the Royal Institute to the terms of the competition for new county offices at Reading, is typical of the difficulties with which the Institute has to contend, and of the reception that is accorded to its protests against the unsatisfactory conditions that are still, all too frequently, found in the particulars issued by promoters. It is clear that strict loyalty by members to the decisions of the Council and competitions committee of the Institute will alone furnish a sufficiently big stick to prove an argument that will be respected by promoters of competitions. On the other hand, the Council cannot expect that loyalty without greater promptness in dealing with competitions than they have hitherto frequently shown.

WE understand that the circular-letter from some members of the present Council of the Royal Institute sent out with the voting papers was not only unauthorised by the Council as a body, but was inserted without the knowledge of some other members of the Council. Surely this is a very strange proceeding. We do not know whether the signatories of the circular are paying for the printing. If not, the auditors ought to surcharge them with the cost, as it is clearly contrary to the by-laws that any section of the Council, however high their position, can expend the moneys of the Institute without the authority of the Council. If the signatories are paying for the cost of the circular, what right have a few members of the Council to use the staff of the Institute and to take advantage of the expenditure of the Institute to send out their private communications?

THE thousands of architects who are in favour of registration should take note that the signatories of the circular do not intend that a Bill should be promoted in Parliament till all architects have joined the Institute. Presumably this is the policy of other members of the present Council who are opposed to registration—the signatories of the circular appear to imply that they speak for others as well as themselves—and it therefore behoves all members of the Institute who are in favour of registration to elect to the Council those candidates who are pledged to support registration.

WE understand that the following candidates for membership of the Council of the Royal Institute are prepared to support registration:—As *Vice-Presidents*: A. W. S. CROSS, J. S. GIBSON, S. P. PICK; as *Fellows*: A. W. BREWILL, MAX CLARKE, F. R. FARROW, W. A. FORSYTH, ALEXANDER GRAHAM, G. HUBBARD, A. R. JEMMETT, H. V. LANCHESTER, R. F. MACDONALD, C. E. MALLOWS, P. OGDEN, C. H. B. QUENNELL, H. R. RICARDO, E. R. ROBSON, L. SOLOMON, P. B. TUBBS, W. G. WILSON, E. WIMPERIS; as *Associates*: K. GAMMELL, A. E. MUNBY, H. W. WILLS, A. N. WILSON.

ALTHOUGH the Government has expressed its readiness to provide 10,000*l.* towards the sum required to purchase for the nation HOLBEIN'S "Duchess of Milan," we must say that we sympathise with those of our modern painters who feel that far too much importance is attached to the value of "old masters," and that the inflated prices engineered by the dealers are rather due to the rarity than to the excellence of the paintings that fetch such enormous sums. Why should the nation give the present holders of this particular picture 10,000*l.*? For that is what the whole transaction amounts to. There are millionaires in America who would cheerfully give half a million dollars for a picture if they could be persuaded that such is the market value, but who otherwise would not give five hundred for the same work, no matter if it were the finest production of HOLBEIN, TITIAN, or any other "old master." It is the obvious policy of the dealers to work up fictitious values for antiques of every kind—pictures or anything else—and they know very well that, no matter what prices they give at auction in London or Paris, they can find a Chicago pork-butcher or a "King" of some market or other to take up their bargains with a goodly added margin of profit. Sir CHARLES HOLROYD'S valuation of the picture in question is the key of the whole matter. He says "the work was an unique specimen of HOLBEIN'S noble art." Precisely; its market price is the result of its being "unique," not of its "noble art." If there were a couple of hundred more of HOLBEIN'S paintings equally good the whole lot might be bought for a tenth of the price asked for the "Duchess of Milan." There is another point of view. The 10,000*l.* offered by the Government and the 62,000*l.* to be added to it by the British public could be far more advantageously expended in the cause of British Art than by the purchase of a single picture, even though it be "unique."

MR. EDWIN T. HALL, V.P.R.I.B.A., has done good service by promptly pointing out how the Budget proposals of the present year will cripple the great educational institution of Dulwich College, of which he is chairman of the Estates Governors. The charity, it appears, possesses 480 acres of uncovered land, the net income from which is 1,900*l.* Under the Budget Bill this would be charged with a land tax of 1,000*l.*, and this charge would reduce the net income of the whole estate available for education by 7 per cent. Educational and other charities throughout the country would in many instances be, like Dulwich College, sufferers from the proposed taxation of ground values.

THOSE English competitors who have taken part in the competition for buildings in Italy suitable for resisting seismic movements will be interested to learn that the jury has been appointed and has elected as its president Professor ANGELO BATTELLI, of Pisa; vice-presidents, Professor GUIDO GUIDI, of Turin, and engineer LUIGI MAZZOCCHI, of Milan; secretary, engineer C. PINCIROLI, of Milan; vice-secretary, engineer C. CHIODI, of Milan. The jury is to be divided into sub-committees, who will report to a full meeting of the members.

THE Cornwall County Council are making themselves ridiculous. They purchased a site in Truro for new county offices, promoted a competition amongst architects for designs for the new buildings in which fifty-nine sets of plans were submitted, and Messrs. SILCOCK & REAY'S design was accepted, and now there is an opposition on the part of some members of the Council, who do not want the county offices in Truro at all. There is no question that new offices are absolutely necessary, and the matter has been under consideration by the County Council since November 1907. Now the Council has decided to defer the question for three months, when the opposition will propose that the county offices be at St. Austell and not at Truro. The competition for the new offices was not very inviting, as it was clear that the Council did not know how much they would have to spend to obtain the accommodation for which they asked, and there was very little prospect that the scheme for which architects were to prepare designs would be carried out in its entirety. It is very hard that the successful competitors should be placed in such an unhappy position, and we think that the Institute has still one more reform to press forward in open competitions—that they are *bonâ fide*. It is time public bodies learnt that architects do not compete for the premiums, but for the work.

IT would scarcely seem that the case of HANRAHAN *v.* Leigh-on-Sea Urban District Council was of sufficient importance for an unsuccessful appeal to the Divisional Court from the decision of the judge of the Southend County Court to be carried to the Court of Appeal. The result of this further appeal is that the Lord Chief Justice, Lord Justice FLETCHER MOULTON, and Lord Justice FARWELL have decided that the Urban District Council were justified in pulling down an old third-class railway carriage which had been converted into a residence, and hence had become a "new building," and as such did not comply with the local by-laws. Hence one cannot turn old railway carriages into bungalows in districts where the ordinary type of building by-laws operates.

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AT ROTHENBURG ON THE TAUBER, BAVARIA.

THE NEW CHARTER AND BY-LAWS OF THE ROYAL INSTITUTE.

THE new Charter, or more properly the Supplemental Charter, 1909, of the Royal Institute has now been printed and issued to the members, together with the proposed revision of the by-laws. The most important provisions of the Supplemental Charter are, first, the creation of a new class of Licentiates; second, the enactment that no person shall "be admitted a Fellow of the Royal Institute unless he shall at the time of admission be either (*a*) an Associate of the Royal Institute or a person who has passed an examination qualifying for admission to the class of Associates, or (*b*) a Licentiate who has passed such examination or examinations as may from time to time be prescribed by the Council as a qualification for the admission of Licentiates to the class of Fellows." So far good; but the Charter goes on:—"Provided, however, that the Council shall have power to elect and admit as a Fellow any architect who shall have attained the age of thirty years, and shall have been engaged as a principal for at least seven successive years in the practice of architecture, as to whom the Council may resolve that it is desirable to elect and admit him as a Fellow." The third provision of some importance is that a certificate of membership "shall be termed a diploma," and the fourth that the Royal Institute may propound a "scheme or curriculum for education in architecture," and in and after the year 1913 no person shall be "entitled to admission to the final examination for Associateship of the Royal Institute unless he shall have passed through a course of study under or in accordance with such scheme or curriculum," as well as have passed examinations.

The words in which provision is made for the creation of the new class of Licentiates are important. The Supplemental Charter says:—"The Council of the Royal Institute shall elect Licentiates of the Royal Institute in manner to be provided by by-laws. Licentiates shall be architects who have attained the age of thirty years, and either (*a*) have been engaged as principals for at least five successive years in the practice of architecture, or (*b*) have been engaged for at least ten successive years in the practice or study of architecture." Licentiates, except by special resolution of the Royal Institute, can only be elected within twelve months after the coming into force of the new by-laws. They are not to be members of the Institute, but may attend and take part in the discussions at meetings of the Institute.

It will be noted that under the terms of the Supplemental Charter Licentiates "shall" and Fellows may be elected by the Council alone. The proposed by-laws enact that the names of all candidates shall be "suspended in the meeting-room and published in the Journal of the Royal Institute," and any objections are to be sent to the Council and considered and determined by them. A further new by-law provides that the election of Fellows by the Council must be unanimous, and that of Licentiates by "an affirmative vote of two-thirds of those present and voting, and in any case of not less than twelve." It is admittedly desirable that there should be some way of admitting to Fellowship of the Institute an architect of high standing, who is at present without the pale, and who could not be expected to submit himself to examination, say, for example, Mr. T. G. Jackson, R.A.; but the power given to the Council might easily be abused, and in view of what has occurred in the past, we may forgive those younger members of the Institute who fear that such abuse is not only possible, but probable. The provision, however, that the decision of the Council in the case of Fellows must be unanimous should allay this fear. It ought to be easy to secure the election on the Council of a number of members who would not hesitate to maintain the principle that the election of Fellows by that body should be the exception, and a very rare exception.

As the avowed object of the creation of a class of Licentiates is to include within the fold of the Royal Institute every person who has the smallest real claim to be considered an architect, there can be little objection to the election of Licentiates by the Council, save that the members of the Council may be disposed to be too lenient and admit those against whom nothing has been said rather than those for whom valid claims have been substantiated. The law of libel and slander in this country is so severe that a member of the Institute might well hesitate before making any statement to the Council, although he might be well acquainted with most damaging facts in the history of a candidate for the class of Licentiates. The Council may, and probably will, say that any such statement is privileged, but there is nothing in the by-laws or in the Charter to this effect, or in any way protecting an informant from the possibility of a libel action.

Professional conduct, ethics, or etiquette, is a subject with which the by-laws deal in an amended fashion. The present By-law 22 becomes now By-law 24, and members and Licentiates are liable to "reprimand" as well as suspension or expulsion. These may now be incurred not only by conduct derogatory to professional character or by engagement in occupations inconsistent with the profession of an architect, but by anyone "who shall refuse or neglect to be bound by a published resolution of the Council." The resolutions of the Council in the matter of professional conduct at present published are, in our opinion, simply puerile, and if the Council can do no better in the future than it has done in the past in this direction, this amendment of the existing by-law should be negatived by the members. At present it is bad form for a member of the Institute to put his name up on a building in course of erection, but all right for him to do so when the building is finished. He must not style himself other than "architect" or "architect and surveyor," and should this by-law be passed as it stands, may be reprimanded, suspended, or expelled if he signs his drawings with R.A. or F.R.I.B.A. after his name.

On the point of professional conduct there are some important additions proposed to the forms of declaration. A Fellow, an Associate, or a Licentiate must sign, "I promise that I will not have any interest in any contract or in any materials supplied to any work on which I may be engaged. I further promise that I will not take part in any competition the conditions of which have been disapproved by the Council."

The first of these promises revives a principle that was maintained by the Institute under the original Charter, but

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abandoned under the present by-laws. Apart from all other considerations, this vacillation is unworthy of the dignity of the Royal Institute, and must result in the loss of that respect which should be accorded to the premier and presumably representative body of the architectural profession. As regards the proposal itself, there is a good deal to be said both for and against. On abstract principles it is not desirable that an architect should be pecuniarily interested in the supply of material or work for a building with the superintendence of which he is charged. On the other hand, the adoption, again, of the restriction, once abandoned and now proposed to be revived, will no doubt have the same effect as before, and eminent architects will remain outside the Institute by reason of the restriction. Of course, if it be adopted, no member or Licentiate of the Institute can hold shares in any limited company supplying materials of which he has a sufficiently high opinion to include them in his specifications. He must otherwise make his clients take an inferior article because he would have an interest in the superior. Again, it is not an unknown thing for an architect to pick up advantageously old artistic work, panelling, carving and so on. He could not under the proposed by-law sell this to a client who might be eager to purchase. An architect under this restriction could not financially assist a young and talented craftsman by providing him with capital unless he abstained from employing him and gave work to his competitors.

The promise about barred competitions is sound in principle, but if it is to be adopted the Council must treat members more fairly than they do now, and not delay their decision as they have frequently done until half the time allowed for the preparation of drawings has elapsed, or as in the case of the Concert Hall, Eastleigh, until after the drawings were sent in.

An important new by-law is No. 44, which abolishes the present Board of Examiners and transfers its powers to a Board of Education, destroying the independence of the examiners and making them subservient to the Board of Education. The proceedings of the Board of Architectural Education up to the present have not been such as to inspire us with confidence, and their modifications of the curriculum of the examinations are merely high-flown persiflage of which no one seems to know the meaning. The Board of Examiners have at least been definite and comprehensible in their requirements, even if these may be open to criticism by those who, lacking a sense of proportion, attach undue importance to some one aspect of the many-sided problem of architectural education. Not only the Board of Examiners, but the Statutory Board of Examiners is to be abolished, and presumably the candidates for district surveyorships are to be examined under the regulations of the priests of the high-art cult. The amusing part of the *volte face* is that examinations are to be conducted by those who say that one cannot examine in art; hence, if consistency is to be maintained, candidates for membership of the Institute may in the future be utterly ignorant of art.

We are assuming that the constitution of the future "Board of Education" will be substantially that of the present "Board of Architectural Education," and that the new Board will not be the present "Board of Examiners" under a new name.

COMPETITION FOR EXTENSION OF GRIMSBY TOWN HALL.

THE Town Council has now appointed as assessor Sir W. A. GELDER, F.R.I.B.A. The building may extend further on the site than is shown in the sketch-plans, but competitors are advised by the Town Council to take the opposite course and reduce the area built over as far as possible in view of the limit of cost. A design for an entirely new town hall will not be considered.

Members of the Royal Institute of British Architects are requested to communicate with the Secretary before taking part in the above competition.

COMPETITION FOR NEW COUNTY OFFICES AT READING, BERKS.

THE question of the objections of the Council of the Royal Institute to this competition was discussed at the Berkshire County Council on Saturday. The special committee which had been dealing with the proposed new county offices to be erected at Reading reported that a difficulty had arisen with regard to the appointment of Mr. Mervyn Macartney as assessor in connection with the competition. In the conditions of the competition Mr. Macartney was required to report to the Council on the designs submitted and place them in their order of merit, but the Council reserved to itself full liberty to select the design considered best suited to its requirements. The Royal Institute of British Architects, under their rules, insist that the author of the design placed first by the assessor shall be employed to carry out the work, and accordingly they called upon Mr. Macartney to resign his position as assessor, and also forbade members of the Institute to compete unless this stipulation was carried out. The buildings committee now reported that they had reason to believe that the Institute would not object to the County Council having the right to select one of the first three plans placed in order by the assessor, and they recommended that the conditions of the competition be altered accordingly to meet the views of the Royal Institute of British Architects, provided that the County Council was at liberty to select any of the plans placed first, second or third by the assessor, the award or premiums to be left to him.

Sir Robert Mowbray, in moving the adoption of the report, said he was not certain whether the recommendation would meet the views of the Royal Institute, but the committee hoped so. He thought it would be advisable for the Council to authorise the committee as to the line of action they should take if the Institute did not agree.

Mr. Walton inquired as to how the Council would stand if the Royal Institute, as he was afraid would be the case, said their laws were as the laws of the Medes and Persians? He thought it would be as well to suggest an alternative.

Mr. Keyser hoped the Council would not give up its independence in this matter, and that they would have the power of accepting the design which they thought best.

Mr. Wroughton said he did not like the idea of being dictated to by this Institute of Architects, royal or otherwise. They did not contribute to the cost in any way; the Council alone paid the piper, and should have the right to select which plan they thought best. He thought they should throw it open to the profession regardless of the Royal Institute, as it would be a capital opportunity for a young rising architect to send in plans. Personally, said the speaker, he would rather go to France, or even Germany, than be dictated to by this trades union.

Mr. Ferard said he did not think the Council need bother themselves, for there was every reason that the Institute would meet them in the way suggested. They had done so in Manchester and other places.

Mr. Benyon (Lord-Lieutenant of the county) proposed, in the event of the Royal Institute not agreeing with the suggestion, that three or four architects should be asked to submit plans.

Mr. Russell seconded, but hoped that the alternative would not be needed.

Mr. Walton said that they could have an open competition. The majority of architects were members of the Royal Institute, but there were many eminent ones who were not.

Mr. Long suggested that the matter should be left entirely in the hands of the committee supposing the Institute would not agree to their recommendation.

After some further discussion, the committee's report was adopted with the addition proposed by Mr. Long.

The Burslem Town Council have adopted a report of the general purposes committee on the question of utilising the land in Wedgwood Place for public purposes. They recommended that it was desirable and necessary for the purpose of preserving the identity and interests of the town of Burslem that the land should be used for public buildings to be erected at a cost not exceeding 25,000*l*. A sub-committee is to be formed with power to instruct the architect, and obtain plans, estimates and tenders. Before any tender is accepted the committee will report to the Council on the whole question. It is suggested that there should be a hall to accommodate 2,500 people, stipendiary court, children's court, small assembly room, &c.

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STEELWORK.—X.

By C. V. Childs, A.M.I.C.E.

In London the designer is met with the difficulty of ascertaining whether his design may have to pass the scrutiny of the municipal authorities. In a building within the meaning of the Act the approval of the steelwork plans is left entirely to the discretion of the district surveyor; in the case of a "special" building, however, the Council demands that the plans, details and the calculations should be submitted to their engineer before their consent be given. There may be occasions where this may be demanded in the case of ordinary buildings, for which application has to be made for permission to depart from some of the regulations.

The two separate, though closely allied, authorities appear to have very different ideas as regards what the strength of the steelwork should be. The Council's engineers are inclined to be over-exacting, and the district surveyors just the reverse in many instances. This is apt to produce an anomalous condition of things in regard to the steelwork for, it may be, different parts of the same building. Of the two the "special" building is more often of less importance than the one governed by the Act. It may often happen that the steelwork has been designed for the main portion of an important building and appears to pass the regulations without a murmur of approval or otherwise. Then an addition, possibly only an open shed over a yard, or something equally unimportant, may be required which comes under the "special" building clause. For this not only the design, but also the details, and perhaps the calculations as well, have to be submitted to the Council's engineers; this design must conform with their requirements, which may exceed by 100 per cent. the basis on which the steelwork for the main and most important part of the building has been calculated.

One hundred per cent. may sound an exaggeration, but in competition steelwork contractors may work to as low a margin as over ten tons per square inch stress for the steel (inaccurately termed a factor of safety of three), and the remaining percentage may easily be accounted for in the reduced amount at which the floor loads have been assumed. Many an architect could bear out the statement that they have had considerable trouble to conform with the Council's structural regulations for buildings such as theatres, &c., but when it came to the question of the steelwork, on which the whole safety of the building depended, no notice whatever has been taken of it except to pass it over to the jurisdiction of the district surveyor. From the draft of the proposed new Building Act the same procedure is to be adopted in the case of the skeleton steel framework.

The district surveyors can hardly be expected to keep a staff of engineers for the purpose of checking steelwork plans; they probably consider that their duties are sufficiently exacting without this work, which has practically become an extra since the Building Act was framed, being also imposed upon them. With all due respect to the Council's engineers, they surely must be aware that the steelwork for all but a very few buildings would fall far short of the standard they require in the case of the "special" buildings. A sample case may be mentioned of how it has been possible within the last three or four years to construct the floors of a building which from its design and position could never have been intended for anything but a warehouse, to which purpose indeed it was put, and that too for a very heavy class of goods. Luckily for the building there were weaker features than even the cross joists, but these will suffice to point the example. The safe load on the cross joists, calculated according to the Council's requirements of seven tons stress per square inch, would have been two-thirds of a hundredweight per square foot. Allowing only three-eighths of a hundredweight for the dead weight of the floor, the difference leaves 33 lb., or but little over a quarter of a hundredweight, as the safe amount of load to be superimposed. Under the proposed new Act it is stated that the superimposed load for a building of the warehouse class should not be less than two hundredweights per square foot; this is almost seven times greater than that in the case mentioned above. This example is enough to show that under the present system it is still possible to erect dangerous structures, and though the district surveyors are the governing authorities in respect to the steelwork, yet their powers of preventing such a state of affairs appear to be limited. Surely a *via media* might be found between the restrictions imposed on a "special" building and the latitude allowed in the case of the more important buildings. To begin with there should be some authority to which the designer could appeal to settle what the amount of the superimposed loads should be for buildings to be used for special purposes; apparently, from the writer's experience, no assistance can be expected in this respect from the district surveyors. The designer would willingly work in conjunction with the authorities if the means were provided to enable him to do so; at present these two are antagonistic to one another, mainly on account of the severity of the restrictions imposed by the Council's engineers when the steelwork comes under their jurisdiction. Surely the way might be made easier and the authorities and the designer brought more into harmony with one another. If it is possible to-day for the steel contractor to design his work at a stress of ten tons per square inch, the authorities might see their way to reduce their minimum of seven tons stress; so, too, as regards the stanchions the safe allowable stress in the proposed new Act is apparently based on what has been called the R.I.B.A. formula, only in a more exacting form. For a stanchion whose length is ninety times its radius of gyration the proposed allowable stress is three and a half tons per square inch. For twenty years the Carnegie Steel Company have worked to a formula that allows five and one-third tons stress for a similar stanchion; according to Messrs. Dorman, Long & Co.'s handbook the safe stress would be 4.6 tons per square inch. The formula adopted by the Council's engineers is probably the most severe of any that has been applied to stanchions for building work. The writer, with all due deference, would suggest that a minimum rather than a maximum standard should be adopted by the authorities and made applicable to steelwork for all buildings, whether within or outside the meaning of the Act; at present it might be inferred that the authorities, by placing the steelwork under the jurisdiction of the district surveyors, are loth to enforce what they consider is requisite when their engineers are the arbiters.

If their requirements were universally enforced it would certainly cause considerable commotion among steelwork contractors; but by imposing reasonable restrictions as to the strength of steelwork for all buildings the contractors would know that in cutting down the steelwork below the required standard they were doing so at their own risk, and they would be liable not only to having their material rejected, but also for damages on account of delay in flagrant cases. If such regulations were framed and carried out in a true spirit of equity the authorities might call upon the architect or the designer to furnish a certificate that the steelwork was designed to conform with certain assumed floor loads and also with the regulation allowable stresses. This would at least put the onus for the safety of the building on to the shoulders of some responsible person, and should be a safeguard against reducing the limit of safety to a vanishing point, even though it could not entirely eliminate so-called errors of judgment.

The specification should be brief and to the point; the longer it is the less attention it will probably receive. A great deal depends on whether the work is to be properly inspected by a firm of inspection engineers. This matter will be referred to later.

It is useless including in the specification clauses that it is impossible to see carried out, and yet the writer invariably does so in one instance, where no inspection is to be made at the rolling mills, in the hope that some day the practice may become universal. This clause reads:—"The contractor is required to produce guaranteed particulars of the tests made at the rolling mills on the melts from which the material used in this contract is rolled; the melt number to be stamped on all material before leaving the mills."

The contractor orders the material from the mills according to his own specification. It is usual for the mills to supply him with particulars of the tests made on specimens of each melt or heat from which his material is rolled; the melt being each separate charge of the furnaces, which when converted into steel is poured into the ingot-moulds, thence passes through the blooming mill and, after being cut to lengths, is rolled to its approximate shape on the breaking-down mills, finally appearing as the finished section after passing through the finishing rolls. The melt number should be stamped on all mill lengths; this serves as an identification mark for all material leaving the mills, so that it can be traced back to its particular melt, the tests on which can be inspected. This, in the writer's opinion, is a better guarantee of good material than that of specifying that certain samples should be provided by the contractor and sent to a testing laboratory, which is a more or less haphazard method for ascertaining the quality of the steel.

If such tests are unsatisfactory, the difficulty then is to determine what is the amount of the material affected by these tests. The test specimens may have been cut from one melt, but the majority of the material may have been rolled

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from entirely different ones, and there is no means of tracing back the material to its own particular melt.

For a rough-and-ready method of determining the quality of the steel the bending test is in general sufficient for the purpose; it is easy to apply, and can be done at the works without having to send the test pieces to a laboratory if no testing machine is at hand. If the test specimens will stand being bent cold around a rod whose diameter is the same as the thickness of the test piece without showing any appearance of fracture, then the material may be considered of sufficiently good quality for the structural steelwork for buildings. This is a sure test for the ductility of the steel, which after all is its most important factor for girders or beams. Any overloading on such a beam would make itself apparent not by its collapse, but by its excessive deflection, and would automatically notify the state of affairs to any casual observer.

An occasional visit to the shops and the tapping of the rivet heads can hardly be called inspection, and yet it is about all that a consulting engineer is able to do in this respect; such inspection might just as well be deferred until the material is delivered at the site. In America consulting and inspecting work are two distinct and separate branches of the engineering profession. In that country the inspection of the steelwork for any important building is placed in the hands of a firm of inspecting engineers, who have their regular staff of inspectors located at the various mills and within easy reach of the shops. Proper inspection must be thorough. It begins at the rolling mills by making physical tests on the steel from which the various shapes are rolled, which, if passed, are stamped by the inspector before leaving the rolling mills. Inspection at the shops calls for the continual and not the sporadic attention of the inspector. He watches it pass through the various processes of punching, drilling, assembling, rivetting, &c.; he checks the lengths, the open holes and the connections by his copy of the working drawings, and finally checks the weight of each delivery as it leaves the shops. Another important function he performs is to so regulate the timing of the delivery of the material, first from the rolling mills to the shops, and then from the shops to the site, that the material arrives as it is wanted and in its proper sequence. From this it is evident that only a firm with a specially organised staff of inspectors is able to give this work the attention it requires if this work is to be performed in a proper and thorough manner, and unless so done it can hardly be designated inspection.

THE ARCHITECTURAL ASSOCIATION ANNUAL DINNER.

THE annual dinner of the Association was held on Wednesday, May 12, in the Gaiety Restaurant (Georgian Hall). The chairman was Mr. Walter Cave (President). Among those sitting at the head table were Mr. Ernest George, P.R.I.B.A., Sir W. B. Richmond, R.A., W. Howard Seth-Smith, Past President A.A.; E. A. Abbey, R.A., T. G. Jackson, R.A., E. Guy Dawber, Past President A.A.; Solomon J. Solomon, R.A., H. Greville Montgomery, M.P., Sir A. Brumwell Thomas, Vice-President A.A.; A. D. W. Pollock, Master Plumbers' Company; Professor R. Blomfield, A.R.A., G. E. Bond, J.P., President Society of Architects; John Murray, H. C. Cole, President Surveyors' Institution (Junior Meetings); J. A. Marshall, A. Fincham, President Clerk of Works Association; H. T. Buckland, and at the other tables were H. P. G. Maule, Professor E. C. Alston, R. Frank Atkinson, Gerald C. Horsley, W. Curtis Green, Theodore Fyfe, Louis Ambler, William Wallace, F. R. Farrow, G. Gilbert Scott, Maurice E. Webb (Hon. Secretary A.A.), R. Dircks, Neville Cooper, C. W. Bowles, B. de Q. Quincey, Stanley Towse, H. G. Tayler, A. W. Bartlett, A. H. Ryan-Tenison, Ian MacAlister (Secretary R.I.B.A.), F. Winton Newman, A. E. Bullock, W. G. B. Lewis, G. H. Jenkins, Stanley Hamp, Leslie Lambert, Harrison Hill, A. Needham Wilson, Louis Jacob, T. L. Dale, W. Paul, Albert Fox, Ernest Mills, D. G. Driver (Secretary A.A.), C. Luff, Harold Green, T. Frank Green, C. R. Davy, E. Gunn, C. H. Freeman, C. W. Ferrier, H. B. Elkington, G. Leonard Elkington, G. Northover, Professor G. Moira, C. E. Hutchinson, F. R. Betenson, Guy M. Nicholson, G. B. Carvill, S. M. Spoor, M. W. Zambra, C. Wontner Smith (Hon. Sec. A.A.), D. Warry, Chas. Tanner, E. Harding Payne, W. Dewes, A. J. Perrin, Percy May, R. P. Oglesby, Ellis Marsland, F. J. Osborne Smith, Philip E. Webb, A. F. Spencer, G. D. Gordon Hake, F. Yerbury, F. J. Worrow, Walter Lawrance, T. Raffles Davison, W. H. Jamieson, H. Saffery, Herbert Batsford, L. M. Gotch, G. E. Mills, H. C. Willies, F. A. Davis, J. Williams, Arthur Keen, Henry Tanner (Vice-President A.A.).

After Mr. WALTER CAVE, President, had given "The King and the Royal Family," he said that he had to make a slight alteration in the order of the toast list, inasmuch as Mr. T. G. Jackson, R.A., who was to propose "The Architectural Association" had to leave early in order to catch a train. That toast would therefore be given before that of "The Royal Institute of British Architects."

Mr. T. G. JACKSON, R.A., on rising, said he gave the toast of "The Architectural Association" with much pleasure. He felt for them the greatest interest as well as a sincere admiration, because at one time it was the only body which did anything for the education of young architects. It originated in a desire for mutual help. The Association had always put teaching before examination, and had never fallen into the fallacy that education and examinations were the same thing. For that and for other reasons it was entitled to great commendation. It was a fact, remarkable of late, that examinations in general had fallen into disrepute. Some years ago when the Royal College of Arts was being reorganised, the committee (of which he was a member), decided that certificates should be awarded not as the result of examinations—which often had a fictitious value—but rather for general work. The Architectural Association had followed something like that system in their school. The last annual display of work was highly creditable, and he was especially struck by the holiday sketches. It was only by going about and seeing and studying the good work of our predecessors that architects could hope to equal or surpass them. But sketching was not practised as in his young days, when it occupied every Saturday afternoon and autumn holiday. Architects had the proud knowledge that their occupation was not merely for a livelihood, it was also their greatest pleasure. They, as a class, could never look to become very rich, but they were repaid in other ways. Mr. Briton Riviere, R.A., recently told the story of a distinguished artist who in taking his walks abroad came upon a young painter busy on a landscape. After he had duly encouraged him the older man said, "May I ask what you make by painting?" The other replied it was about 150*l.* a year. "Oh! 1150*l.*" The younger man corrected him, it was 150*l.* he had said. This distinguished painter then told him that he always added 1,000*l.* to his receipts, as being equivalent to the pleasure he received out of his work. This was no less applicable to architects. With the toast of the Architectural Association he coupled the name of Mr. Cave, their president.

Mr. WALTER CAVE, in responding, said he had first to thank Mr. Jackson for his kind words, and the honour he had done them in coming to the dinner, and also in sending his son to the Association's school. The schools were going strong; the same number of students as last year attended the day-school and about the same number the evening classes. This was quite satisfactory. On such an evening it was impossible to go into the difficulties of architectural training. But he might point out that at the Association schools they had to provide an education that began at the beginning, and to give it to a very varied class of men. Some came from the public schools and universities with the power of learning fully developed. Others, not blessed with the same advantages, came to them without that power—though full of enthusiasm. The difficulty which faced the Association was how to provide education for students who started with such widely differing powers of acquiring knowledge. Mr. Maule, who played so prominent a part in the school, had been considering that problem. Another question they had in hand was the finding out as soon as possible whether the student was suited for following their profession. It was there that their real responsibility lay. That their elementary teaching was sound was proved by the approval given to it by the profession. Though whether they had been stringent enough in the past in eliminating the unfit was open to question. In the future, things would be stricter. As to himself, he might be pardoned for making one or two remarks. He had acted as President for two years, and, moreover, enjoyed the unique distinction of having presided at three dinners. During his term of office the building debt had been extinguished, and nearly 12,000*l.* paid off—chiefly through the help of other members of the profession. They had attempted the revision of some of the bylaws, but certain parts had not been very favourably received. He believed that the objectors and the Council

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would prove to be more at one than was at present supposed. The whole question was to be gone into again; and, he did not doubt, there would be ultimate satisfaction to all parties. The arrangements for the Sketch Book had been altered. For the past eighteen years Mr. W. G. B. Lewis had been a most loyal friend to it. It would now be the duty of Mr. Gerald Horsley, Mr. Theodore Fyfe and Mr. Curtis Green to carry on the great tradition that had been established. Another feature was the formation of the athletic club; this was perhaps the most remarkable illustration of progress in their entire history; moreover, the membership was increasing daily. It showed the amount of interest which athletics commanded. The annual sports will take place on June 5 at Stamford Bridge, where excellent sport would be afforded, and it would be a great help if everybody, both members and friends, would attend. The Association had during his term of office received the promise of a studentship amounting to about 150*l*., which was a matter of very considerable importance. If it was carried through it would be a very great assistance to them. The youth of the Association was its greatest asset. The older members ought to try and help things that are being started, and generally take a keen interest in the affairs of the Architectural Association. They had a very large number (including about half of the day school) of their members connected with the Territorials. The occasion of the annual dinner was a suitable one for thanking the Council for their assistance to him, and also for thanking the staff, with Mr. D. G. Driver at their head. At one time it had seemed a relief to him to think of the time when he would get out of the chair. But now he was beginning to feel that when he had passed the chair he would have passed beyond one phase in his professional career, and to have joined the senior ranks. It had been two years of great interest to him, and he had come to the conclusion that even two years was scarcely long enough in which to learn everything that is to be learnt in order to keep things going. The new president, Mr. Henry Tanner, jun., was well known to everybody, for he had held office during six years. No one was better qualified to carry on the work, and the Association would be in the very best of hands. Mr. Cave concluded by thanking everybody for their toleration, and wishing the Architectural Association the very best success and a long life.

Mr. Henry Tanner, jun., in proposing the toast of "The Royal Institute of British Architects," said it was one certain to be received with the greatest enthusiasm. The relations had always been most cordial. The parental interest of the Institute had been shown for many a year, not only in moral support, but financially also. Their donations had been most useful, especially the contribution to the building fund whose funeral had just been alluded to. They must mention also those to the Sketch Book and Architectural Museum. The debt on the side of the Association might well seem a long one, but if the Institute gave them money, the Association gave in return men who rose to high office. Looking at the Council for next year their Mr. H. T. Hare and Mr. Guy Dawber were both on the top. Mr. Cave, their retiring president, who had served them for so many years, would go just as far in the Institute, and be just as popular. There was hardly any need to lay any stress on the wide influence of the Institute, as was shown by the multiplicity of subjects they are consulted upon. One of them was the London County Council Bill, 1909—on this subject Mr. Ernest George had published a very excellent letter, with which he was in agreement. Architects could not approve of much of that Bill; they had no wish to be scheduled, and he believed their point of view would finally outweigh the London County Council's. The Institute were to be congratulated on their financial position with its reserve of 26,000*l*. He might express a hope that that would not be kept intact long; he would like to see them housed in a worthy building of their own. Probably he was preparing trouble for some architect. It was hard enough to design for an ordinary client; he scarcely dared think what it would be like to do so for a company of architects.

Mr. Ernest George, P.R.I.B.A., said that the Institute had always been in entire sympathy with the Association and had always had the greatest regard for it. The bond was that of work in common. The achievements of the Association were most interesting. Young architects now possessed fine opportunities for training which were unknown when their elders were young. There were the schools and a capital system of visits to old buildings, works in progress, builders' workshops, and other places for getting a knowledge of materials. In his day students joined the Royal Academy schools for the fun of competing for the medals. They attended lectures by the champions of the Gothic and Classic schools. When Mr. Phenè Spiers returned from Paris, the idea of a school for architecture took shape. The teaching now obtainable was undoubtedly fine, but it was to be hoped it would never take the place of apprenticeship, which was very profitable, and always will be. The erection of a farmhouse taught as much construction as the erection of a temple. Something more was wanted than an answering of economic requirements. The Association Sketch Book was admirable, and equally so was their selection of officers. The Institute appreciated the fine men sent up to them, and they formed a strong body.

Sir A. Brumwell Thomas proposed "The Visitors," who made a long and distinguished list. First came Sir W. B. Richmond, R.A., who was to respond. This artist was known to all for his decoration of St. Paul's. It might be said with all sincerity that future generations of workers in mosaic will have reason to be grateful for the spirit of thoroughness he brought to the study of that tremendous problem. The care with which he investigated the effect of various colours placed in opposition, and how he obtained his colour scheme will be remembered by all. Sir William Richmond might well say with Leonardo da Vinci, "Thou, O God, dost sell to us all good things at the price of labour!" Mr. T. G. Jackson has brought great scholarship into his practice of architecture. After a distinguished University career he became a pupil of Sir Gilbert Scott's. He is to be credited with an enormous number of collegiate and other works which have given very great pleasure to the large number of his admirers. The President of the Institute would always be welcome as being one who always attended their functions. It might be necessary to remind future presidents of this precedent. Mr. E. A. Abbey, R.A., commenced his career as an accomplished black and white illustrator; he had developed into a most decorative painter. Architects admire his works, except in one very important particular, which was not past remedy in the future, viz. that they always go across the Atlantic. Mr. Solomon had to his credit a long list of ideal paintings. Professor Blomfield was looked on as one of the authorities on education, and therefore of special interest to the Association. On one point the Architectural Association might well make a departure. They pursued a course of study up to a certain point, and then left the students to look after themselves. But really the Association should take on for a year or two longer those who are anxious to pursue their preparation, and so take advantage of their enthusiasm, and make it more national. Mr. Greville Montgomery, M.P., was to be congratulated on the success of his building exhibition. To-day the pageantry of the past was popular. And it might be thought that he had just been making such a pageant; though really his review was of the characters of to-day, of old friends and distinguished artists who have this one aim in common "that they pursue truth together."

Sir W. B. Richmond, R.A., said he preferred to talk about other people than himself, but the present was an opportunity for saying something which he had been wanting to say, and he was encouraged to do so by the knowledge that in all probability few of those present had travelled the world as he had done. They might not have observed, and they might not know that one of the great points of ancient architecture was that it was always coloured. One gentleman in discussing this subject exclaimed, "Oh! I prefer it bare." Sir William asked to be allowed to mention some of the ancient architecture which he had himself seen that had been coloured. There was the Temple of Selinus destroyed 300 B.C., in which colour was employed so beautifully by the architect using grey, blue, black and brown, that, while it in no way interfered with the structural portions, it seemed to have performed the act of embracing the sky. It was used with wonderful skill in the propylæa and temples of Athens. He had seen it in Egypt. Until a certain period there was no building in Great Britain which did not receive colour upon the majority of the surfaces. The prevalent idea of non-colour is entirely a modern one and dates from the days when the arts became divorced. The painter said to himself "I will stand upon my own legs, and I will put my pictures in frames." The architect said, "I am the skeleton and I want no colour." That is a mistake. No one wants the adoption of unrestrained colour over anything. But what is wanted is some means of coalition in the very principles of education. Supposing an architect knows at the beginning his building is to be aided by sculpture and colour. At the moment of the conception of his plan the painter and the sculptor should be called in, and for very obvious reasons. The architect will restrain them from vagaries, and

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perhaps they will restrain him from going beyond instructions. We have a right to look to the millennium when there will be absolute coalition between architect, sculptor and painter—it will come at last. The first move must come from the mistress of the arts if it is desired to make the best of the buildings, and to get the utmost out of them. But said Sir William, "don't get bad sculpture because it is cheap, leave a capital plain rather than badly carved. If you can't afford to pay the price of good decorative painting, don't go to a firm which turns out things ad nauseam." Architects have got the matter in the very palms of their hands. They should seek out young earnest sculptors and painters, and train them to do their will, while appealing to them sympathetically. In time there will arise a school which (by beginning when man is at his best—in his youth) will be equal to anything the world has seen, and it will be a national school as great as has ever been known.

THE SOCIETY OF ARCHITECTS.

A MEETING of the above Society was held on Thursday, May 13, when Mr. G. Topham Forrest (Member), architect to the Northumberland education committee, read the following paper on "Secondary Schools."

A little over a year ago I had the honour of reading before this Society a paper on the "Planning of Elementary Schools," dealing with the subject from the standpoint of Part III. of the Education Act of 1902. To-night I propose to deal with Part II. of that Act, where it is enacted that local education authorities shall consider the educational needs of their areas and take such steps as seem to be desirable to supply or aid the supply of education other than elementary.

Before giving the matter serious consideration, many authorities deemed it advisable to devote their energies to the very important question of elementary education, with the result that a considerable amount of improvement has been effected in the sanitary conditions and equipment of our public elementary schools. The time, however, has now come when secondary schools are receiving due attention, and the present appears to be a good opportunity for the consideration of the various matters connected with the planning and erection of these buildings.

Having been engaged exclusively upon school work since the passing of the Act of 1902, I propose to-night to touch only on such points as I can establish from my own experience and observations (advisory and otherwise), regarding it as a duty to do this little to advance a subject on which, I feel certain, much practical information and enlightenment is still needed.

The education question has now become all-embracing; the country's education bill runs into millions. Wastage in the past has been enormous. Wastage in many ways, on buildings and furniture which are now unsuitable, and on schools which err in some hygienic provision, so that costly remedies have had to be found.

The conditions under which education is now carried on are so vastly improved that any attempt at a general sketch of systems or organisations would be out of place here. In most competitions for secondary schools and where work is entrusted to architects in private practice, fully drawn up rules and regulations are now invariably issued by local education authorities, and intending competitors are informed as to the methods of classification, the sub-divisions of classes and questions of organisation, so that the architect before commencing with his plans has a clear idea of the law and conditions under which education is carried on, under the authority to whom the plans have to be submitted. He can study, therefore, very closely the question of routine and organisation in that particular district, which is (needless to state) of the utmost importance in securing the best possible plan.

The subject of this paper being capable of indefinite expansion, some limitation is desirable, and therefore I have endeavoured to make the character of it as practical as it is possible to do so, adopting the principle that it is better to thrash out in detail one or two of the more important headings, rather than to indulge in a superficial skimming over of them all, as is generally adopted, without of course plunging into the thousand and one scientific, technical and artistic questions which must be solved by the architect in each case.

Matters relating to the size of cloakrooms, the amount of hanging space necessary for each scholar, the number of closets required, &c., have already received their quota of discussion and need not be repeated here. These and similar matters are dealt with fully in the building rules issued by the Board of Education. These rules should always constitute the architect's vade mecum, although committing them to memory must be regarded only as a means to the end, as efficiency can only be acquired by practical everyday experience.

The school architect has to be thoroughly efficient in the principles of planning, how to get the accommodation required squeezed into the most suitable and economic plan for the money at his command, the choice of good building material, up-to-date science fittings, a good system of heating and ventilation, and the latest in gas and electric light illuminants. New systems of warming and ventilating buildings appear every year. Science fittings of a few years ago are now obsolete. Every month sees some new form of gas or electric lamp put on the market; and this is the era of ferro-concrete. Therefore, I say, these matters must *not* be allowed to stagnate, but must be kept moving. Our books must be continually open in front of us, otherwise our schools will be hopelessly out of date in a few years.

The discussion in the following paper of some specific systems of heating, &c., also details of fittings, &c., is made from an independent and unbiased study of their merits, and without any interest in advertising their excellences or their defects.

The term "secondary school" is of wide application and covers educational institutions of very different aim and type. It is applied to the city grammar school, the city high school, the modern commercial or technical school and the residential school. Strictly, the name should be confined to those schools which educate pupils who have passed the primary or preparatory stage, and whose age is approximately thirteen to eighteen. But the majority of secondary schools have preparatory departments and undertake the education of the young from the age of seven.

Secondary schools are divided into two classes (1) residential or boarding schools, (2) day schools. In the former, for a considerable part of the year, the school performs the double function of a school and house; and in the latter (which is the subject of this paper), the school merely shares with the home in the process and responsibility of education.

In dealing with the subject, I have adopted the following arrangement. First of all to give some consideration to the question affecting the plan generally, and of the extent of the accommodation required, the use and purposes of the different rooms, and the form, dimensions, &c., that have been found best adapted to serve the purposes, the best types of science fittings and desks, suitable systems of heating and ventilation, and the latest principles in artificial lighting. Complete plans have been commented upon, but constructional details have been as far as possible avoided.

In selecting the schools for illustration on these walls, great care has been taken to try and show the various types of buildings erected by different education authorities, and to what extent perfect organisation of the school depends upon the plan. These illustrated are all recently designed buildings, and embody the latest developments in secondary day school planning.

It is not suggested that they show in all cases an ideal arrangement, or that they are merely models to be copied; they show how things are being done, but not necessarily how they should be done. There can be no ideal plan made to suit all requirements, as the organisation of the school materially affects the arrangement of the buildings, and districts and centres vary tremendously.

Site and Aspect.

The question of site is an all-important one. As the hygiene of a school really commences with the site, the importance of securing a good one is obvious. I think, however, that enough has already been written regarding the ideal position for a school site which, as far as actual experience goes, is not of much practical value. I propose, therefore, to pass on to the consideration of a few points which concern themselves with preparations for actual building. Very often the site is fixed upon before instructions are given to the architect, but those interested in this question should note carefully the following points:—

It is very desirable that the architect should ascertain as far as possible the probabilities of any damage to the surface of the site by mineral workings, in order that he may, in planning the buildings, take into consideration the question of the foundations should the circumstances appear to call for special treatment.

(To be continued.)

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NOTES AND COMMENTS.

It is but fair to the Corporation of the City of Bath that notice should be taken of their reply to the charges that have been made against them in respect of the proposed alterations in Bath Street. The Corporation say:—"That the Bath Street houses (with the exception of the corner house facing Stall Street) are not now and never were the property of the Corporation; that the Grand Pump Room Hotel is in the hands of lessees for a term which will not expire for thirty-three years, apart from a new agreement now entered into for the extension of the term; that the enlargement of the hotel is desired by the lessees, who and whose predecessors in title have kept the hotel closed for more than six years; that the Corporation give their assistance to the scheme, believing that it is in the interests of the city so to do, the continued non-occupation of the hotel being an injury to the city and a deprivation to all those invalids who require treatment and accommodation without exposure to the open air; that no pecuniary profit on the transaction is being made by the Corporation, the increased rent being balanced by the postponement of the reversion; that the business took five years to negotiate; that the agreement was sealed a year ago; and that the utmost publicity has been given to the matter throughout." They also assert that Bath Street is not a portion of what is commonly understood as eighteenth-century Bath, nor is it a "part of the scheme for the building of Bath," nor has it "extraordinary historical associations."

The Royal Commission on Ancient Monuments in Wales and Monmouthshire has held its first meeting in the Principality at Cardiff, and has collected already some interesting facts with regard to the existing antiquities of that district of Wales. The need of such a Commission and of the assistance of the Government in the preservation of ancient monuments is shown in the effect of the weather on the great cromlech of St. Nicholas. The capstone of this, the largest in the county, is cracked across, and one side is subsiding. On the other hand, the effect of man's spoliation is seen in the south wall at Caerwent, which, it was stated in evidence, is the finest and most imposing piece of Roman work in the south of Great Britain, being 22 feet high and 10 feet 6 inches thick. This has been brought to a dangerous condition by the removal of the faced stone near the plinth, probably for building purposes. There seem to be a good many tumuli in the district around Cardiff, and although many have been opened, some are still unopened. The data regarding the tumuli are not, however, sufficient for any scientific classification. Roman remains are numerous, and excavations have been made at Cardiff, Caerleon, Caerwent, Llantwit-Major, Gelligaer, and Dowlais.

ILLUSTRATIONS.

OXFORD COLLEGE SERIES. QUEEN'S.—INTERIOR OF CHAPEL—INTERIOR OF LIBRARY.

The illustrations given this week of Queen's College are in continuation of those in our issues of April 16 and April 30, with the historical account of the College by the Provost, Dr. Magrath.

NEW BUILDING FOR THE GOVERNMENT OF VICTORIA, AUSTRALIA.

The basement contains store-rooms, strong-room, furnace chamber, &c., and is approached by a separate entrance in Melbourne Place. From this last entrance is provided an electric goods lift between the ground and the basement floors. The ground floor is wholly occupied as an exhibit hall, and is fitted up with mahogany showcases. There are two entrances to this floor, the principal one being in the Strand and the secondary, or office entrance, in Melbourne Place. A passenger lift is arranged close by this last entrance, which serves all the floors in the building. The first floor is occupied by the Secretary and his staff, the second floor by the Agent-General and his secretary, the third floor by the accountant, &c. The fourth floor is arranged as an exhibit room for mineral products, &c., and the fifth floor as a reading room. The sixth floor is constructed in the roof, and contains ample space for storing Government papers and books. The floors, roofs, and staircases are constructed of fireproof materials. The joinery consists chiefly of mahogany. Victorian marble is used for the hearths and surrounds of stoves. Lavatories are provided off the staircase for all the principal floors. Low-pressure radiators, electric lighting, and intercommunication telephones have been installed throughout the building. The building is faced with Portland stone, and the roofs covered with green slates with copper finishings, &c. The total height of the building is about 120 feet from the pavement to the top of the small dome, upon which stands the figure of "Progress," modelled by Mr. F. W. Pomeroy, A.R.A. Mr. Alfred Burr, F.R.I.B.A., of 85 Gower Street, is the architect. He has also designed the completion of the Strand block of which the Victorian Government Offices form the western end.

NEW OFFICES FOR THE GRAND TRUNK RAILWAY OF CANADA.

These premises have been erected in Cockspur Street, S.W., by the Grand Trunk Railway Company of Canada, to serve as their West End offices. Their main office occupies all the ground floor. The remainder of the building has been arranged as independent offices, and for these tenants are now being sought. They are reached by staircases from Cockspur Street and Warwick House Street. The main office is 17 feet 6 inches high, with black oak panelling up to 10 feet 6 inches, and a frieze over by Mr. F. Brangwyn, A.R.A. The front is in Portland stone. The work has been carried out by Messrs. Leslie & Co. from the designs of Sir Aston Webb, R.A.

NEW BUILDINGS FOR THE UNIVERSITY OF CAMBRIDGE.

These buildings, opened by the King in March 1904, have been erected from the designs of Mr. T. G. Jackson, R.A. The Sedgwick Memorial Museum has been built partly with a fund raised shortly after his death to commemorate Adam Sedgwick, Woodwardian Professor of Geology in the University of Cambridge. The building stands on a site purchased from Downing College for University purposes, and is an L in plan, facing Downing Street and Downing Place. It contains on the ground floor two large lecture rooms, working rooms, and a museum of comparative geology. Two staircases contained in projecting towers rise from storey to storey to the top of the building; but the principal entrance to the great museum, which occupies nearly the whole first floor, is by an external staircase in the interior court, which divides at the lower part into two sweeps, at the foot of which are a pair of cave-bears and a pair of primitive bisons, forming the finish of the balustrades on either side. The great museum is fitted with high cases projecting at right angles to the walls between the windows, and table cases elsewhere. Down the middle are arranged the great saurians and skeletons of extinct animals, and at the south end is a board room, with a private room for the Professor adjoining. In a niche between two arches in the centre of the museum is a bronze statue of Professor Sedgwick, the last work of the late Onslow Ford, R.A. The second floor is occupied by numerous museums and laboratories, and by a library which is handsomely fitted with oak, for which part of a gift of 2,000*l.* from Dr. Latham, the late Master of Trinity Hall, was made available. The builder was Mr. Sindall, of Cambridge, and the clerk of works Mr. Robert Edwards. The carving is by artists from the staff of Messrs. Farmer & Brindley. The fireproof floors and other constructive ironwork is by Messrs. Homan & Rodgers, of London.

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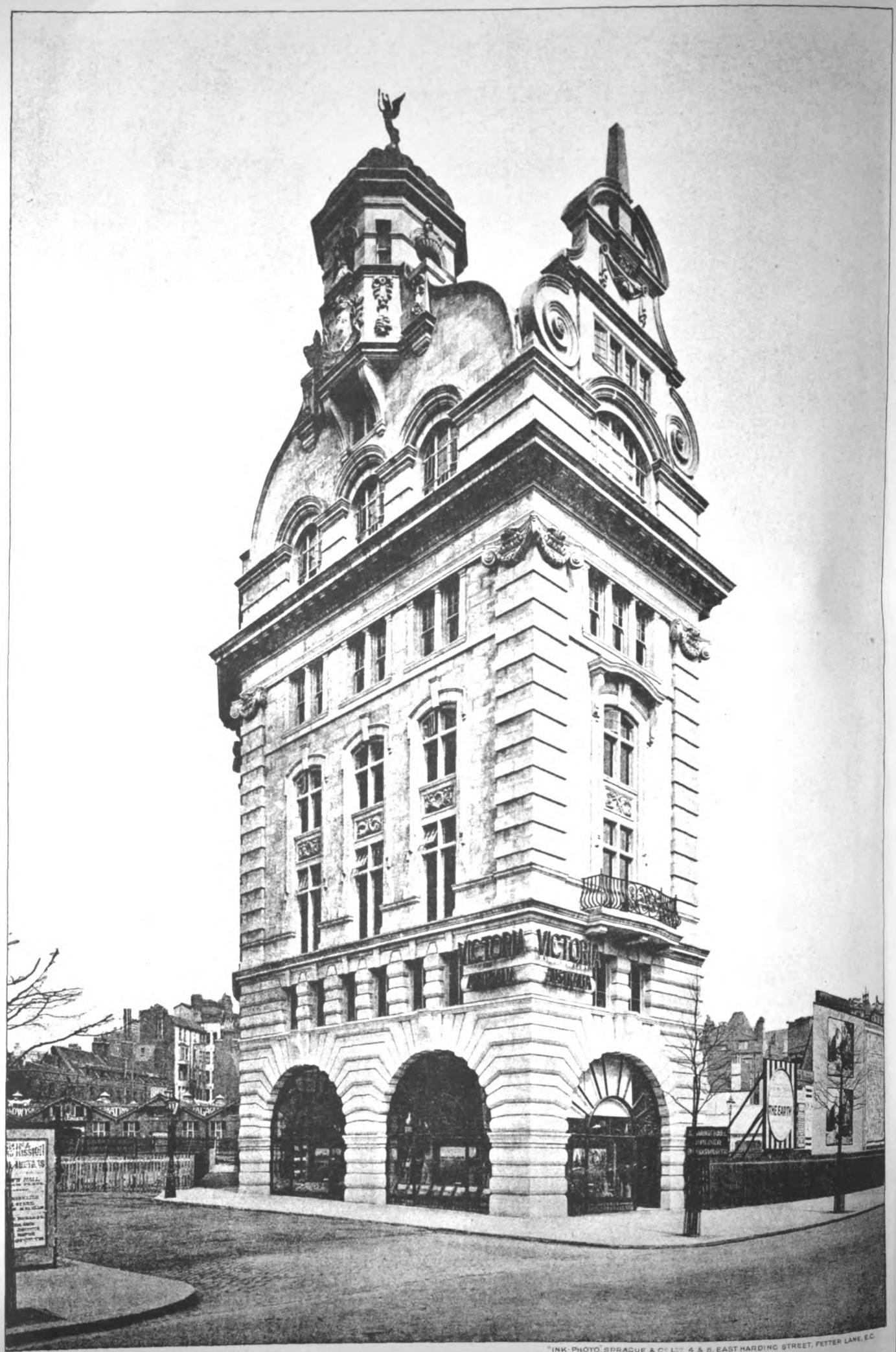


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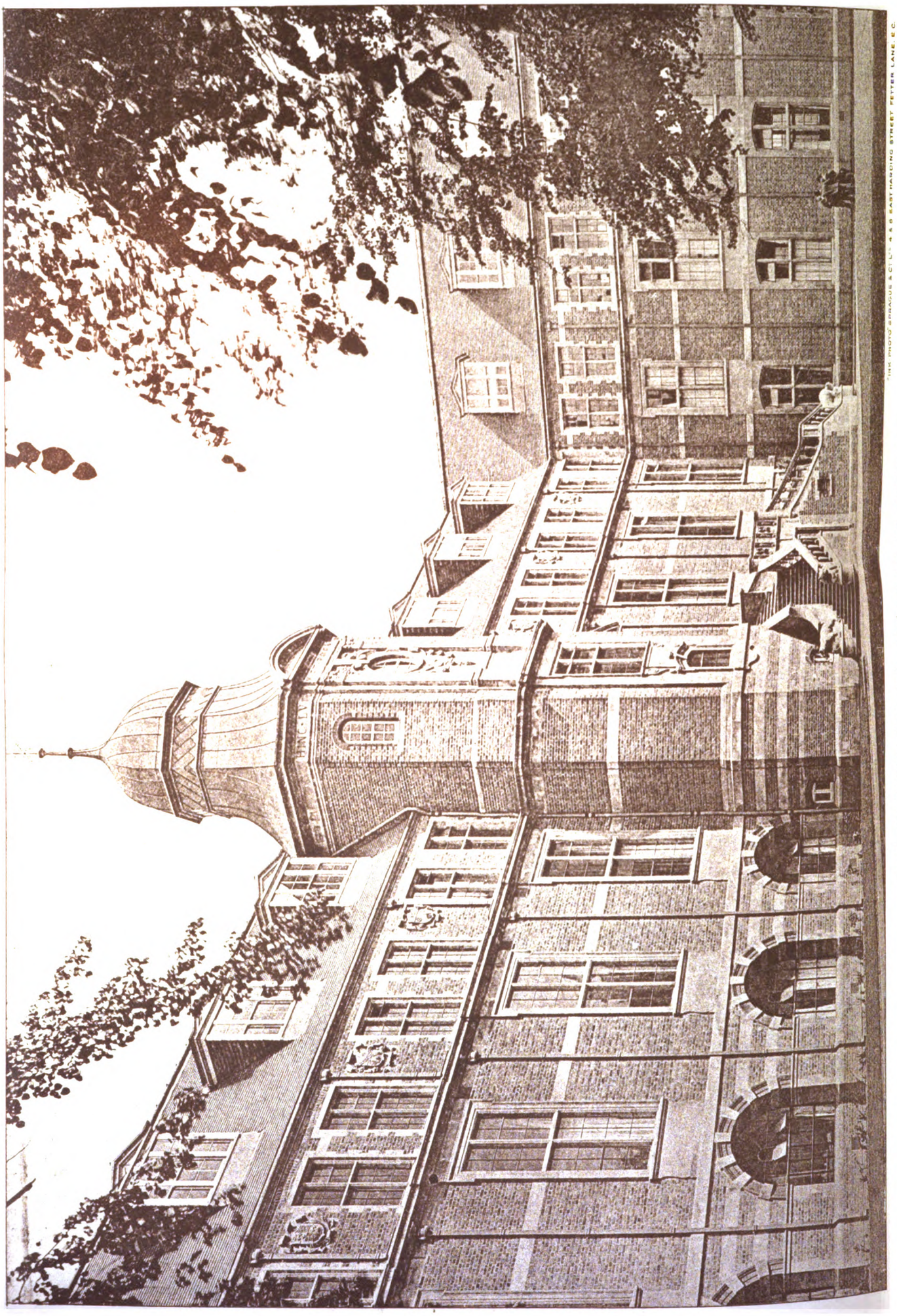
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NEW BUILDING FOR THE GOVERNMENT OF VICTORIA, AUSTRALIA.

ALFRED BURR, F.R.I.B.A., Architect.

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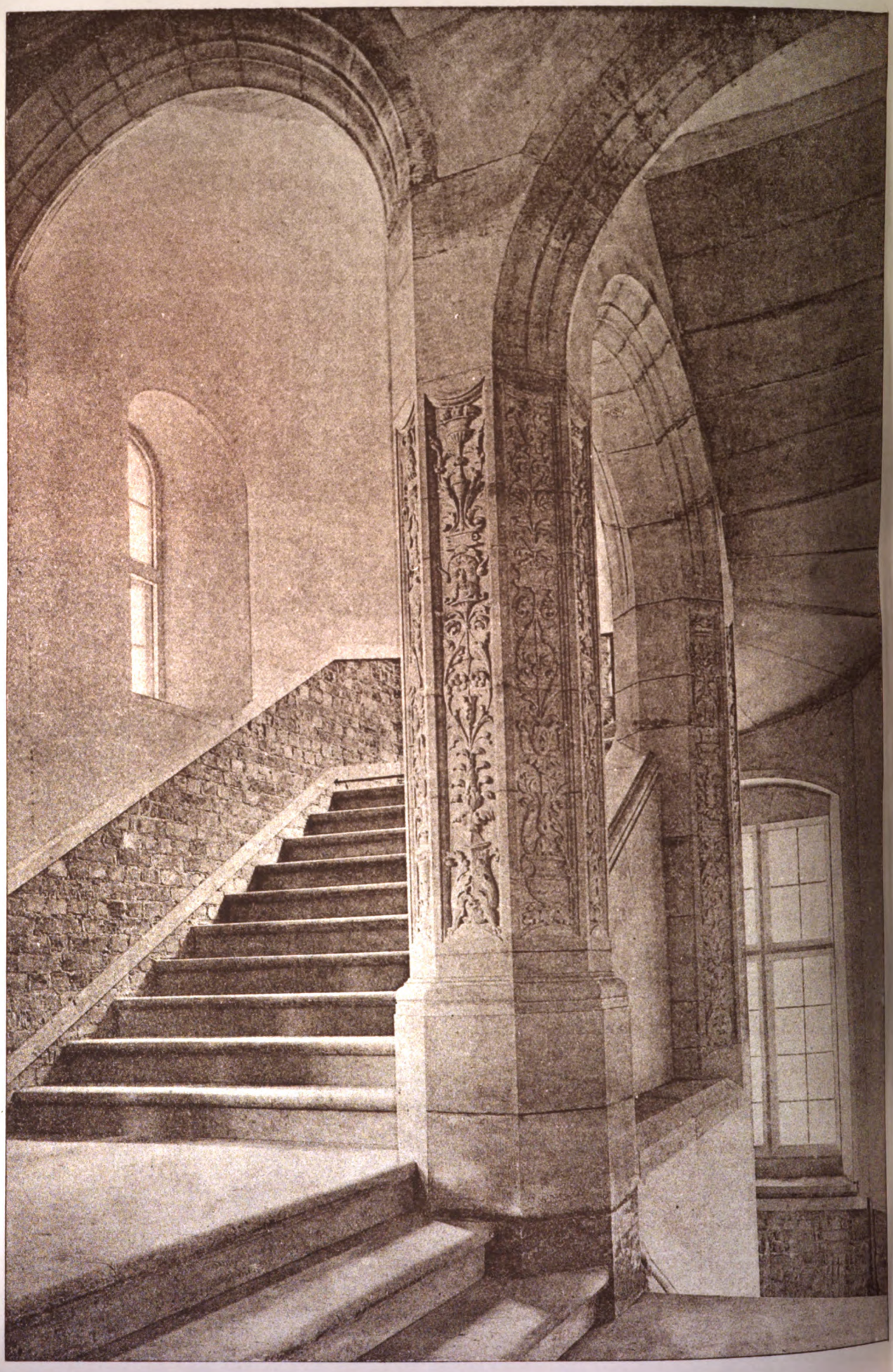


NEW BUILDINGS FOR THE UNIVERSITY OF CAMBRIDGE.

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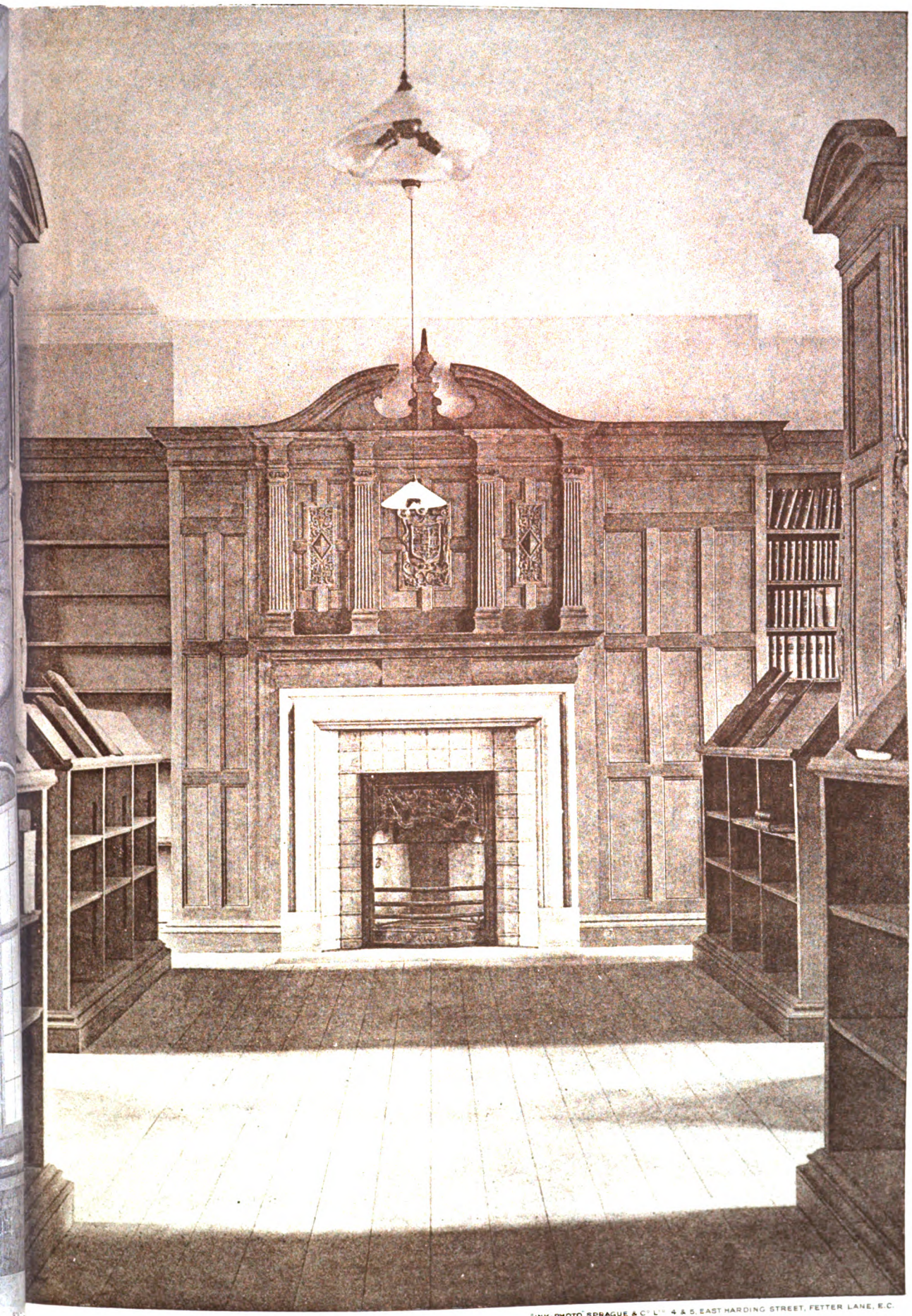


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T. G. JACKSON, Architect.

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SITY OF CAMBRIDGE.

EW Building, Architect.

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NEW BUILDINGS FOR THE UNIVERSITY OF CAMBRIDGE.

T. G. JACKSON, R.A., Architect.

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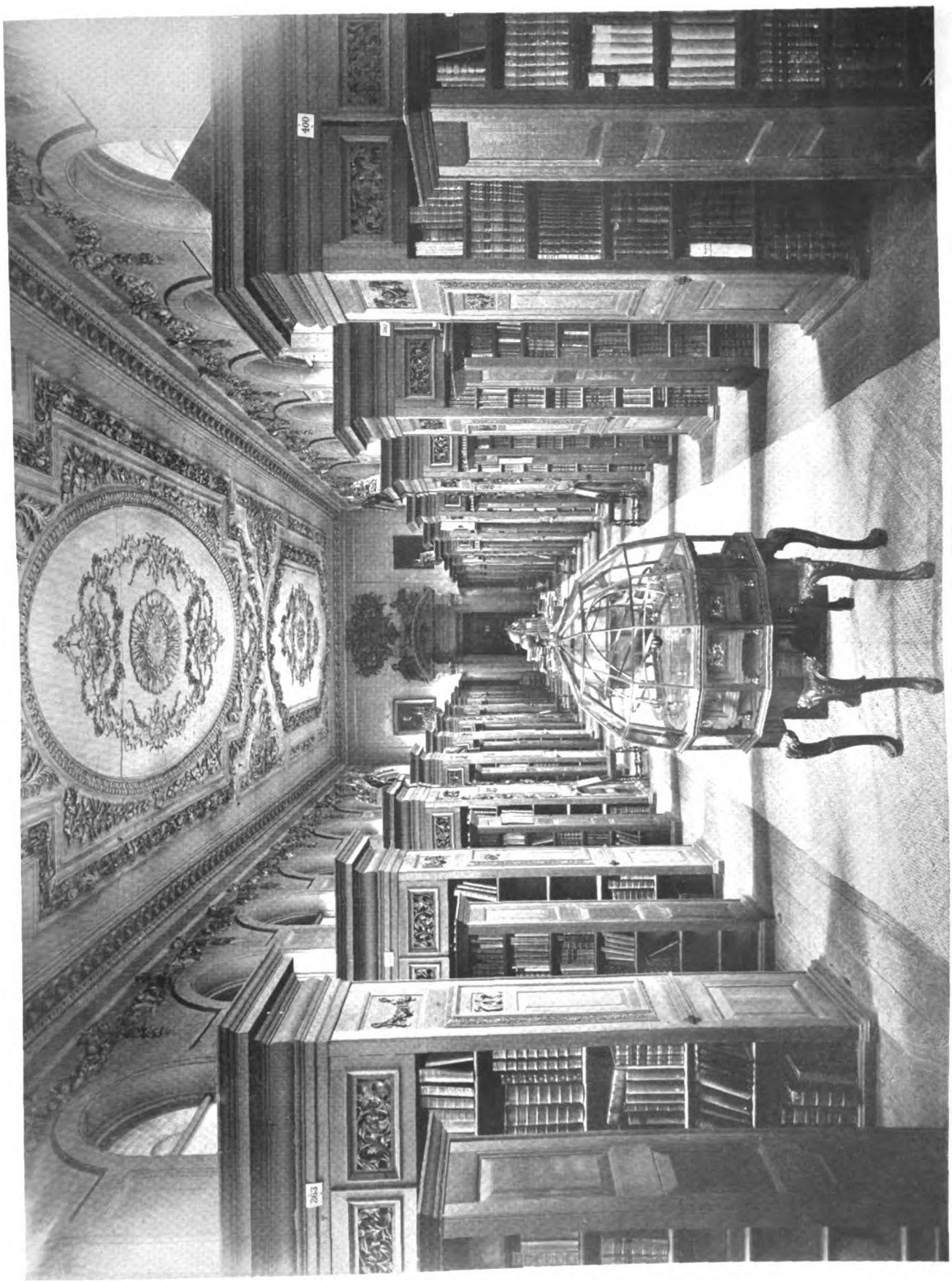
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NEW OFFICES FOR THE GRAND TRUNK RAILWAY OF CANADA.

SIR ASTON WEBB, R.A., Architect.

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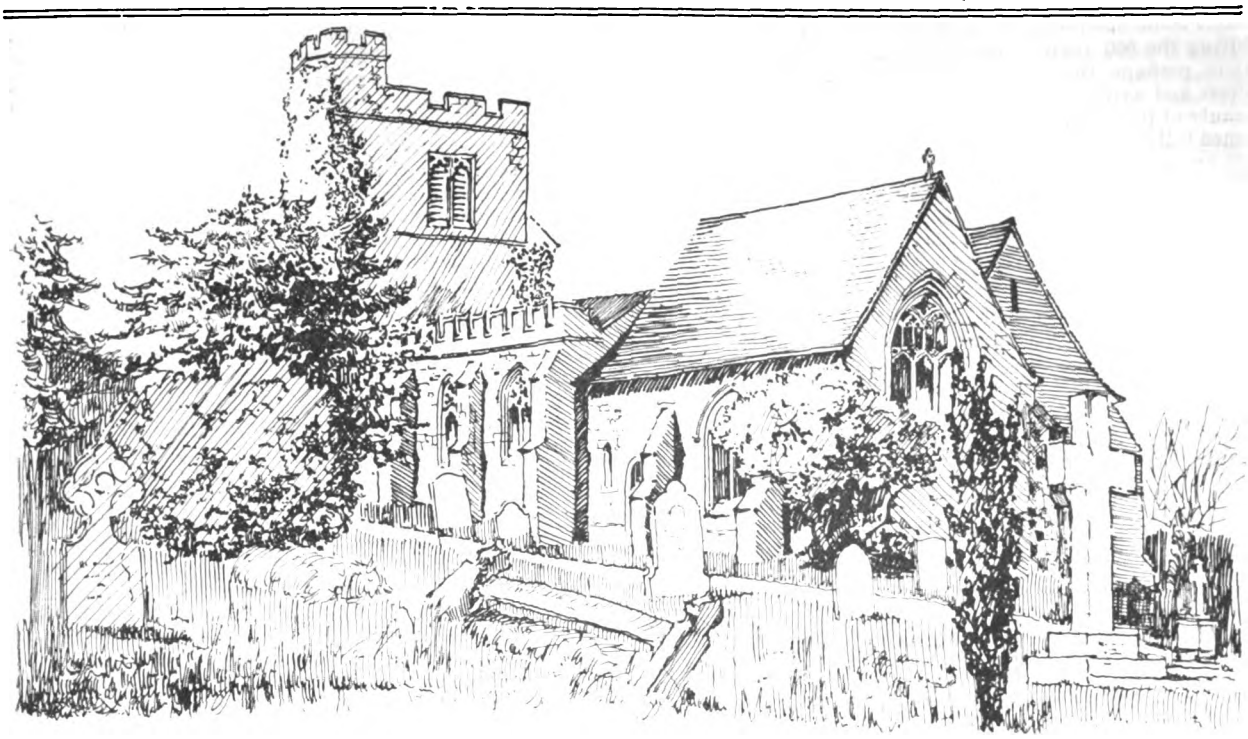


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SOUTH MIMMS CHURCH, MIDDLESEX. From a Sketch by ADRIAN HARDMAN.

BRUGES AND THE NEIGHBOURHOOD.*

(*Concluded from last week.*)

FORMERLY connected with the sea by means of the Zwyn, an arm of the North Sea now long since dried up, in the thirteenth and fourteenth centuries Bruges was the principal port of Europe. It was the great manufacturing centre of the north. The great cities of the Low Countries were the industrial capitals of the north and west, and equal in importance with Florence, Venice and Constantinople in the south and east. They imported wool, largely from England, and manufactured it into cloth. This was their staple industry, and as the centre of the Hanseatic League carried on an extensive trade with Europe and the East. In the Middle Ages Belgium in the north and Italy in the south formed the commercial and artistic centres of mediævalism. This is shown in the character of the buildings and architecture. In Belgium we do not find the magnificent palaces, the marbles and mosaics of Italy, but cloth halls, town halls, merchants' houses and simple brick dwellings, typifying the commercial pursuits of a great trading community. A country which could produce artists of the genius of Memlinc, the Van Eycks, Rubens, and such masterpieces of architecture as the Cloth Hall at Ypres, Hôtel de Ville in Brussels, and many other buildings too numerous to mention, must be recognised amongst the other nations renowned for their art and architecture.

The most perfect piece of architecture in Bruges is perhaps the Hôtel de Ville, which stands in the centre of the Place du Bourg on the south side. It is a beautifully proportioned Gothic building, dating from the year 1376, and was erected by Count Louis of Maele, probably finished about the year 1420. The architect is supposed to be Jean de Valenciennes, but it is not known for certain. The treatment of the windows is a common feature in Bruges, the outer mouldings running up between the storeys, forming a kind of panel treatment in between. It is found in the brick gables and other buildings, and this may probably have served as a model. The niches between the windows contain statues of the Counts of Flanders. These are not the original ones; they were destroyed by the French revolutionaries in the eighteenth century. The whole of the upper storey is occupied by the great hall, which has a very fine open timber roof. A photograph of Mr. Curtis Green's charming drawing of the Hôtel de Ville shows the whole façade of the building. On the right is the Chapel of the Holy Blood, and on the left is the Maison de l'Ancien Greffe. The latter is a very ornate semi-Renaissance and not particularly interesting building dating from 1535. It has been restored, and is used now as a court of justice. The fireplace in the Court-room, which formed part of a former building occupying the same site, is an interesting piece of Renaissance work erected to commemorate the battle of Pavia, which resulted in the declaration of the independence of Flanders. The lower part is of black and white marble, and the overmantel is of oak. The central figure is that of Charles V. of Flanders, and on either hand are statues of his ancestors, parents and other members of his family. It has been restored. The Chapel of the Holy Blood, to which I have already referred, is the chapel in which is deposited the vial which tradition says contains some of the water in which Joseph of Arimathea had once washed the body of our Lord. This relic was brought from the Holy Land in the twelfth century by Dierick of Alsace, Count of Flanders, cousin of Charles the Good, and deposited in the old chapel which Baldwin of the Iron Hand had built. This relic has been associated in a remarkable way with the history of Bruges. During the troubles with Ghent in the fourteenth century it was lost, but later was found in one of the waterways close to the Beguinage. It was hidden during Reformation times, and only restored to its present resting-place in 1819. This chapel is a building of two storeys, the lower one being the crypt of St. Basil, probably the oldest building existing in Bruges. The upper chapel was rebuilt in the fifteenth century. At the time of the French Revolution it had fallen into great disrepair, and was restored in the nineteenth century. The portal and staircase of the chapel are on the west side of the square; they date from the sixteenth century and, like the chapel itself, have been restored. The statues are of bronze.

A photograph of a portion of a bird's-eye view of Bruges, the work of Marc Gheeraerts in the year 1562, is particularly interesting, as it shows the ancient Bourg as it existed at that date, with the group of buildings on the south side, including the Hôtel de Ville, the Chapel of the Holy Blood, and on the left the Maison de l'Ancien Greffe. The old church of St. Donatian then occupied the north side of the square. This building, originally founded by Baldwin, was pulled down in the eighteenth century. Its place is now taken by the fish market. To the right is the belfry and the old Cloth Hall, a fourteenth-century building which has long since disappeared. The River Roya can be traced in its course between the belfry and the west side of the Bourg and along under the old Cloth Hall. It follows the same course still, but, as already mentioned, has been built over since. The belfry, occupying the central position in the market place, is the most conspicuous structure in Bruges. In nearly all the principal Flemish towns the belfry is the central and dominating feature, towering up sometimes many storeys over the surrounding buildings. In Flanders the belfry was the symbol of civic liberty. The sounding of the bell in the Middle Ages was a call to arms, and of many a

* A paper read by Mr. C. Wontner Smith before the Architectural Association on April 30.

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tragic scene has the belfry at Bruges been the silent witness during the 600 years it has stood in the old market place. It is, perhaps, the most interesting of all Flemish belfries. Poets and writers have vied with each other in praising the beauty of its outline and the charm and richness of its sweet-toned bells:—

> Low and loud, and sweetly blended,
> Low at times, and loud at times,
> And changing like a poet's rhymes,
> Ring the beautiful wild chimes
> From the belfry in the market of the ancient town of Bruges.

Its architectural merits are, however, another matter. It is a strange conglomeration of storeys and styles. It has been destroyed three times, has been added to and altered; its very height gives it a dignity which its architectural merits fail to do. The belfry has a strange history. No doubt the original structure was built in the days of the first Counts of Flanders, and was constructed of rough stone, like other buildings of the time. It was totally destroyed in the thirteenth century and afterwards rebuilt, the two lower storeys dating from this period. The octagon was added in the fifteenth century and the parapet 100 years ago. There is another tower in Bruges more striking than the belfry and a far finer piece of architecture. I refer to the tower of the church of Notre Dame. This dates from the thirteenth century and is of magnificent proportions. It is built of brick and rises to a height of just 400 feet, measuring to the top of the spire. The Late Gothic portal of the north side is a very charming little piece of work; nestling at the base of the tower it looks absurdly small in proportion. The cathedral of St. Sauveur close by has been much spoilt by later additions. The transept and the group of chapels round the choir are quite the best parts. The tower is comparatively modern. By far the most interesting church in Bruges is the Church of Jerusalem or Holy Sepulchre. This is quite a small building, erected at the beginning of the fifteenth century by two brothers named Adornes. The plan is most peculiar and quite unique. The nave has no aisles. The sanctuary is underneath the tower, which is at the east end, and is reached from the nave by two stone staircases 10 or 12 feet above the rest of the church. The exterior is as quaint as the interior. It is built of brick, and the tower above the roof-level becomes octagonal. There are two small angle turrets at this stage in front, but at the back the walls are simply sloped off. The whole is surmounted by a wooden fleche, terminating in a large golden globe. The grouping and general appearance of this little building is extremely pleasing. It might be called, perhaps, the "Miracoli" of Bruges.

But, however interesting, it is not the churches which form the chief attraction of these Belgian cities; the old brick houses, with the stepped gables and traceried windows, are their chief charm. Until about the fourteenth century the houses were probably built of wood. As the number of the inhabitants increased and better buildings were required brick was more generally employed. Nearly all the public buildings in Bruges were erected in the fourteenth and fifteenth centuries, and the greater number of them are of brick.

The Flemish bricks are unequalled in colour and texture. They are small in size, very uneven in surface, and the graduation in colour has a most charming effect. The windows are generally grouped together in recessed panels; the outer mouldings enclosing them run right up to the top storey. The windows themselves are square, sometimes having stone lintels and dressings, but are more often of brick, the space between the head of the windows and the top of the enclosing arch being generally filled with tracery. When mouldings are used they are simple in character, but the plain chamfer often sufficed. The later examples are rather overloaded with detail and tracery, but many of them are well designed; the variety of treatment is wonderful. Some of the most noted of the old houses and halls still remaining in Bruges are the halls of the merchants of Genoa and Spain, the Maison des Orientaux, which was the residence of the great traders of the Hanseatic League, the Gruthuise, Ghistelhof and many others. One of the most charming little buildings, for its design and general proportions, is that known as the "Poorter's Loge." It was built in the middle of the fourteenth century, and was used then as a kind of mediæval club house.

Bruges in the Middle Ages must have been a city of turrets and spires. Many of them have, alas! disappeared, but there are a few still remaining, and of these a very good example is the one behind the "Poorter's Loge." There is another one close to the Quai du Rosaire, at the back of the Hôtel de Ville. I should just like to mention another interesting building in Bruges, and that is the Hospital of St. John. This building was founded in the twelfth century and still serves the same purpose. It forms a very picturesque group opposite the church of Notre Dame, and in it are to be seen some of the best examples of Memlinc's work. It is rather difficult to get a good view of, as the streets are narrow at this point. One of the most interesting parts is that close to the canal. To the right of the old thirteenth-century gateway, now built up, is the chapel, and beyond it the present entrance and some later additions which have been recently restored. The ramparts which formerly surrounded Bruges have been pulled down, and of the old picturesque gateways only three now remain.

Those who have been to Bruges have no doubt been struck by the number of small Renaissance doorways to be seen in many of the side-streets, set in little gable ends of brick. These are the entrance doorways to the almshouses or "Godhuises," which were founded in the seventeenth century. After the troubles with Maximilian, Bruges became almost depopulated, and owing to the silting up of the Zwyn, which formerly connected it with the sea, its position as a manufacturing city was considerably affected. Most of the weavers left Bruges and settled in Antwerp and other places, and at this time Bruges became the home of many of the neighbouring religious houses, who erected convents and hospitals in all parts of the city. Many of the doorways are well designed, and have over them in some instances niches containing figures. There are many other things I should like to say about Bruges, but it is impossible in a short paper as this must be to do more than make a passing reference to the many interesting buildings which it possesses. I fear I have treated the subject very inadequately, but as I want to say something about the other towns we visited, I must pass on. A few hours were spent at Damme and Courtrai, the former at one time the port of Bruges, and a most interesting place. However, I can only mention the more important towns. Like Bruges, Ypres was in the fourteenth and fifteenth centuries a very important and flourishing town, and one of the principal centres of the manufacturing trade. The chief interest lies in the group of buildings of which the Cloth Hall is the central feature. The Cloth Hall at Ypres is the finest in Belgium. Its enormous length, the dignity and simplicity of its design are most impressive, and seen from the market place with the church of St. Martin rising in the background, it forms one of the finest groups of buildings to be seen anywhere. This Cloth Hall was commenced in the thirteenth century, and was not completed till 100 years later. The main façade is 335 feet long, and the Cloth Hall proper occupies the upper storey. These old Cloth Halls of Belgium are a distinctive product of a commercial community, the legacy left by the trading republics of the Middle Ages. It is commercialism embodied in building, and they remain to-day monuments to the enterprise and genius of these old Flemish burghers. The building at the east end of the Cloth Hall is called the Nieuwerk, a Renaissance structure dating from the year 1620. The upper floor of the Cloth Hall consists of three long galleries with open timber roof, containing frescoes representing incidents in the history of Ypres. Inside the courtyard are two very interesting wooden gables with large recessed windows in which there is some old glass, and a picturesque timber passage-way supported on wooden cantilevers.

Ypres possesses in addition to its Cloth Hall, the exceedingly fine church of St. Martin, formerly the cathedral of the district. It is of very ancient foundation, and dates from the thirteenth century, erected on the site of a much earlier church. The western tower is a lofty and beautifully proportioned piece of work, later than the church itself. It has never been completed, but the base of the stone spire, with which it was originally intended to be finished, just shows above the roof. It was designed by Martin Utenhove, of Malines. Portions of the church are now being restored, and there is a talk of completing the spire, but I think it would be much better to leave it alone. It is built of brick and stone, and is nearly 200 feet high. The interior of the church is equally interesting, the columns and arches are of a darkish green stone, and the choir, which has no ambulatory or chapels, contains some good Renaissance woodwork in the shape of stalls and confessionals. The font, at the west side, is a charming piece of Renaissance work. It is of bronze, and the font-cover is attached to a wrought-iron bracket on the wall. Beyond these two buildings, Ypres contains nothing of very great interest. There is one other building, however, that I should like to mention, and that is the

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Boucherie or meat market, which stands in the south-west corner of the Grand Place. The lower storeys are of rough stone work, and date from the thirteenth century. The upper part is of brick, with the typical Flemish gables and traceried windows. Of Ghent I do not propose to say much. I was only there a few hours, and consequently know very little about it. Like other Belgian cities, Ghent is being modernised, but some of its old buildings still remain. Time will not permit me to do more than just mention one or two of them. The church of St. Nicholas, one of the oldest buildings in Ghent, claimed a good deal of my attention. Unfortunately the interior has been greatly modernised, but the exterior is much as it was; in fact it has been improved considerably since the houses which formerly stood all round and against it have been removed. It piles up magnificently, and looks equally well from any point of view. Though not particularly attractive outside, the cathedral at Ghent has an impressive interior. Apart from its architecture, its chief interest lies in the fine examples of Vandyke's works which it contains. Mention must be made of the Renaissance sacristy, which is a very charming piece of work. The Hôtel de Ville, a building of the florid Gothic type, has been considerably restored. It has several interesting features, the best being perhaps the rectangular Gothic staircase, with pierced balustrades and brick-vaulted roof running up to the first floor.

Before passing on to Oudenarde in conclusion, I should like to mention the group of old buildings on the Quai aux Herbes. The well-known Skipper's House is one, and perhaps the best of its kind in Belgium. It was erected in 1531, and is now being restored. Next to it is a Renaissance house, and beyond a very early building, used as a granary in the twelfth century. It reminds one of the lower part of the Boucherie at Ypres, the character of the stonework and general design is somewhat similar. The architectural interest in Oudenarde centres round the Hôtel de Ville and the church of St. Walburga. The latter dates from various periods. The tower is of magnificent proportions, and possesses, incidentally, a really musical peal of bells. The Hôtel de Ville is a small building, erected in the Late Gothic period, and although rather florid and overloaded with enrichment, is a very good piece of work of its date. Inside there is a well-designed Late Gothic chimney-piece, and an oak screen, the work of Paul von Shelden. During the restoration of the central turret about ten years ago, Mr. Ellis Marsland, who was then touring in Belgium, seized the opportunity of taking a series of photographs while the scaffolding was there, and these form a unique collection of views of the different storeys right to the apex, including the lead figure above the crown.

Mr. H. D. SEARLES-WOOD, in proposing a vote of thanks to the lecturer, said it had been enjoyable to see views of buildings familiar to most of them, and which recalled to him his first tour abroad. The opinion formed then was that Belgium made an interesting change in the usual programme of excursions, but it was a tour which could be taken by anybody, and did not require guidance. In their annual excursions members of the Association had access to buildings which were not open to the general public, but in Bruges they were not privileged in that way. As far as the country districts of Belgium were concerned it was very significant how very little architecture there was beyond the fortified walls of the towns. He presumed the reason was that the country, being open to invasion, was too much disturbed to allow of important buildings being erected.

Mr. W. CURTIS GREEN seconded the motion, and remarked that lectures of the kind were valuable, because they saw illustrations of mediæval buildings which helped thought. That period of architecture was nearer to them than any other, and it seemed to him that the buildings could be dissected, and their points in construction found out; yet when they had discovered that they knew as much as the mediæval builders, and that they could do even better work, they felt they could not do what the mediæval men did, since their work lacked the same charm.

Mr. R. P. OGLESBY attributed the charm to be found in mediæval buildings to age and the time given to their erection.

Mr. F. DARE CLAPHAM hoped the lecture would set two precedents, (1) that the retiring hon. secretary should always read a paper when about to quit office; and (2) that occasionally they had a paper written on the annual excursion. Such a paper as that he was sure would be most interesting to those members of the Association who for various reasons could not take part in the gatherings. Many of the members knew very little about their own country, and on the annual excursions in England buildings were visited which it would be impossible to see privately; the value therefore of papers similar to the one they had heard that evening was apparent.

Sir A. Brumwell Thomas, Messrs. Theodore Fyfe, S. Flint Clarkson, F. Winton Newman, and H. W. Brittan supported the vote of thanks.

Sir A. BRUMWELL THOMAS on behalf of the members offered the thanks of the Association to Mr. Walter Cave, the retiring president, and Messrs. Curtis Green, Louis Ambler, W. Wonnacott, and A. Needham Wilson, the retiring members of Council.

The motion was carried by acclamation.

PICTURES AND THEIR ARTISTIC ENJOYMENT.

By P. WALTON HARRISON, M.S.A., P.A.S.I.

"I KNOW what I like!" is a remark almost certain to be heard at any exhibition of pictures, and the tone of voice in which it is usually uttered leaves little room for doubt that the speaker at least is convinced that "what I like" is certainly not less worthy of admiration than what anybody else likes.

It may happen that some friend whose knowledge of art is not confined to "knowing what he likes" is standing by, and ventures to question the merit of some picture singled out by the speaker for special approval; but, if so, his objections are promptly met by the well-known assertion that "De gustibus non est disputandum!"

Now if any artist is sufficiently in earnest to desire that good art should be appreciated and bad art condemned, it is his positive duty not to allow those who know nothing about art to take refuge behind this false and flattering old proverb. Taste is a matter that admits of discussion; one man's taste is emphatically not as good as another's.

Architecture, sculpture, painting and music are but different dialects of the universal art language, and should express, each in its own sphere, some beautiful phrase of nature. Every day vulgarities, and coarse strength of language are intelligible even to inattentive ears, but refinement and grandeur of language come to us only as the reward of some study of the subject.

The average public which pays its annual shilling at the turnstiles of Burlington House "does" the exhibition and comes away with a headache, due mostly to mental indigestion. Not knowing what is good and what is bad, what is worth looking at and what is not, most of the visitors have to look once at least at every picture on the walls, and are constantly on the strain not to miss any that they may afterwards be told they ought to have seen and admired.

The physical and mental effort involved in seeing an exhibition in this way is exhausting, and hence the almost inevitable headache of those who "only know *what* they like." But those who know also *why* they like certain pictures better than others, and have art knowledge enough to recognise good pictures at a glance, look only at them, and consequently come away pleasantly stimulated by their two or three hours' stroll through the Academy rooms.

How many of us admire a landscape for no better reason than that last year we wandered up that valley, or climbed that mountain-side, or loitered away a summer's afternoon on that shore; or are interested in a picture mainly because it shows us a particular place that we purpose visiting? How many of us again are attracted to a picture simply by some humorous incident, some silly sentimentality, some simpering face with eyes of superhuman size; whilst, whether a picture is well-composed, well-drawn, well-painted, whether the colour is richly or delicately harmonious, whether, in a word, the language in which the ideas of the painter are expressed is forcible or refined, what does it matter to us? Unable to understand, we are unable to enjoy.

To be able to derive artistic enjoyment from any work of art one must have the power in some measure of appreciating technical excellence, and be able to apprehend the aim of the artist in each picture that he paints.

All art being but an echo of nature, a knowledge of painting must necessarily quicken our perception of natural beauty, and so add immeasurably to the sum of our enjoyment. But the reverse does not hold good. Because we are ardent students of nature from the scientist's point of view, we are not necessarily able to understand and enjoy a work of art. To be able to do that we must not only be able to see the aim of the artist in each separate work of art, but must

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apprehend at least, even if we do not practically understand, the limits within which he is constrained to work by the very necessities of his particular art dialect. If not, though of course able to recognise any special beauty or natural truth which the artist has incorporated in his work, we shall be apt to look for phases of truth and aspects of beauty which could not possibly have been included in the same art effort, and, failing to find them, it will be difficult for us to give ourselves up to the enjoyment of the truth and beauty which the artist has been able to realise.

An experienced painter knows only too well how much he must leave unrecorded in every picture he paints so as to render at all visible that particular phase of beauty to express which the picture is painted; and unless we are able to recognise this necessity, how is it possible for us to enter into his enjoyment? If light, for instance, exists in any remarkable degree in a picture, as it does in many of Turner's works, it is foolish to object that the forms are less distinct and the colours less decided than in Nature; because an artist of Turner's power could certainly have emphasised both form and colour correctly had he chosen to do so, and could have elaborated all details as accurately as any so-called "Pre-Raphaelite." Or if we see great richness and beauty of colour in a picture, as we actually do in most of Titian's works, we must be content with the glowing tones of the flesh and the deep splendour of the draperies and backgrounds, and must not complain of the want of absolutely natural truth of light and distance. Or if we find great elegance of line and ideal beauty of form, as we do in so many of Raphael's works, we ought to be content to tolerate the mediocre and sometimes commonplace colouring, which to some extent is the price that Sanzio had to pay for the very qualities for which we admire him. Again, if a picture shows that the painter has aimed at expressing grandeur, vivid vitality or character, we must not be surprised to find forms generalised or even exaggerated, as Michel Angelo and Rubens have actually done.

It is very far from my desire to deny that it is the duty of each artist to do his utmost to unite all possible excellences in every picture he paints; but if we want to get as much pleasure as possible out of existing pictures we must give up the expectation of finding all the best qualities embodied in any of them. If it should sometimes seem to us as if the great masters had almost scorned some of those art qualities that we specially admire, let us confess that they could afford to do so.

Anyone, artist or not, strolling through an exhibition can pick out the pictures that please him, can say what subjects on the walls are sympathetic to himself. But the man who is content only to "know what he likes" must not lose sight of the fact that the subject selected by the painter is not the sole standard of the merit of a picture as a work of art. The choice of subject shows the man; it is the treatment of that subject which reveals the artist.

Now the beauty or grace or truth expressible in a statue or picture is far more material and emotional than intellectual. In sculpture before anything else we want material form sufficiently beautiful to please the eye, and in painting we want first of all beautiful form, beautiful colour, and picturesque light and shade and composition; and without these fundamental requirements the most elevated ideas, the most refined sentiments, have no art value whatever.

The artists who know most about their art know how difficult it is to draw really well, how seldom a picture is perfectly composed, how rarely a painter is greatly gifted as a colourist, how few painters have much taste, and how unlikely it would be to find all or even most of these excellences united in the same artist, and so they are ever glad to greet real merit of any sort, and are ever the most lenient and appreciative of critics. Fault-finding is easy enough, but mere disparagement of pictures, such as one so often hears at public exhibitions, is the lowest form of criticism. A picture represents often a considerable portion of a fellow-creature's life, and if we say anything about it at all, we should honestly endeavour to see what is good in it, as well as notice its evident faults and fallings short of excellence. What profit or pleasure is it likely that anyone can derive from a visit to an exhibition whose habit it is to criticise the pictures somewhat in this fashion?

"Well, yes, now you mention it, I see that the colouring is rather rich; but how coarsely the paint is put on! It doesn't look bad, you say, from this distance; but just go close to it and see if the paint hasn't been plastered on with a trowel. If that's what you call effective painting, give me an artist who knows how to finish his pictures."

Or in this fashion:—

"Oh! the composition is very graceful, is it? Well, perhaps there is a sort of refinement about the picture when you come to examine it carefully; but you don't mean to tell me you call those dingy drabs and dirty greys good colour?"

Surely one would get far more enjoyment from a visit to a picture gallery if it were one's custom to look rather for the merits than for the faults of pictures, and to criticise them something after this fashion:—

"Yes, the drawing is rather hard, and there is a want of air in the picture, and the colour is not absolutely first rate; but what individuality there is in all the forms, and what fine action in that figure! And how dramatically the whole subject is rendered!"

Or in this fashion:—

"I must admit that it is not easy to define some of the details; but what does that matter when the whole picture is so suffused with light, and when the canvas has been transformed into a vision of lovely colour?"

In all honestly-painted pictures there are certainly some qualities worth notice, if only we have eyes to see them; and the only fair way to criticise a work of art is to look for those qualities which the artist has striven after, rather than for those which he has not attempted to express. If we assume any judgment as to the value of a picture as a work of art, we certainly must not base our verdict on the subject merely, but before calling a picture bad or good we must be able to recognise whether or not the drawing is correct, whether the colour is harmonious or true, and whether the composition is good—that is, whether the lines and general arrangement of form, colour, and light and shade are picturesquely effective.

THE DESIGN AND REQUIREMENTS OF ELECTRIC-POWER WORKS.*

IN all electric-power works it is important to secure a good site, and in searching for a site it is necessary to bear in mind the following:—

Site.

(1) In the early days the works were so small that it made little difference whether the fuel could be unloaded direct or had to be carted, but in our days, when electric-power works are getting of such dimensions and require such an enormous amount of fuel, it is important that every penny should be saved in its handling. A great many works are suffering from the early mistakes made. In many municipal works the site was chosen on account of the Corporation owning the land—often in the middle of well-populated districts—and as the works have grown this bad selection has cost them thousands of pounds. The fuel must be obtainable to-day either by rail or water, preferably by both. If by rail, a switch siding should be constructed; and if by water on the river or canal, a wharfage should be built so that the coal can be picked up by the transporters or cranes from the barges and delivered direct into the bunkers.

(2) There are many works to-day where the necessity for a supply of water for boiler feed and condensing purposes was lost sight of, important as it is.

(3) The site selected should be in such a position that no question of nuisance, annoyance or injunction can give future trouble.

(4) It is important to examine the subsoil. Very often a large amount of money is wasted in having to build very solid foundations, and many times the site has to be piled.

(5) There must be plenty of room left for extensions.

(6) Due consideration must be given to the capital outlay and cost of the site, for it must be remembered that capital outlay plays a very important part in financial failure or success.

Having selected a site which complies with the above requirements—and it will not be found easy to get one—the next consideration is what sort of buildings should be put thereon, and here comes the question of

The Requirements of an Electric-power House.

Buildings.—Firstly, I will take the case of a power-house where steam engines are to be used, and there will then be the following buildings:—

(1) The main engine-room, which should always be designed large enough for extensions, and this will vary in size according to (*a*) the output of the works; (*b*) the type of plant to be used.

(2) Then adjacent, and usually forming part of the same building, should be the boiler-house, in which are contained

* From a paper by Horace Boot, M.Inst.E.E., A.M.I.Mech.E., Consulting Engineer to the Tunbridge Wells Corporation, presented at the general meeting of the Institution of Municipal Engineers held at the Building Exhibition, Olympia, April 24.

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the necessary steam generators, together with the automatic coal-handling plant.

(3) Next should come, and usually adjacent to the engine-house, the switchboard arrangements, sometimes placed in the main engine-room, sometimes in a building to itself, with an entrance from the former.

(4) The pump-house, to contain the necessary feed pumps, together with the auxiliary plant, and these should be arranged in such a position that the dust or dirt from the fuel does not interfere with the continuous and satisfactory working of the pumps.

(5) A fuel-storage building, and here care should be taken to prevent the possibility of the fuel catching fire; also the fuel should be stored adjacent to the boilers to avoid excessive handling, because every time the coal has to be handled it usually means an addition to the price of about 3*d.* per ton.

(6) Adjacent should be extensive workshops for undertaking all the necessary repairs.

(7) Stores and storekeeper's office. These should be put into one, and need not necessarily be part of the same building, but they should be near.

(8) Then there are the general offices with accommodation for the staff, consisting of (*a*) the general office for the clerks and consumers; (*b*) the typing-room, with telephones; (*c*) the assistant engineer's office and drawing office; (*d*) the chief engineer's office; all of which should be close to the works.

(9) It is necessary to provide baths and wash-houses for the men in charge.

(10) If batteries are used, then a battery-room, which can be worked into some part of the office building, or adjacent to the engine-room.

(11) In addition to the buildings, provision must be made for the chimney shafts.

(12) The foundations for engines, boilers, pumps, main flues, &c.

In the case of small works it is not necessary to employ an architect, but when it comes to the design of large works it is always advisable for the consulting engineer to employ one. It must always be remembered that the buildings are to house a plant which is going to earn money, and not, as is occasionally the case, a plant which would seem as if it were designed for the buildings. It must also be remembered that in electricity supply works, where the profits are never large, too much money must not be spent on ornamentation nor should palatial buildings be erected.*

It is certainly interesting at this stage to compare the cost of various buildings in electricity supply works to see how the price per kilowatt varies:—

Name of Town.	Total Cost.	Cost of Land and Buildings.	Kilowatts Housed.	Cost of Buildings per Kilowatt.
	£	£		£
Brighton . .	717,738	149,431	5,400	27·67
Glasgow . .	1,368,134	211,172	10,993	19·20
Newcastle . .	1,192,442	169,675	20,000	8·48
Metropolitan . .	1,802,383	435,777	18,500	23·55
Tunbridge Wells .	£1,134	13,207	1,170	11·28
Chichester . .	20,000	600 not land	200	3·0

Construction.—There are so many different methods and forms of construction known now that it is impossible in this short paper to enter into them, but, generally speaking, for small power-houses nothing beats brickwork, with the cantilever roof and lantern lights running along the top.

For very large power-houses concrete and steel construction is the best; that is to say, the whole of the building is constructed of steelwork and filled in with concrete walls. It is important to remember that as little inflammable material as possible must be used in the generating works.

Provided there is sufficient land, it is advisable to build a dwelling-house for the engineers-in-charge and cottages for the principal workmen, so that the men are always near if required.

Water Supply.—In works where steam engines are used it is essential to obtain a good supply of water for the following purposes:—

1. Boiler-feed purposes, in which case it must be fairly pure and soft; if this is impossible, a water-softening plant should be used.
2. Condensing purposes in large quantities.
3. Domestic supply.

Nuisance.—In dealing with the question of nuisance, although the undertaking may be working under Parliamentary powers, it is possible for adjacent owners to obtain an injunction and compel the works to be shut down, and for that reason if it is impossible to get a site away from the residential property, it is advisable to buy up the property first, as afterwards the prices asked may become greatly enhanced.

Type of Plant.

The type of plant makes a very great difference to the size of the works. It used to be the practice to use slow-speed engines; these have been replaced with high-speed engines, taking up much less space, and now in the power-stations the steam turbine is taking the place of the reciprocating engine.

In the relative space required for housing reciprocating engines and steam turbines there is a very big difference in favour of the turbines. The cost of buildings per kilowatt is less, vibration troubles are much less and first cost is low, so that for large works the steam turbine is destined to supplant the reciprocating engine.

Style of Building.—I am afraid power-works do not lend themselves to architectural embellishments:—(1) On account of the capital cost having to be kept down; (2) in that their general shape cannot be very sightly. The buildings, as I have said before, must be fireproof, and the materials used are best left to local conditions. Inside, the walls should be lined to a height of about 10 feet with white glazed bricks and finished off with ornamental chocolate or other bricks. For the cranes the pilasters must be of sufficient strength to carry rails on both sides for the crane, which should lift not less than 10 tons.

Flooring.—The style of the flooring for the engine-room is very difficult to settle, but so far as pattern goes it is hard to beat mosaic or tesselated paving, but it should be set up in squares, as otherwise there will not be sufficient give and it will crack owing to the variations in temperature. In many works tiles are used, but the trouble is that when heavy tools are dropped the tile is usually broken. Hard wood flooring has been tried, but with oil and grease about it is difficult and expensive to keep clean, and when dirty becomes very slippery. For the boiler-house I am in favour of using blue bricks placed sideways on account of their lasting properties.

The design and height of the roof varies according to the plant to be installed. For turbines the height can be kept low; on the other hand, if reciprocating engines are installed, sufficient room must be left below the crane for effecting all the necessary repairs. In all power-works a travelling crane is indispensable.

A site should not be chosen where a great deal of money has to be wasted on levelling, for it is important that the engine-room floor should all be on one level. Again, great care must be taken to see that the flues and economisers are not placed below the ground water-level, as nothing will keep the water out of the flues should this be the case.

It is very difficult to keep the boilers and generators in a line with one another, on account of the boilers requiring so much more room for the same output. In America they often place the boilers on different floors, but this practice has not been copied over here, as there are undoubtedly objections to it.

Refuse Destructors.

Many local authorities consider that the refuse destructor should be situated alongside the electricity works, and that the steam generated by burning the refuse can be used for this purpose. There is no doubt where the loads coincide this can be done with great economy, but where a works has only a lighting load, which does not suit the conditions of burning refuse, the saving obtained by combining the two is not so apparent as it would be in the case of combining a refuse destructor with a waterworks or works requiring a constant amount of power. Anyhow, I venture to think the practice will increase rather than diminish.

The refuse-destructor house should be designed to have an inclined roadway for the carts to deliver above the furnaces, so that they can be charged direct. In the case of destructor buildings it is better to build them apart from the engine-house, to keep the dust out, otherwise trouble will be experienced. One cannot be too careful in building a refuse-de-

* Mr. Boot, in common with many engineers, is evidently under the erroneous impression that architecture, as distinguished from mere building, is principally a matter of money, whereas it is mind rather than money that elevates building to the level of architecture—a fact that American engineers are beginning to realise.—ED.

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structor house, and it should be well ventilated and arrangements made for cleaning and disinfecting.

Latest Design of Large Power-Works.

Some particulars of one of the latest works—that owned by the London County Council, and known as the "Greenwich Generating Station," for the supply of electric power to the tramways—will be found interesting. The buildings were designed by the Council's architect to the requirements of Mr. J. H. Rider, and trouble was experienced in getting sound foundations, for the whole of the floor has been floated on a concrete raft 6 feet thick, having concrete retaining walls. The buildings are of steel framework enclosed with brick walls having stone dressings for ornamentation. The boiler and engine-houses are faced with ivory-white glazed bricks and a brown glazed dado, which certainly gives a very good finish. The floors throughout are of concrete, covered with terrazzo or granolithic. The boiler-house is 445 feet long by 80 feet wide, and the engine-house is about the same dimensions. Especial care has been taken with the coal-handling plant, and it is capable of unloading no less than 2,000 tons per twenty-four hours.

It is interesting to note here that, although employing water-tube boilers and bituminous coal, very little trouble from smoke is experienced; this is probably due to the fact that the boilers are raised higher than is usual above the fire-bars.

There are many good points in the design of these works that it would be impossible to go into in this paper, but if my readers are interested I cannot do better than refer them to the excellent paper read recently by Mr. J. H. Rider before the Institution of Electrical Engineers.

Buildings for Gas Engines, &c.

Hitherto I have only dealt with buildings required for the generation of electricity when using steam engines, but should gas engines (either suction, producer or power gas) be used, then a boiler-house is not required. Instead of a boiler-house, however, there must be what is known as a gas-house, which should be well ventilated and left open at the sides; space is also required for the gasholders, and it is important to see that the buildings are so designed that all noxious fumes given off by the gas-making or by leaky joints cannot concentrate, but are at once carried away. The engine-house follows much the same lines as that required by steam, except there must be better ventilation, and where this is not always possible forced or mechanical ventilation must be resorted to.

In the works I designed for the city of Chichester, which are, of course, small, but which will probably be followed by all small towns where an electricity supply is not at present given, the buildings only comprise an engine-house. The walls are brickwork, the roof steel framework and slated, the flooring terrazzo, and the generating plant is interesting as one of the first (if not the first) depending upon its supply when employing engines of the Diesel type for prime movers. Here only a simple engine-room is required to house the engines and dynamos, switchboard and other auxiliaries; no boiler or gas-producer house is required. The large storage tank containing the crude petroleum is better placed outside the buildings and need not be covered in.

It will be noticed by referring to the table above that the cost comes out, from the building point of view, very low, which is one of the advantages of using Diesel oil engines for generating electric power.

I am of the opinion that for small towns, where coal is dear, nothing can beat the results obtained by these engines, and what with metallic-filament lamps reducing the cost of electricity to below that of gas (in small towns) and still allowing a margin of profit for the shareholder or municipal authority, there is no reason why many towns now, which hitherto have been too small to put down works, should not follow the example of Chichester.

In designing the buildings it must not be forgotten that no matter what type of plant is used, provision should be made for cableways, pipe trenches, &c.

Lighting, Heating and Fire Apparatus.

The lighting of the buildings will, of course, be electricity, but in generating works it is advisable to provide a second method. For heating the buildings steam radiators can be used where steam is employed. Provision should be made for the usual fire-extinguishing apparatus, both in the engine and boiler-houses, as well as in the offices.

The Wath Urban District Council have instructed Mr. Arnold Hallett, of Sheffield, in conjunction with Mr. H. C. Poole, surveyor, to prepare plans for public baths.

ASPECTS OF APPLIED ÆSTHETICS.—III.

THE last of the three lectures delivered by Mr. James Paterson, A.R.S.A., R.W.S., R.S.W., at the Royal Institution on the above subject was given on May 6. It was entitled "Art and Ethics." We give below a condensed report:—

So little sign of serious purpose is immediately apparent in much of what passes for art in these days that one is not surprised at the tendency, among those who regard life with any gravity, to consider all concern for æsthetic problems as a trifling with the higher interests of mankind. It is said that the faith which enabled the artists of an earlier age to create works showing high moral aim has grown cold, and been replaced by doubts which result in soulless essays in paint, devoid of edification if not absolutely noxious in tendency.

An important section of the British public is not content to take art as a contribution towards a full and joyous life, but demands that it shall be respectable, demonstrably useful, nay actively hortatory in its appeal. Such an attitude would speedily stamp out all vitality in the creative arts. But the great question of art and ethics is one of extreme delicacy and complexity. Excessive emphasis in its treatment is to be deprecated; conventional and long-accepted views demand respectful consideration.

The chief argument of the advocates for a direct moral teaching through art is that since the sense of right and wrong is the main distinction between man and brute, man's highest aim must be to strengthen this sense; unless the arts teach they are not considered to fulfil their function. Such, it is maintained, was the attitude of the sculptors of Greece, of the painters of Italy. But it has been amply proved that this latter persuasion had no foundation in fact; and in so far as they were great artists all other emotions were fused in the enthusiasm of creation, all other considerations subordinated to the mistress art, whom they served.

To bring the question to our own time reference may be made to the late G. F. Watts, one of the noblest of his generation and an artist who will ever be ranked high, if not among the highest. His work acutely raises the point, "How far may art legitimately become a teacher of morals?" His art, moreover, apart from the high aims he publicly enunciated, always furnished material for discussion. His themes appealed to thoughtful minds and engaged the attention of those quite unmoved by normal æsthetic influences. Though much has been written about him, the position he will hold as an artist has yet to be determined.

His career from the first was watched and aided by men of distinction, power and wealth; he was never tempted to curry favour with the multitude. He lived in extreme simplicity and never relaxed his strenuous labour. It was his expressed intention to leave the bulk of his work to the nation, and it became increasingly difficult to induce him to part with any of his pictures. This large and unique collection is permanently housed at Limnerslease, near Guildford. The impression on viewing this memorial of the labours of a truly great man is one of elevation, seriousness and richness. Perhaps it is a little too serious; many of the canvasses are so obviously didactic, though what the teaching may be is sometimes doubtful. The meaning of a work of imagination should dawn upon the spectator almost unawares; a written explanation is something like a confession of incomplete success. In a large number of the works these conditions are fully realised.

Some of the printed criticisms of Watts's work are typical of what passes for art criticism. The writers, though nominally engaged in elucidating the work of the artist under consideration, seem more concerned to demonstrate their own power of word-spinning, clouding their opinion or want of opinion in elusive and fantastic phrases.

It would be futile to approach the work of Watts without sympathy for the masters of paint in the past, and especially the painters of Italy. To anyone whose idea of fine pictorial expression is the more or less accurate rendering of natural objects, the vision of this painter must be vain indeed. Realism had never for him any strong appeal; approximate truth to the visual aspect of things he was not concerned with. Hence the misunderstanding meted out to his works by the general public who throng the galleries. The excellences they are unable to appreciate; the lessons the more didactic pictures endeavour to teach are beyond their ken, and are presented in terms with which they are unfamiliar.

Many of his contemporary artists regard the artist's work with qualified admiration; and history shows that the ultimate position of any artist is similar to that given him

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by his peers. "Watts," said one famous living painter, "is not one of the great originating minds. His work was from beginning to end derivative, not notably in motive, but in execution. A certain lack of personality marks and mars his technique. Compared with the acknowledged masters of the past Watts never acquired that perfection of touch, that thorough command over his materials which is unmistakable." This is undoubtedly true in part. But it may be suggested that Watts consciously sacrificed such command and touch for the ethical value of his pictures.

Watts declared his intention was "not so much to paint pictures which shall please the eye as to suggest great thoughts, which shall speak to the imagination and the heart and arouse all that is best and noblest in humanity." Undoubtedly high thought and deep feeling may be expressed in terms of paint. But this advocacy of direct ethical teaching appears to traverse Aristotle's definition:—"Art is a free and independent activity of the mind, outside the domain both of religion and politics, having an end distinct from education or moral improvement."

The artistic product must not be judged by the nobility of the subject, but by the clarity, intensity and beauty of its expression. Mr. Watts in many cases mistook the immutable limitations which hedge the artist, and in such examples qualities which make for true greatness are weakened and tend to disappear.

On making acquaintance with any such production we ask ourselves, "Do we like it? Is our imagination touched?" We must further consider if these emotions are created by the work itself. Cultivated people are constantly moved through very trivial and faulty suggestion; the more sacred the association the more liable to abuse. There is great danger that the faculty of judging may become blunted and even distorted through sympathetic acquiescence in what is manifestly poor and faulty.

In architecture, sculpture and painting the higher the artistic appeal, the more limited the response. It is certainly better to enjoy what is open to criticism than to take no pleasure in anything; indeed it is only by the honest exercise of our preference of the best that we can hope to advance in our appreciation and comprehension of beauty; but along with this pleasure received there must ever recur the questioning spirit and a readiness to rise to higher levels of understanding.

A subsidiary point in the contrast between ethical and purely artistic aims is suggested by a practice of Mr. Watts when he had achieved wide recognition. This was the reduplication of certain pictures in response to the demand of those who had come under their sway. Yet for the most part it is entirely impossible for an artist to make a facsimile of a picture, be it his own or another's invention—the vital spirit eludes him.

The advocates of direct ethical teaching usually minimise the less transcendent aims of what they consider mere earthly painters. These they regard as trivial and unsatisfying, permissible perhaps as having some educational value or suited to the passing consideration of frivolous people.

Watts's presentment of his sitters is the antithesis of much of the outstanding portrait-painting of our day, whose brilliant synthesis takes our breath and leaves us convinced doubtless of keenness of vision, but wondering if there were really no human soul beneath the outward mask. Watts seems to have seen almost too much significance in the features before him, and to have wished to remind us of the possibilities which underly them, the experience of life which has made them significant, the hopes that burned in the mind behind the face.

Significance is the commanding feature of one special work of Mr. Watts which it would be invidious not to mention—viz. the colossal "Physical Energy," a replica of which has recently been erected in Kensington Gardens. Here we have a work which, like the picture "Love and Death," possesses such great qualities; criticism regarding details seems an impertinence. Here we have the artist working in the spirit proper to art; he has in no sense allowed his didactic purpose to interfere with the clear and penetrating presentment of an ideal.

"If a picture," says Sir Richard Jebb, "is also a lecture or a sermon, it is so by accident, not in pursuance of the aim proper to art. But this proposition requires to be supplemented by another. Be the subject or the style of art what it may, art must everywhere and always carry with it a certain moral and intellectual suggestiveness, whether the artist intends it or not. Form, colour, light and shade appeal through the sight to the emotional sense of beauty; and this sense is in its turn associated with feelings, thoughts and memories of a subtlety and a complexity which baffle analysis."

The important thing is to enjoy with all our heart what appeals to our own sense of beauty. If, as has been said, no one is entitled to have opinions, nothing can deprive us of our impressions; and by giving these free scope we shall inevitably advance in our appreciation. In the exercise of our faculties of admiration, hope and love there are no limits to growth.

Let appreciation, however, be honest and real, based upon individual perception, not in acquiescence to a general consent. Ready-made opinions are picked up without effort and discarded without regret by the vast majority of people. The relations between art and ethics are of the closest, but they differ both in extent and in degree from those generally understood.

NOTES ON BOOKS.

"The Force of the Wind." By Herbert Chatley, B.Sc. (Engineering). (London: Charles Griffin & Co. 3*s*. net.)

THE impression that one gathers from a perusal of this book is that, in spite of all the experiments that have been made and the theories that have been advanced, our knowledge of the force of the wind is still far from complete. This does not prevent us from recommending this small volume to the attention of architectural students as usefully introducing them to some of the effects that follow from the energy of the wind. It is too much the custom to regard the force of the wind as being simply applied at right angles to any surface it may encounter, and the chapter on the impulsive force of the wind should be carefully studied together with that on the stream line theory. One would then better understand the merits of the ancient fashion of constructing chimney stacks with separated diagonally-placed flues as an approximation to the form of least resistance, a form, by the way, that was the basis of the old ship-builder's theory of "cod's-head and mackerel-tail." Wind does not always strike a surface, say that of a roof, either horizontally or at right angles to the plane of the roof, and the variation in its direction on meeting an opposing surface with the consequent variation of its velocity is of importance as causing the stripping of slates or tiles. This branch of the subject has been studied by yacht designers in connection with the effect of the wind on the sails of racing yachts. Although Mr. Chatley's book does not, as it could not within its limited compass, treat of every aspect of the force of the wind, it will be found very useful as an introduction to the study of the subject.

"City of London Directory." (London: "City Press." 12*s*. 6*d*.)

Works of reference, generally speaking, are published at the very commencement of the year, but the issue of the "City of London Directory"—the 1909 edition has just been published at the offices of the *City Press*, 148-9 Aldersgate Street—is always delayed with intent until the close of April, in order that cognizance may be taken of the numerous civic, municipal and trade changes that may be looked for in the first quarter of the year. Naturally, in a directory dealing with the City of London, especial stress is laid on the institutions connected with the local life of the "one square mile." Firstly, there is a full list of members of the Corporation, arranged alphabetically, and also according to the wards they represent; while, too, the committees are set out, this being a valuable feature to be found in no other annual. The officers of the Corporation are also stated, and the representation of that body on the various governing bodies of London is given. The up-to-dateness of the work is evidenced by the fact that the death of Mr. C. M. Wither, C.C., and the retirement of Mr. C. Val Hunter, C.C., are duly notified. A full list also appears, not only of the members of the London County Council, but of the committees, the "Directory" being the only work of reference that gives this very useful information. The City Companies' section is exceptionally full, the history of each Guild being summarised, the benefits attaching to membership set forth, and the work undertaken in the interests of trade and technical education described. Other features of the "Directory" include portraits and short biographical sketches of the aldermen, the high officers of the Corporation, the members of Parliament for the City, and the masters of City companies; lists of members of the Lieutenancy and Lloyd's; and a map in colours of the City of London.

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OUR CONTEMPORARIES FROM OVER-SEAS.

THE *Architectural Record* (New York) for this month devotes its whole space to "fireproof," or fire-resisting houses, including under that category houses built of hollow terra-cotta blocks and of reinforced concrete. Incidentally, the numerous illustrations give us an insight into modern American ways of planning small or moderate-sized detached country houses. Some of the houses have wood floors and roofs, and are only fire-resisting by comparison with the normal frame house.

The *Engineering Record* (New York) commences a description of the central heating and lighting plant for the United States Military Academy at West Point by Mr. Henry C. Meyer, jun. Considerable enlargement of the Academy being in progress and contemplated, the problem of heating and lighting is by no means slight, about 3,000 horse-power with a possible increase of 600 horse-power being required, and the electrical load being about 1,200 kilowatts at present with an additional 200 kilowatts in the future. The detail of this installation is described in the article. An interesting account is given of the reinforced concrete dome to the new Capitol of Porto Rico at San Juan. This dome is double-shelled, and is designed to resist a recorded wind velocity of seventy miles an hour with estimated gusts at ninety miles an hour, and also earthquake tremors.

Correspondence

[The Editor will not be responsible for the opinions expressed by Correspondents.]

Architects Beware!

SIR,—With reference to the letter signed "F.R.I.B.A." which appeared in the November 27, 1908, issue of your journal, it has been brought to my notice that at least one company—the Federal Stone Renovating Company and Mr. Stokes, their chairman—consider my remarks unjustifiable and likely to seriously injure their reputation. That being so, I wish to state unreservedly that I had no intention of casting any damaging reflection upon the financial status of the above company or upon the genuine merits of any particular process or invention.

The sole object of my letter was to warn my brother-architects, especially the less-seasoned ones, against the danger of being taken at an unguarded moment and expressing opinions which might afterwards hold them up to ridicule. That this view was accepted by at least one other architect was shown by the letter which appeared the following week and signed "Another F.R.I.B.A."

I can only repeat that I am very sorry, and trust those who consider themselves aggrieved will be charitable enough to accept this withdrawal in all sincerity.—I am, Sir, yours faithfully, F.R.I.B.A.

Designing a Steel Box Girder.

SIR,—My attention has just been called to a letter signed J. Myrtle Smith, A.R.I.B.A., in your issue for May 7, asserting that the design given by me in a paper read before the Association of Engineers in Charge is impossible of execution, and expressing surprise that this was not noticed by any of the engineers to whom the lecture was delivered. Why it should be impossible is not stated, but the idea appears to be that there is insufficient room for the "holder-up" to get inside to hold the rivet heads while the rivetting of the inner angles is done on the outside. The space inside the girder is 15 inches wide (14¼ inches net) by 28 inches high, which is more than enough, as I have before me the drawing of a box girder of similar construction, designed by me fifteen years ago, in which the inside space is 12⅛ inches wide by 22 inches high, and no difficulty was experienced during the construction in putting in any of the rivets.—Yours faithfully, HENRY ADAMS, M.Inst.C.E.

The Building Exhibition.

SIR,—I quite agree with your several correspondents. Yes; the exhibit of drawings was missed. Provided you had been able to exhibit in a better position, I consider the collection was quite as good as many a Royal Academy (Architectural Room) Exhibition.—Yours faithfully,

A COUNTRY EXHIBITOR.

GENERAL.

Mr. J. S. Gibson, F.R.I.B.A., has been appointed assessor for the Middlesbrough public library competition on the nomination of Mr. Ernest George, P.R.I.B.A. It is understood there are from 150 to 200 sets of plans to adjudicate upon.

When the Master and Companions of St. George's Guild, Sheffield, hold their meeting at Ruskin Museum on May 21, the Lord Mayor and Alderman Nuttall, on behalf of the Corporation, will present a proposal to renew the twenty years' lease of the collection in the Ruskin Museum, which expires in 1910, for a further term of twenty years, and will offer to maintain the museum at Meersbrook Park for that period on the conditions of the existing lease.

Hamilton School Board had under consideration last week a communication from the Institute of Architects, Glasgow, stating that if the Board did not give fuller effect to the recommendations of the Institute they would be under the necessity of advising their members not to take part in the competition in connection with the plans for the new academy, which is to cost about 30,000*l*. The Board agreed to give effect to the recommendations in so far as giving the Institute the assurance that a professional man of standing would be appointed as assessor to adjudicate upon the plans and fixing at once the fees of the architect, but the Board declined to publish the name of the assessor until the competitive plans of the new building were in their hands. The architect's fees were fixed at 3½ per cent.

The Manchester Society of Architects at their annual meeting last week elected the following office-holders for the coming year:—President, Mr. P. S. Worthington, M.A., F.R.I.B.A.; vice-presidents, Mr. W. C. Hardisty, F.R.I.B.A., and Mr. Edgar Wood, A.R.I.B.A.; honorary secretary, Mr. Isaac Taylor, F.R.I.B.A.; assistant honorary secretary, Mr. Gerald Sanville, A.R.I.B.A.; members of Council, Messrs. John Brooke, Godfrey Colles, A. E. Corbett, John Ely, J. T. Halliday, F. E. L. Harris, P. D. Lodge, F. W. Mee, Paul Ogden, J. H. Sellers, John Swarbrick, and J. H. Woodhouse. The membership of the society stands at 265.

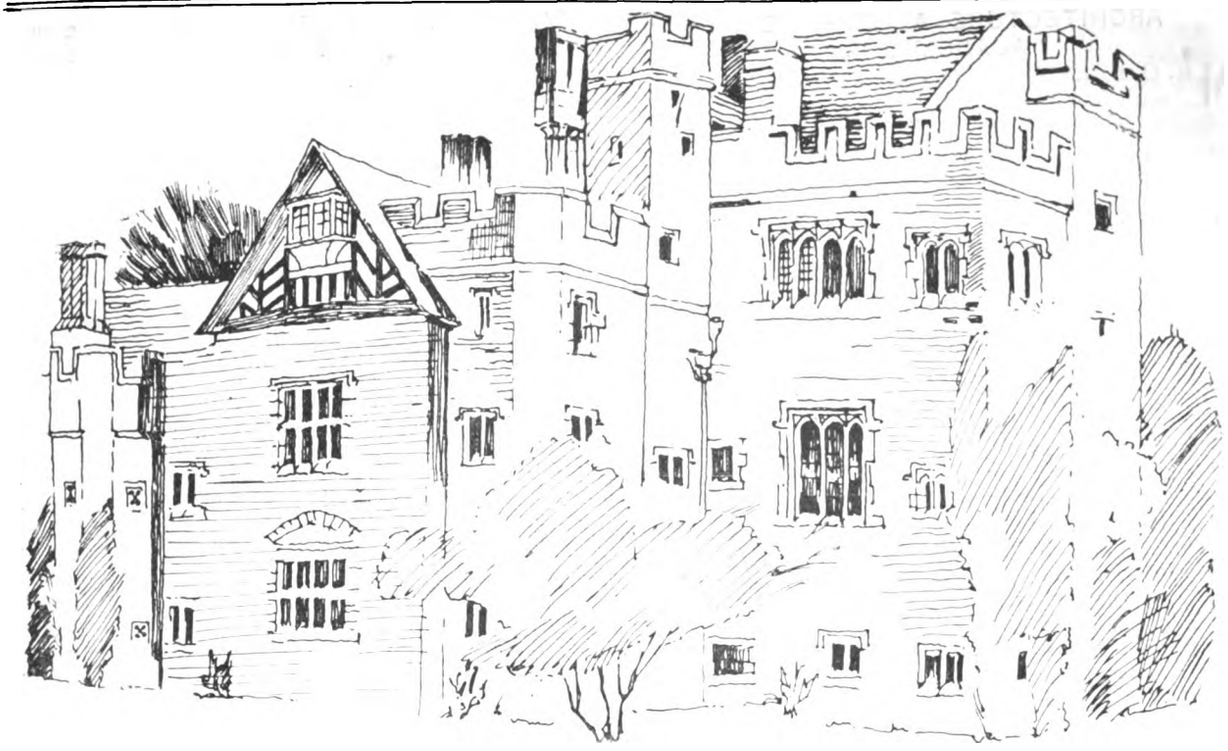
At the Annual Vestry Meeting of the cathedral church of St. Philip, Birmingham, the Rector said with reference to the cathedral tower that they had had it examined by a very competent architect, who said that though the substructure was quite sound, the outer casing was gradually wearing away, and that something must be done in the way of restoration or replacement. It was to be hoped that before the summer was out they would be able to remove the unsightly structure placed for protection's sake against the west front of the cathedral.

The Sheffield City Council organised a competition for laying out the Rivelin Road Estate. The competition was confined to architects practising within a radius of thirty miles of Sheffield. Eleven designs were sent in. The first premium of twenty guineas has been won by Messrs. J. Creswick Brameld & Sons, of York Street, and the second, of ten guineas, by Mr. James Miller, A.R.I.B.A., of Smalldale, Bradwell.

The Borough Surveyor to the St. Marylebone Borough Council recently complained as to the great inconvenience he experiences in not being able to take prompt proceedings against persons who begin to take down buildings in the borough, within 10 feet of any highway, without first giving notice to the Council of their intention to do so and obtaining a licence for a proper hoarding. Having regard to the special nature of these cases and to the need for prompt action, the committee recommended that the borough surveyor (after consultation with the town clerk) be authorised to take proceedings without giving the notices required by the Statutes, Metropolis Management Act, 1855, and London County Council (General Powers) Act, 1890.

The Report of the Liverpool city building surveyor (Mr. John T. Alexander) on the work of his department during the year 1908, states that the number of houses erected during the year was 1,850, or 183 below the average for the previous twelve years. There had been a marked reduction in the number of houses at a rental of less than 7*s*. a week, but more of the common six-room type of houses, commanding rentals of from 7*s*. to 9*s*. 6*d*. a week, had been built, while no houses of a high rental had been erected within the city boundaries, with the solitary exception of a single house at Aigburth. In the Walton district, owing perhaps to increased railway facilities and comparatively lower rentals, there was a marked increase in the number of houses built. The estimated number of houses in the city was now 151,697.

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A CORNER OF COMPTON WYNYATES, WARWICKSHIRE.
From a Sketch by BANISTER FLETCHER.

THE WEEK.

THE opinions expressed by Mr. A. B. HOWES, barrister-at-law, in his paper recently read at the Surveyors' Institution, and entitled "Quantity Surveyors: a Review of their Legal Position," if correct, considerably modify the impression held by most quantity surveyors. It has usually been considered that a quantity surveyor was liable to the builder for any shortage in the quantities, but Mr. HOWES put it that, as there is no privity of contract, the quantity surveyor is not liable to the builder for negligence in preparing quantities, but only for fraud or misrepresentation. As in the hurried conditions under which quantities are usually prepared it sometimes happens that mistakes are made and quantities are "short," many of the best firms of surveyors have been called upon by builders for recoupment, and have accepted the liability without demur. On the other hand, Mr. HOWES said that between owner and quantity surveyor there is a contract of service, and hence a warranty of reasonable if not absolute accuracy. The architect's position, according to Mr. HOWES, is that he is under no liability to either the builder or the surveyor in respect of quantities. The owner is liable to the surveyor for payment until the acceptance of the builder's tender, and after that the builder is liable.

THE Italians, although they will allow no foreigners to excavate in Italy, even when, as at Herculaneum, they cannot find the funds to do the work themselves, have nevertheless made arrangements for the maintenance of an Italian Archæological School at Athens, one object of which will be to undertake excavations. We imagine the Italian Government will be in somewhat of a dilemma if the Greeks, as they quite naturally might, were to ask for permission to excavate on the site of the Dorian settlements in Sicily or Magna Græcia.

THE persistency and influence of those who desire the maintenance as a complete entity of the Indian Collection at South Kensington appear likely to be successful, as the sympathy of Mr. RUNCIMAN, President of the Board of Education, has been won to this view. The probability therefore is that we shall have the India Museum in a new home. Certainly, for the sake of the collection, it would be better even that it should be housed in the extended Victoria and Albert Museum, than in the mean and unsafe shanties in which it is now located.

THE difficulty nowadays of obtaining really good "soft wood" timber was illustrated by the evidence and judgment given in the case at the Salford County Court of WARD & GOLDSTONE *v.* G. N. HADEN & SONS. The plaintiffs agreed to supply a certain quantity of red wood casing for electrical wires which was to be free of all knots "and other defects." Some of the material supplied was admittedly sap-wood, and defendants objected to pay on this account, but the Judge decided that sap in wood was not a defect, and that the red wood supplied was of average quality. He therefore gave judgment for the plaintiffs for the amount claimed.

THE gift of 50,000*l.* by the Goldsmiths' Company to the Imperial College of Science and Technology, South Kensington, should provide that institution with one of the best equipments for teaching engineering to be found in England, a thing in which London has been hitherto lacking. The objects of a central college such as the one at South Kensington, which is professedly intended for the training of teachers in technical schools, should embrace research as well as instruction. Certainly it is not for want of material provision that technical instruction in this country is far inferior to what it ought to be and to what it is in Germany.

SIR WILLIAM RICHMOND has written to the *Times* protesting, on behalf of the Society for the Protection of Ancient Buildings, against the "restoration" or renewal of the niche and canopy work of the west front of Exeter Cathedral. The Society states that the old niche work was of the finest white stone, admirably sculptured, and with expressions of delicacy and finish that claim for the work the highest place in mediæval craftsmanship," and Sir WILLIAM RICHMOND complains that a coarse yellow stone has been substituted. The Society often makes mistakes, and would seem to prefer that the "finest white stone," probably Caen stone, should be left to moulder and decay until nothing but a powerful effort of the imagination could restore for us a presentment of what the old work really looked like.

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ARCHITECTURE AT THE ROYAL ACADEMY.—II.

MR. O. BEESTON HATCHARD'S "Proposed Garrison Church, Khartoum," is shown in a brilliantly coloured perspective that well conveys the idea of the blazing sunlight under which the building will be seen. The design appears quite suitable for the locality, in which anything like elaborate detail would be practically impossible, and the author has skilfully obtained good architectural effect by the use of the simplest forms. Red brick, white stone, rough-cast (in moderation) and tile roofs are the materials. Shade is obtained by means of verandahs and wide projecting eaves. The "New Chancel, St. Mary's Church, Snettisham," by Messrs. Ravenscroft, Son & Morris, is unaffected and harmonises perfectly with the Decorated work of this well-known and beautiful church. Mr. R. Weir Schultz's "Cathedral Church of All Saints, Khartoum," of which both the interior and exterior are shown, apparently is an attempt to obtain the shade necessary under tropical conditions by a double wall plane, the external with triangular-headed Romanesque window openings, and the inner with pointed arches enclosing tracery of some kind not clearly indicated. The nave is spanned by pointed arches in red brick and stone. Considerations of expense have clearly limited the scope of the designer's ideas. Another design for a church in a sunlit country is "A Church near Capetown, S.A.," by Mr. Walter H. Jaggard, in which smallness of window openings is relied upon to prevent undue glare of light; by leaving the walls white in the drawing an idea of bright sunshine is conveyed. Mr. Edward Warren's "Triptych for a College Chapel" is a pleasant conception without elaborate architectural ornament, relying for its effect upon the figure paintings framed in green and gold. The body of the triptych shows angels adoring the Crucified One in the centre, and the wings the twelve Apostles also in adoration. "St. Barnabas Church Hall, Gorringe Park, Surrey," by Mr. Burke Downing, is a nice coloured drawing, which was reproduced by us in our issue of July 10 last year, and shows a clever and comparatively inexpensive design for a mission building, in which good architectural effect is obtained by the expenditure of brains rather than money. Mr. Roland W. Paul's "Pembridge Church, Herefordshire: Interior after Restoration," is a good pen-and-ink perspective from which it is difficult to gather how much is old and how much new, save that there can be no doubt the latter includes the open screen and hanging cross. "Buckfast Abbey Church," by Mr. Fredk. A. Walters, appears quite a cathedral in size and dignity. The style adopted is that of the English Transitional period, and shows once more how a great architectural conception may be independent of elaborate detail. A lofty central tower and a chapel of six altars at the extreme east end on the lines of Durham's chapel of the nine altars are striking features of the plan, to which may be added the position of the choir west of the transeptal crossing. Professor Beresford Pite, by his "Extension of Frinton Church, Essex," is going to change a commonplace little building into one highly picturesque and yet not too grand to retain the character of a country church. The picturesqueness is largely due to a well-designed wooden bell turret which one might describe as a glorified sance-bell cote. Plaster and red brick give brightness of colour, and good tracery of Perpendicular type interest to the design. The "Third Church of Christ Scientist," by Messrs. Fair & Myer, is a remarkable design, which is not wholly shown, but sufficiently suggested by a good coloured perspective to enable us to grasp that its salient features are quite out of the common. The entrance front has a tall, square tower set in the crown of a semicircular recess between two square blocks, and behind the tower is a low dome that presumably covers the body of the church. The drawing shows a polychromatic use of material that ought to delight the heart of Sir William Richmond. "New Church of St. Michael, Sunnyside, Berkhamstead," by Mr. Philip M. Johnston, is a quiet country church with a big tiled roof coming down low over nave and aisle, and with a square-tiled bell-cot at the west end. Mr. J. Coates Carter's "The Gate House, Anglican Benedictine Monastery, Caldey," is a powerful piece of design in rough masonry and simple detail, quite expressive of the purport of the building of which it forms a part. Mr. Matthew Honan's "New Church, Warrington," is shown both by interior and exterior views, and is broadly treated with a distinctly Italian feeling in the composition and a reminiscence of Romanesque work. The interior would afford a fine field for colour decoration, and would seem to have been designed with this intention. "New Unitarian Church, Lewisham," by Messrs. E. L. Wratten & W. H. Godfrey, is a simply treated mission-hall type of church with plain semicircular arches. Mr. J. Ernest Franck's "Church Hall for St. Mary's, Spring Grove," is a mission hall simply treated in brick with an elaborately detailed stone porch that provides the excuse for some more trenchant design. Sir Charles A. Nicholson's "Design for Rebuilding Clifton College Chapel" has for its chief feature, in the internal view that is shown, a vaulted crossing with a lantern, which reminds us in a way of the central feature of Ely. Coloured decoration in the form of paintings in architectural panels is indicated. Mr. W. Talbot Brown's "Church of St. Peter, Rushden," has breadth and dignity, and is a fitting design for a town church in brick without extravagance. Tile roofs, a small bell tower, gabled vestry and Perpendicular tracery help to make up the character of the design. In his "New Church, Wellingborough: Exterior," Mr. Arnold H. Hoole seems to have determined not to show his roofs, which, if the lines of the eastern gable are true, are of flat pitch and certainly have high parapets. It looks rather curious to see the tower only a little higher than the roof parapets.

ARCHITECTURE: ITS TRUE PRINCIPLES.—X.

By R. OWEN ALLSOP.

The Symmetrical and Asymmetrical Plan.

THE objection to the absolutely symmetrical plan is that it always suggests that the requirements of practical service have suffered in order to render the plan symmetrical. That this is often actually so we know well; that it is invariably so we have good reason to surmise.

The advocates of the symmetrical plan urge that the making of such is difficult, whereas the making of a plan by piecing together, anyhow, the several component parts, is an easy matter. The mistake here made seems to be to confound genuine thoughtless patchwork with scientific asymmetrical planning. It can be shown that the *striving* after symmetry of plan must necessarily entail a sacrifice to practical needs.

It seems much to say that there is something positively offensive to the eye in the perfectly symmetrical building—that of absolute symmetry both as to front and sides. This must be more mental than an appreciation of the eye, for we have already considered that the effect of symmetry, especially in large buildings, is quite lost in perspective. The sentiment then must arise from a mental consideration that the symmetry is forced and against truth and sincerity of purpose, in that the practical needs of the building must suffer. In claiming, then, that the symmetrical plan is good, because more difficult to make, the advocates of the system are standing upon ground not quite secure. May there not be a still more excellent system of planning? And is the statement that the symmetrical plan is more difficult to make quite true—is it at all founded on truth?

To give effect, whether architectural or otherwise, by symmetry is the easiest thing possible. The child writes a name and doubles the paper whilst it is yet wet, and is pleased with the symmetrical smudge resulting. The turner in a marvellously short time produces a symmetrical baluster from a shapeless mass of wood. Truly the mere production of symmetry calls for little or no science, skill or art; the making of a balanced effect does, however, necessitate the highest artistic knowledge and skill.

The symmetrical plan supposes that the practical

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requirements are just exactly duplicated—even the one side and the other. This necessarily supposes that there are such conditions that the most practically convenient disposition is one-half on the right, and one-half on the left-hand side. Can we possibly conceive of such conditions in nine out of the ten buildings needed either for the service and convenience of man, or to the honour and glory of GOD? Who would wish (to produce symmetry) for two further campaniles at St. Paul's Cathedral? Who would prefer two added eastern towers to our asymmetrical cathedrals? There is no disputing as to taste, but to some of us the perfectly symmetrical building of multifarious practical needs—as in civil architecture—is offensive. We have already suggested the reason—the sacrifice of truth and sincerity to produce that which is the mere essential characteristic of the beauty of vase or monument. The latter—if a work of architecture at all—is ordinarily a very low order of such.

What then must be the main guiding principle of planning? What, surely, but honesty of purpose? And how is this principle evidenced by the production of a plan whose motive is not practical service but the production of the beauty that characterises the inanimate crystal in its formation? The perfectly symmetrical building always suggests green cloth and a glass case—the cardboard model. Here, the eye, embracing the whole of a large building at one glance, can appreciate the symmetry. The conditions are different where we regard a large building in the actuality. On the other hand, extreme asymmetry—as in fig. 23—suggests anarchy.

The great error into which the extreme symmetrists fall is plainly in ignoring the fact that there are three main styles of planning:—(1) The perfectly symmetrical, (2) the patchwork, and (3) the honest and scientific.

Under the first principle of planning, if our practical needs produce naturally that which has not (in spite of some effort) the symmetry of halves, we force on such



FIG. 23.—AT PONTRESINA.

symmetry unnaturally. Practical convenience suffers in consequence. The *plan is bad*. By the second "principle," being too lazy or ignorant to do otherwise we patch on part to part wholly irrespective both of convenience and effect. The plan is worse. On the scientific system—hence the artistic system—we throw our utmost energies into producing the utmost convenience with the utmost effect, but we do not sacrifice practical needs to that which (it is supposed) will give a pleasing effect to the eye. Which is the better system of planning?

What is wrong with the horse, that he has not either a tail or a head at both ends? Surely nature has been wrong (according to the extreme symmetrist) in not thus balancing the appearance! To our way of thinking we can by analogy learn much from such a consideration of natural animal forms. The animal has a head—a principal part—a dominant. So in building there are principal parts. But in the building of perfect symmetry the whole is subordinated to an imaginary axis—for to such we must at last refer all symmetry of halves.

Now it is evident that the architect who produces a perfectly symmetrical monument or crystal-like plan has chiefly kept his attention fixed upon the symmetry. The practical needs have been wholly secondary—indeed, of importance of an infinitely lower grade, being in fact absolutely sacrificed and ignored.

This as a proposition may at first be denied; more careful consideration will show that the statement is not over exaggerated—not, in fact, exaggerated at all. The aim is the symmetry of halves. It is not the plan as a practical working device for the benefit of those who are to be installed on the building or to have approach or access to, or thoroughfare therein.

The same object is before the designer in producing

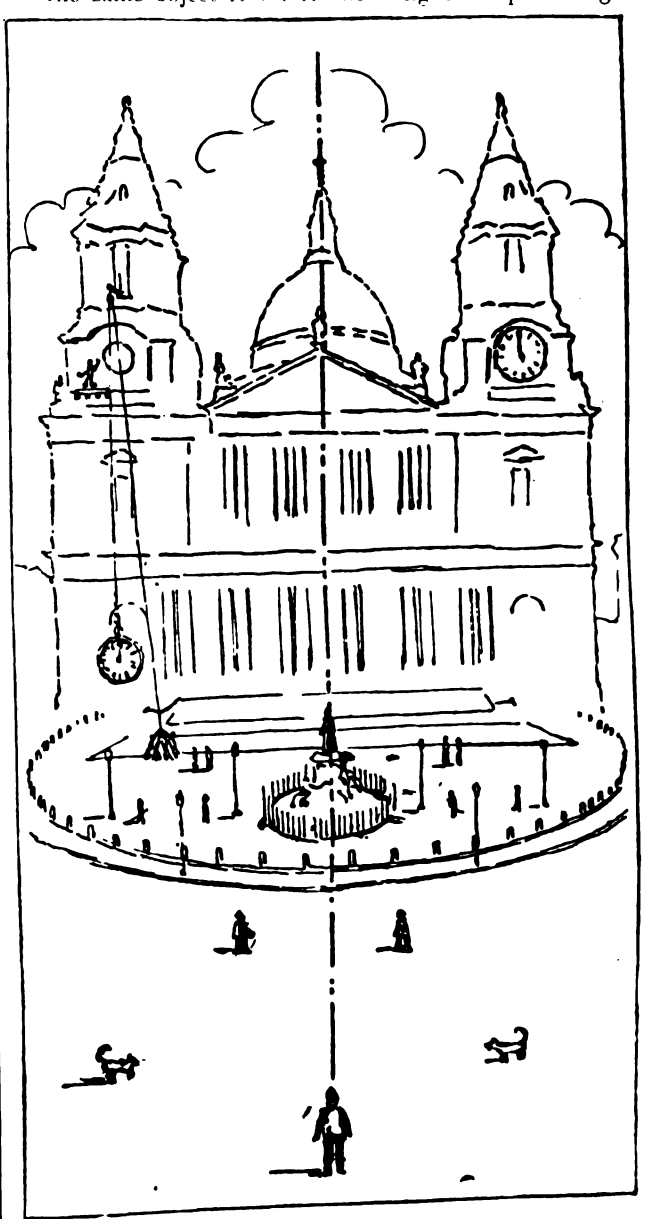


FIG. 24.—WEST FRONT, ST. PAUL'S.

a genuine monument, or a vase, or other minor class of ornamental composition in three dimensions—a solid.

The necessity for exact symmetry is frequently referable to the practical demands of stable equilibrium. This principle concerns vertical division only. The governing factor in this case is, therefore, either a perpendicular axis or plane, and in any case the whole refers to the earth's centre. An ordinary stone column may be instanced. We are, therefore, at times justified in ultimately referring the principle of exact symmetry to the overruling force of gravity. We should see at once the absurdity of an idea of dividing a 50-feet high building

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by a centre horizontal line 25 feet from the ground level, and then making the part above and below "symmetrical"—the same above and below and referring to the centre horizontal line.

The most important practical fact concerning exact symmetry is that in this arrangement every part of the whole is subordinated to the effect of symmetry. The great power of exact, mathematical symmetry is thus at once evident; and at the same time its unnaturalness—where this narrow oneness of effect is not demanded—is also made clear. In the case of a bowl of flowers, if we assume that we have a certain number either all alike or of different variety, no one with natural good taste would proceed to arrange these in the bowl or vase in perfect "symmetry." Were this done, the attention would be called off the flowers themselves and directed to a *pattern*, as such. All their individual beauty would be prostituted to this pattern. If we are designing a doorway, the complete portal is the theme, to which all parts must be subordinated. The end and aim here differs, and absolute equilateral symmetry the principle justly employed, at any rate in the main mass. It is, by these considerations, evidently suggested that there is on the one hand absolute, rigid symmetry, and, on the other, harmonious grouping; which is a reflection simply bringing us, by another road, to symmetry and balance as separate things.

We may make a floral cross or anchor, but that is a different thing from making a pattern of flowers of a varied outline repeating on either side of a neutral axis; for in the former case we decorate (embellish) the cross or anchor, and to these simple forms the flowers are subordinate ornaments or enrichments. It is another thing to construct an ornament of flowers so that the flowers are subordinate to a (*per se*) senseless form. For the practical purposes of the architectural designer it suffices for him to remember that exact equal-halved symmetry makes for one, absolute and only, while harmonious grouping, or balance, ensures unity without submerging individual component parts; and we can always powerfully aggrandise the part of asymmetrical placing with respect to the whole.

There is a favourite (or common) photographic view of St. Paul's Cathedral showing the west front with the dome and cross exactly central. The complete picture constitutes a *pattern*, and the pattern dominates the whole. If this pattern-like appearance is so desirable we have, in our rough sketch, endeavoured to enhance the effect by some additions, made and in the making.

(*To be continued.*)

THE IRON AND STEEL INSTITUTE.

THE fortieth annual general meeting of the Iron and Steel Institute was opened on May 13 in the hall of the Institution of Civil Engineers, Sir Hugh Bell, Bart., President, in the chair.

The report of the Council for 1908 stated that the year had been one of considerable activity and progress. The number of ordinary members had increased by 116, and the total number of members on the roll on December 31 was 2,128, as against 1,522 in 1898. Severe losses through death had been experienced during 1908, the list comprising forty-one names. The statement of accounts showed that the receipts for the year amounted to 6,367*l.*, and the expenditure to 6,011*l.* The Council announced the grant, by the Royal College of Heralds, of armorial bearings to be borne by the Institute, the gift of the President, Sir Hugh Bell, Bart. Mr. George C. Lloyd has been appointed to succeed the late Mr. Bennet H. Brough, who died in October.

Owing to the steady growth of the membership of the Iron and Steel Institute, and to the expansion of the Institute Library, the Council decided, early in the year, to secure more commodious offices, and to effect certain improvements in the internal arrangements. Negotiations were therefore opened with the Westminster Trust, who are the landlords of the premises, and the Council concluded an agreement in February. The new premises consist of a suite of ten rooms, on the first floor of No. 28 Victoria Street, having precisely the same outlook as the recently vacated offices, and access being obtained from the same main entrance and staircase. The Council have also obtained the use of a storeroom, conveniently situated in the same building, on the sixth floor.

The new by-laws were proposed and unanimously adopted by the members.

Among the papers read at the opening meeting was the following by Mr. J. Cruickshank Smith, B.Sc., F.C.S. (London), on

The Value of Physical Tests in the Selection and Testing of Protective Coatings for Iron and Steel.

The expression "protective coating" is now applied to any material or mixture of materials—whether oil, varnish, paint, or enamel—employed with the specific object of protecting a structure from external influences.

There is a growing tendency to regard such materials as coming within the scope of engineering materials or materials of construction. Little argument is necessary to prove the correctness of this; it is self-evident that the engineer who designs and selects the materials for the structure itself should also select the final coating on which, in a large measure, the life of the structure depends.

There has been a noteworthy increase during recent years in the attention devoted by technical chemists and testing engineers to the physical and mechanical properties of paints, varnishes and other protective materials. This is largely due to the growing appreciation of the fact that in actual service and under the conditions of prolonged exposure to the atmosphere, moisture, &c., the durability or life of protective coatings depends as much on physical laws as on chemical ones, and further, that the physical state or condition of a protective coating has an important bearing on its liability to chemical influences both external and internal. In other words, it is not always composition that determines the technical value of an article. Other factors besides composition enter into the question, and it is the determination, and if need be the measurement, of these factors which the author would include in the expression "testing."

This is neither the time nor the place to enter into a voluminous discussion on all the moot points which arise in connection with the selection and application of protective coatings. The author's object at present is to indicate the trend of technical opinion in regard to the principles to be followed in the testing and technical valuation of such materials prior to exposure under average or normal conditions, and to point out how the engineer who is responsible for the selection and application of protective coatings can best safeguard the interests of his client, the owner of the property under treatment.

The chemical aspect of the question will therefore be left on one side, and those physical and mechanical tests which recent experience has proved to be most valuable in enabling one to arrive at a judgment as to the comparative merits of different protective paints will be dealt with briefly.

Protective coatings consist as a rule of a pigmentary portion and a fluid medium or vehicle. The author desires to point out in passing that pigments are themselves invariably defined and valued in terms of physical properties—opacity, insolubility and degree of crystalline structure; also that the fluid vehicle after drying presents certain mechanical features as to elasticity, hardness and the like, which determine its value as a paint material. If it be borne in mind that a film of protective paint spread over a continuous length of iron or steel surface seldom has a thickness of more than $\frac{1}{2000}$th of an inch, and that the life, or at any rate the cost of maintenance, of the structure depends on the capacity of the paint film to expand and contract, without breaking, in accordance with the expansion and contraction of the structure itself, to maintain a hard and impervious surface, to resist the solvent action of rain-water and chemical impurities in the atmosphere, it will, the author assumes, be granted that the physical properties of paint films are of pre-eminent importance in determining the selection of the materials which yield the said films.

The physical tests which may be employed as a guide in selecting protective coatings are of two kinds:—

(1) Those applicable to the paint itself.

(2) Those applicable to the film produced by the drying of the paint.

The more important of these tests will now be discussed very briefly, and the author would point out that he refers here only to tests which experience has proved to be of real utility in solving the problems connected with the subject.

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1. *Tests Applicable to the Paint.*

(a) The Pigment and Vehicle should be properly proportioned in order to insure efficient Application and the Minimum of Free Oil Space in the Dry Film.—The physical property which underlies the question of correct consistency of the paint is that of "viscosity," and on the viscosity of the paint depends to a great extent the efficiency with which it can be applied. If the viscosity be too high, the paint film will be too thick, and imperfect and unequal drying will probably result. If the viscosity be too low, the paint film will probably be too thin, and will tend to run down in tears. Unfortunately no cut-and-dried method has yet been elaborated by means of which the correct consistency of a protective coating can be accurately determined before use. This is, therefore, a point which the user of protective coatings must perforce leave to the producer of these materials, although it is within the power of the consumer to protect himself by specifying that the consistency or viscosity of the paint shall be such as to enable a film of a given thickness to be produced under stated conditions.

The question of free oil space in a paint film is an extremely important one, and it has been proved that the smaller the amount of free oil space the more impervious to moisture and as a rule the more durable will the film be, the currently accepted view at present being that the fluid medium or vehicle in protective coatings acts merely as the elastic binding or cementing medium which holds the real protective agent—namely, the pigment—together. By examining the films produced by different paints under the microscope one can obtain most useful information as to the relative areas occupied by solid pigment and transparent vehicle, and in selecting a protective paint careful examination under the microscope should never be neglected.

(b) The Size of the Pigmentary Particles should be Small and Uniform.—This is now accepted by paint experts as a proved truth, and the author might refer in passing to the now classic research, which finally set this matter at rest, conducted some years ago by Mr. Robert Job, chief testing chemist to the Philadelphia and Reading Railroad.* The actual measurement of small pigmentary particles is a matter requiring some experience and manipulative skill, but such measurements cannot be neglected in the physical testing of protective coatings. Without entering into unnecessary details, it may be said that the pigment in a paint may be considered to be finely ground when the largest particles do not exceed .001 inch in diameter. In the case of a paint which proved after exposure under service conditions to be a thoroughly satisfactory protective coating, the largest particles were of this diameter, and there were very few of that size. The smallest observed particles had a diameter of .0002 inch, and the estimated average diameter of all the particles was .0004 inch. In the case of another paint which proved unsatisfactory in service and whose composition was practically identical with the paint just referred to, the largest particles were .018 inch in diameter, and there were many of .010 inch, while the finest particles had a mean diameter of .0002 inch, the estimated average size of all the particles being .008 inch.

Here again the requisite physical state of the paint can be secured by suitable specification.

(c) The Pigment and the Vehicle should possess the Minimum Tendency to Separate from each other.—Theoretically a protective coating consisting of pigment and vehicle should be in such a state that it flows like a homogeneous liquid without separation into its component parts. It is within the power of manufacturers of these materials to approximate to this theoretical state of things under reasonable conditions, and a very simple physical test can be applied in order to determine whether separation will occur. This test was devised by Job in connection with the investigation referred to above, and after considerable personal experience of it the author can confirm its value. The paint, in a condition ready for use, is placed on a piece of sheet glass, which is then stood vertically for one hour at a temperature of 100° F. No separation of the pigment and vehicle should be observable at the end of that time. To make the test more severe the paint may be thinned with raw linseed oil, and even then no palpable separation ought to occur.

(d) Accelerated Tests.—Obviously the main purpose of tests such as those that have been described is to enable one to arrive at a judgment as to whether the material under test is likely to behave satisfactorily under service conditions. In order to determine this with perfect accuracy a whole series of long and laborious exposure tests would have to be applied. This under ordinary commercial conditions is not possible, therefore attempts have been made to arrive at satisfactory conclusions by exposing the paints to severe conditions for a short space of time, and by examining the films so produced in order to see whether they are free from the defects which one would expect to find in them after long exposure under milder conditions. This method has been applied with considerable success in the technical valuation of oil varnishes for protective purposes,* and is likely to be employed more widely in the future.

2. *Tests Applicable to the Film.*

(a) Determination of the Thickness and Uniformity of the Film.—Although the average thickness of a paint film extending over a considerable surface may be $\frac{1}{1000}$th, or $\frac{1}{500}$th, or $\frac{1}{200}$th of an inch, the thickness at various points usually varies within considerable limits, and obviously the actual utility of the film will depend greatly upon the thickness at the thinnest point. It is therefore of importance to determine whether the film produced by a given protective coating is liable to produce an uneven film. The average thickness of the film can be readily determined by applying a coat of the paint on a piece of perfectly plane glass, and when dry covering it with another piece of similar glass. The thickness of the two pieces of glass plus the film of paint can then be determined by the calipers, and if from the figure so arrived at the thickness of the two pieces of glass by themselves be deducted, the mean thickness of the paint film is obtained. It is not so easy to determine the actual variation in the thickness of the film at different points, but useful information in this respect is yielded by examination under the microscope. It is evident that inequalities in the thickness of the film are largely due to variations in the size of the pigmentary particles. Consequently if the latter factor is properly adjusted there will be comparatively little danger of the film exhibiting inequalities.

(b) Strength of Film as Determined by Breaking-machine.—It is only within the last twelve or eighteen months that actual measurements have been made of the strength of a paint film, and an ingenious instrument has been devised by Mr. R. S. Perry for this purpose. It is called the "Filmometer," and is shown on a diagram which the author has had prepared. Although figures have been arrived at indicating the pressure required to rupture various paint films of known thickness, the tests are hardly far enough advanced yet to enable one to predict with perfect certainty from the figures obtained what relation obtains between them and durability in service. All that can be said at the moment is that much valuable information concerning the effect of age upon a paint film as influencing its strength and elasticity may be expected in due time. As Mr. Perry points out, these are two vital qualities in a paint, as it is through them that a paint resists abrasion, cracking, peeling and blistering.

(c) Elasticity of Film.—This factor also can be measured by the filmometer, and the remarks made under (*b*) apply here with equal force. It is hoped that during the next twelve months sufficient data will have been accumulated to enable the filmometer to be made use of in testing paint films for technical purposes.

(d) Permeability of Films by Vapours and Gases.—It has been abundantly proved that every paint film hitherto obtained is permeable by moisture. Whether this moisture finds its way through the film through pores or whether it percolates by a process of osmosis is a moot point; nevertheless the fact is proved that paint films are permeable by moisture and gases. They differ, however, in the degree of permeability, and the less pervious they are the better will they effect their purpose of protection. A method for determining the relative permeability of paint films has been devised by the Scientific Section of the Paint Manufacturers' Association of the United States and is indicated on the diagram.

(e) Hardness of Surface of Film.—Many protective coatings have to resist surface blows, abrasions and the like. Hardness, therefore, is an important factor. It can be measured in terms of a definite standard by means of the instrument devised by Bailie and Laurie,† of which the author has a specimen here.

The various problems in connection with the physical and mechanical testing of paint films and protective coatings, and the connection between the results of these tests and

* *Journal of the Franklin Institute*, July 1904.

* "The Physical Testing of Oil Varnishes" (J. Cruickshank Smith), *Proceedings of the American Society for Testing Materials*, 1907.

† *Journal of the Royal Scottish Society of Arts*, July 1906.

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urability under service conditions (which is the true riterion of the value of protective coatings) are being arnestly investigated at the present time, and it is probable hat much valuable information will be available before long.

In conclusion the author would like to direct attention to vo aspects of this important subject which are liable to be st sight of. One is the need for carefully drawn specifica-ons, worded in such a manner as will enable the consumer o obtain the full advantage of the most recent scientific esearch in the domain of protective coatings. The second the all-important position of the consumer in such matters. fter all it is the owner of the property that is the con-umer, acting through his professional adviser the engineer, ho is primarily interested in obtaining the best value he an for his money. But in order to do this the consumer ust be able to state intelligently what he wants and to ssure himself that he gets it. The author cannot do better n this connection than quote a few sentences which formed art of Dr. C. B. Dudley's presidential address some years go to the American Society for Testing Materials. He aid:—"The influence and voice of the consumer in the anufacture of commercial products has come to stay, and it s simply the part of wisdom for all concerned to recognise he situation. Also, since both the producer and the con-umer have a direct interest in the product or thing made, he one in its production and sale, the other in its use, there s no real reason why each should not study the product in ost minute detail. If the producer knows better than the onsumer, as he undoubtedly does, the effect of composition nd details of manufacture on the thing made, so also does he consumer, if he studies as he should the behaviour of the aterials in service, know better than the producer knows or an know the relation between the composition, the physical roperties or even minute characteristics of the thing made nd its successful use. It is only by the combination of nformation from each of these two sources that perfectly uccessful commercial products can be obtained."

May it not be granted, then, that the true policy to ursue in the fabrication and utilisation of protective coat-ngs for iron and steel is that which has proved successful n other departments of industrial activity—namely, the armonious co-operation in technical matters of the producer nd the consumer? Thus only will the efforts to convert the rude materials of Nature into products useful in the service f man be crowned with success.

ROYAL SANITARY INSTITUTE.

A MEETING of the Institute was held on May 12 in the Parkes Museum, Mr. H. D. Searles-Wood, F.R.I.B.A., residing.

Mr. H. A. Roechling, M.Inst.C.E., F.G.S., read a paper n

The Passage of Excreta through House Drains.

In his introductory remarks the author said he intended o deal with the subject from a practical standpoint, and on he basis of such experiments and observations as he had nade during many years on house drainage systems. It vas his intention also to make use of the experiments under-aken by the Institute in 1893 for the purpose of ascertaining he quantity of water required for an efficient flush of a vater-closet. In the passage of excreta through house lrains, he said it was not so much the actual gradient at vhich the drain was laid in the ground that was of import-nce as the relation between the total height which the water ad to fall in its passage from the flushing apparatus to he street sewer to the total length of the way. The ydraulic discharge gradient, as the author termed it, would vary for every sanitary apparatus fixed in the house, but vas of necessity always steeper than the gradient of the lrain itself. Generally speaking the hydraulic discharge gradients were steeper than 1:10, and from upstairs baths nd water-closets they were as a rule steeper than 1:5. It s of course very essential that the excreta should not lodge n any part of the house drainage system, but should pass as quickly as possible from the water-closet into the street sewer, and the physical problem presented by the transport is a somewhat complex one. A number of conditions, some of which varied continually even in the case of the same closet, had to be considered, such as the actual quantity of flushing water, the quantity and quality of excreta, the atmospheric conditions (cold or warm air in drains), the bends and construction of the drain, the condition of the invert and sides of the drain, &c., &c., but the two conditions which stood out prominently were the limited quantity of the flushing water (two gallons) and the liquid heavily charged with solids. The effect of discharging only a limited quantity of water with each flush was to establish a decreasing head throughout the period. Whilst the discharge from the flushing apparatus lasted the head decreased somewhat slowly, but immediately that was over a rapid decrease set in, which again became slower towards the end of the period. It is owing to the decrease of head that, generally speaking, two flow periods could be distinguished, which were not sharply divided, but merged one into the other. During the first period the flow, as a rule, was fairly regular and uniform, hence the period might be called the "first or regular flow period," but towards the end of the discharge from the flushing apparatus the flow became more irregular, smaller and smaller, until it finally ceased altogether with a mere dribble. To distinguish that period from the first it might be called the "second or irregular flow period." The two periods were the more distinct the quicker the discharge from the flushing apparatus, and the less distinct the slower the discharge. As soon as the flushing cistern was started the water entering the basin carried forward into the soil pipe a portion of the excreta and paper, the rest being removed at later stages of the flush. At the bottom of the soil pipe, especially when that was fairly high, the excreta would be further reduced in size and might be thrown against the sides of the drain, especially where the branch drain entered the main with a sharp bend. They would then be pushed along the bottom of the drain, and so long as the first flow period lasted they would be carried forward through the disconnecting trap into the street sewer. Some of the excreta, however, might have lodged on the invert with paper forming obstructions around them, and if that happened during the latter part of the first or regular flush the force of the water might not be sufficient to remove them. During the second or irregular flush they might be moved a little further down, with the result that at the end they were left behind in the lower part of the drain or in the disconnecting chamber. As the carrying capacity of the water for the same pipe depended very largely on the depth of flow and the velocity, and as these were of necessity best during the first period of flow, it was evident that for the conveyance of the excreta through the drain that that period was of primary importance, whereas the water during the second period ran to all intents and purposes to waste; hence it was very essential that the first period be made as efficient as possible, which could be done by discharging the flushing water all at once, as it were in a rush, thus increasing the depth of flow and velocity.

Referring to the mean velocity of flow in house drains, Mr. Roechling stated that owing to the complexity of the problem involved no formula would give correct results in all cases, and all velocity formulæ must therefore be looked upon as giving only approximate results.

The author then referred to the experiments made by the Sanitary Institute in 1893 with artificial excreta (a mixture of soft soap, cocoa fibre and clay) and pieces of paper. The experiments, he said, showed clearly that for a correct appreciation of the results of a water-closet flush it was necessary to know, in addition to the length and gradient of the drain in the ground, the hydraulic discharge gradient, and that the latter was really the most important factor for the elucidation of the problem. Generally speaking, a short drain (such as a branch drain) had a steep hydraulic gradient, and a long drain (such as the main drain) a flatter hydraulic gradient. Concerning the self-cleansing character of a closet, he held it should not go forth that with a two-gallon flush it must necessarily retain some of the excreta and paper. There were a number of good wash-down closets in the market that would (if properly fixed) give perfectly satisfactory results in that respect. The removal of the excreta out of the closet depended as much on the way in which the water was discharged into the trap as on the quantity of the flush, and when the former was correct no difficulty need be experienced with two gallons. The quantity of the flush and the hydraulic discharge gradient governed the velocity and the depth of flow, and those factors determined practically the transporting power of water flowing in a pipe. It might be that for very steep hydraulic discharge gradients the velocity was of greater moment than the quantity of the flush, but for the range of the experiments, in which the velocity varied from 4 feet to 5 feet per second, it was clear that the quantity was of greater importance than the velocity, and that chiefly owing to the longer duration of the first or regular flow period produced by the greater quantities; the velocity and the depth of flow varying so little, the difference in the results could hardly be due to them. As an instance he gave the case of a 4-inch

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pipe laid at an hydraulic discharge gradient of 1: 4.41, the velocity and depth of flow being practically the same for a 2, 2½ and 3 gallon flush, so that the better effect of the greater quantity could only be due to the greater length of the duration of the first or regular flow period. The influence of the diameter was, he said, interesting to observe, as only for an hydraulic discharge gradient of 1 in 4.41 (i.e. for short pipes) was the 4-inch pipe slightly better than the 6-inch pipe, but for all other gradients experimented with the 6-inch pipe gave better self-cleansing results than the 4-inch pipe. That result, though against popularly conceived notions which were based on the flow of clean water, admitted of very simple explanation. The depths of flow and the velocities being but slightly different, a 6-inch pipe, presenting a greater width at top water-level, gave the excreta more room to move in and thus afforded less chance for obstructions than the 4-inch pipe. The influence of the length of the drain in the ground could be clearly traced apart from the flatter hydraulic discharge gradient, but assuming that the velocity at the entrance to the drain was the same in a 4-inch or 6-inch pipe laid at the hydraulic discharge gradients of 1: 4.41 and 1: 6.51 (the gradients in the ground being the same, only the length differing), the better self-cleansing effect of the shorter pipe seemed to be due to the increased resistance encountered in the longer pipe.

For practical purposes it might therefore be said that in order to be self-cleansing the velocity in either a 4-inch or 6-inch pipe with a two-gallon flush in five seconds should not be less than 4½ feet per second, and with a three-gallon flush in seven seconds it should not be less than 4 feet per second. The rule, making a fair allowance for the conditions of every-day practice, gave a limiting hydraulic discharge gradient of 1: 4 for a two-gallon flush in five seconds, and for a three-gallon in seven seconds a limiting discharge gradient of 1: 5 either for 4-inch or 6-inch pipes. It should, however, be clearly understood, observed the author, that the rule applied to the drain itself, and not to disconnecting traps.

The total quantity of water used in a house occupied by five persons might be put at 75 gallons in twenty-four hours, out of which 10 gallons would be used for water-closet flushes, 65 gallons remaining for other purposes. It would be clear that the quantity of water used in each house would be more than sufficient to remove, even under the worst condition experimented with, the whole of the matters remaining behind in the house-drainage system after solitary water-closet flushes if the whole of the 65 gallons reached the drain under proper flushing conditions. Unfortunately, however, that was not the case, and on an average not more than 30 gallons reached the drain in proper flushing condition, the remainder, or 35 gallons, being discharged in such quantities and at such rates as to be useless for the purpose. With a 2½ or 3-gallon flush no difficulties need at any time be experienced under ordinary conditions in keeping the house-drainage system perfectly clean and sweet, but the case of a 2-gallon flush required a little further consideration. The worst case here to be inquired into was a house in which there existed only one water-closet on the ground floor without any bath or lavatory, a condition of things frequently met with in cottage property in a provincial or suburban town. Such a case would not lead to any difficulty as regarded the clean state of the drainage system provided the hydraulic discharge gradient of the water-closet was not flatter than 1: 6.5. Where, however, the gradient was flatter than 1: 6.5 it might become necessary to arrange for separate flushing, either with the waste water of the house or the water-supply of the town. At any rate, in such a case in a new house the sanitary authority ought to have power to insist on such arrangements if, after careful consideration of all the facts, they were of opinion that that was necessary. In all other cases no difficulty need be experienced in keeping with a 2-gallon flush the house-drainage system clean and sweet, and where baths and lavatories were in use, especially on upper floors, the system should work perfectly without the least difficulty. It was here assumed that the house-drainage system was used in a reasonable manner, as no provision could be made against wilful abuse or destruction. As, however, even the best apparatus was liable to get out of order in continued use, a periodical inspection of all house-drainage systems was very advisable.

These deductions, made from the experiments of the Royal Sanitary Institute, were amply borne out by every-day experience, which clearly proved that with a well-constructed and well-maintained system neither the drain nor the disconnecting trap did get blocked, and that where that took place a local fault was at work, such as the water-closet apparatus having got out of order or the system being subjected to improper usage.

The author had had under his immediate supervision for a number of years several hundred cottages in a manufacturing suburb of a provincial town, which were inhabited by a continually shifting population, not infrequently of a somewhat doubtful character, and the chief trouble there experienced was the blocking up of the water closets through unsuitable paper, rags and other improper articles. The closets had originally been pan closets, but the urban district council made the owner put up water closets with disconnecting traps in the main drains. In one of the suburbs of London about one-third of the houses were inspected some time ago, with a view to ascertaining the state of the house drainage. Out of 6,745 inspection chambers visited, 6,457 were found to be in proper working order, and in only 288 cases was the disconnecting trap discovered to be blocked up. Expressed in percentages this meant that about 96 per cent. of the traps worked all right, and that only 4 per cent. were out of order. It was added that in 654 additional cases the accident of the blockage of the disconnecting trap was observed to have occurred some time previously. This might have been so or not, but as the blockage was not actually observed during inspection, it was in the nature of hearsay evidence only, and should therefore not be adduced here. Eight months after the first a second inspection was made of the 288 chambers previously found defective, and, in addition, of 216 chambers not previously found out of order. In that case only forty-nine chambers were found faulty, which was a little under 1 per cent. of all the 6,745 chambers previously examined. Taking the results of the second examination first, they clearly showed that it was comparatively a simple matter to remedy the state of things discovered on the first occasion, and that the remedy adopted was so successful that out of 288 cases 239 traps worked quite properly after eight months, and only forty-nine were again found defective. The inference might therefore be made that the faults found on the first occasion were due not so much to principal faults of design as to careless and unjustifiable usage.

Taking the results of the first examination, it did not seem logical to argue that because an apparatus had in 288 cases broken down and had worked perfectly satisfactorily in 6,457 cases, the apparatus itself was bad, and ought therefore to be abolished altogether. If all apparatus that failed in four cases out of every hundred had to be abandoned there would be little apparatus left after a comparatively short time, and the only correct inference from the above figures seemed to be that the apparatus itself was good, and that in the cases of failure the cause was not to be found in the apparatus itself, but in the way it had been used. The results of the first and second inspection therefore confirmed each other and corroborated the experience almost universally gained, that a disconnecting trap fixed and used with care works perfectly satisfactorily, and that where it collapsed that was usually due to a local fault either in the water-closet flushing cistern or in the usage. Indeed, on no other assumption would it be possible to account for the many million traps now in use and for the great numbers that were fixed year after year.

Mr. BALDWIN LATHAM said the paper did not seem to him to be completely satisfactory with regard to the question as to what happened in house drains. Many forms were in use in the country in which there was no flushing through, and yet the drains were clear. The Fowler closets had been quoted, and they were found to act perfectly in manufacturing districts. It appeared to him that most lectures of the kind were prepared with reference to that bugbear of the past, sewer air or sewer gas; but having had a very extensive personal experience in the matter, he believed sewer air was not so deleterious as people imagined it to be, and they knew that it was not the specific cause of typhoid fever. Only recently he had read through an American work on typhoid fever, and there was not one single mention of sewer gas or air as being the origin, but in every case it was attributed to drinking water improperly filtered. The stoppage of intercepting traps, too, was almost unknown, and he believed that given a good trap, with an abrupt fall of water, no fault could be found with them. No mention had been made in the paper of the effect of grease in pipes, and yet it was a most important element in the passage of matter through drains, for an accumulation of grease would gradually stop the channels to the sewers.

Mr. J. PATTEN BARBER said once a dislike had been taken to intercepting traps it was easy to believe all that might be argued against them. He did not think they became so quickly blocked as some people imagined, for he had found

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that when one discharge of water from a closet did not quite reach the intercepting trap a dam was formed, which, with the second flush, wholly cleared the drain. The first discharge of water might be said to lubricate the drain, and the second, having overcome the inertia of the trap, cleansed it. With regard to the experiments made by the Sanitary Institute, he did not think the right material had been used as artificial solid matter. Cocoa fibre and material of that description was the cause of solid matter adhering to any inequality in the sides of the drain, and sawdust, with clay, was a better substitute. He would have liked to have heard how the velocities of discharges were arrived at.

Mr. C. H. Cooper believed the intercepting trap had been blamed on account of its having been placed in a position never intended for it. He referred to a trap serving the drainage of more than one house. The two-gallon discharge to a water closet would be an efficient flush when the closet was new, but in all cases they had to provide for the far side of the trap, and the closet once having become coated, the force of the discharge was reduced, and in the course of years he believed the two-gallon flush would be found useless.

Mr. H. P. Boulnois said there was no doubt that the paper was clear upon one point—the inefficiency of the two-gallon flush. The speaker had proved by experiments of his own that a larger volume of water was required, and that it should reach the drain in a rush. The question of traps, he said, was exercising the minds of the Local Government Board, and a departmental committee was considering the matter, and speaking personally he would not live in a house the drains of which were without an intercepting trap.

Mr. F. Wood and Mr. W. Kaye Parry also spoke in favour of intercepting traps.

Mr. W. Jennings, alluding to the flushing of drains exercised by bath water, said there was no difficulty in obtaining baths with large outlets, but it was no use having large outlets if the engineer or plumber, for motives of economy, fixed small waste pipes.

Dr. Butler suggested that intercepting traps were not always a success, and there was risk in employing them, since failures were not revealed until the sewage from the drain had percolated through the brickwork.

Mr. H. Freyberg believed that owners of property appreciated disconnecting traps, and he himself thought they should be made compulsory.

On the motion of the Chairman, a hearty vote of thanks was passed to the author of the paper, by whom it was briefly acknowledged.

ILLUSTRATIONS.

St. Barnabas Church, Mitcham, Surrey.—South-East View.

The church which we illustrate from a water-colour drawing in the Royal Academy will form the second of a group of buildings to be erected to serve the new district of Gorringe Park, Mitcham, Surrey, recently adopted by the City of London School Mission as their special sphere. The church hall, of which a drawing also appears in the Royal Academy, and was illustrated in our issue of July 10 last, was opened by the Bishop of Kingston early this year. The church is cruciform and planned to accommodate 600, with a morning chapel for 50. The materials proposed are dark Crowborough bricks and Ketton stone, with dark red hand-made tiles for the roof. The architect is Mr. Burke Downing, F.R.I.B.A., of 12 Little College Street, Westminster Abbey.

Sedgwick Memorial Museum, Cambridge.—Principal Entrance.

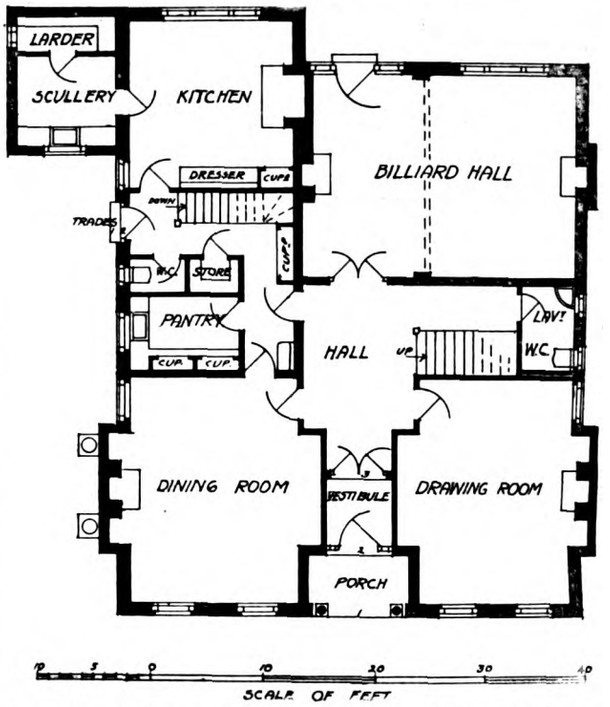
Our illustration this week is in continuation of those in our last issue, and shows in detail the principal entrance to the great museum, with the external staircase adorned with the representations of cave-bears and primitive bisons. We need scarcely repeat that Mr. T. G. Jackson, R.A., was the architect of these buildings.

Details of Kirby Hall, Northants.

Kirby Hall is one of the most interesting examples that we have in England of Early Renaissance architecture, and its details in particular have a peculiar sense of refinement that makes their study valuable. How long it will be before the whole building is lost in decay it is impossible to say, but we fear that the day is not far distant. Our illustration is taken from measured drawings by Mr. W. Eaton, A.R.I.B.A.

House in Heath Drive, Hampstead.

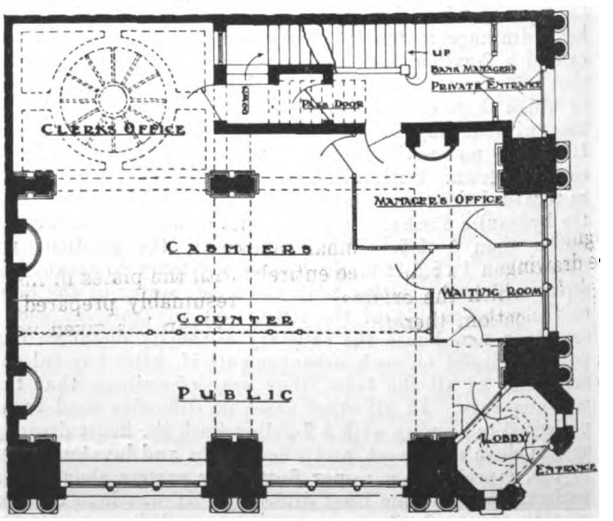
This house has been designed for C. W. Hart, Esq. The plan, while providing the ordinary dining and drawing-rooms, has, instead of the usual small library, a large room opening on to the garden big enough to take a full-sized billiard-table, but so arranged that a library could at any time be formed, and in this case the hall would be extended to the garden. The arrangement of the kitchen and offices is shown on the plan; advantage was taken of



the site being below the level of the road, and cellars and additional larders were placed in a basement. On the first floor are five bedrooms and dressing-rooms, bath, &c. Internally the house is simply finished with detail of Georgian character. Externally the walls are faced with red bricks of pleasantly varied colour, with hand-made tiles to roof. The architect is Mr. C. H. B. Quennell, F.R.I.B.A., of 17 Victoria Street, S.W.

Design for a Bank—Front Elevation.

This building is intended to be executed in Portland stone, with green Westmoreland roofing slates, the



Ground Floor Plan.

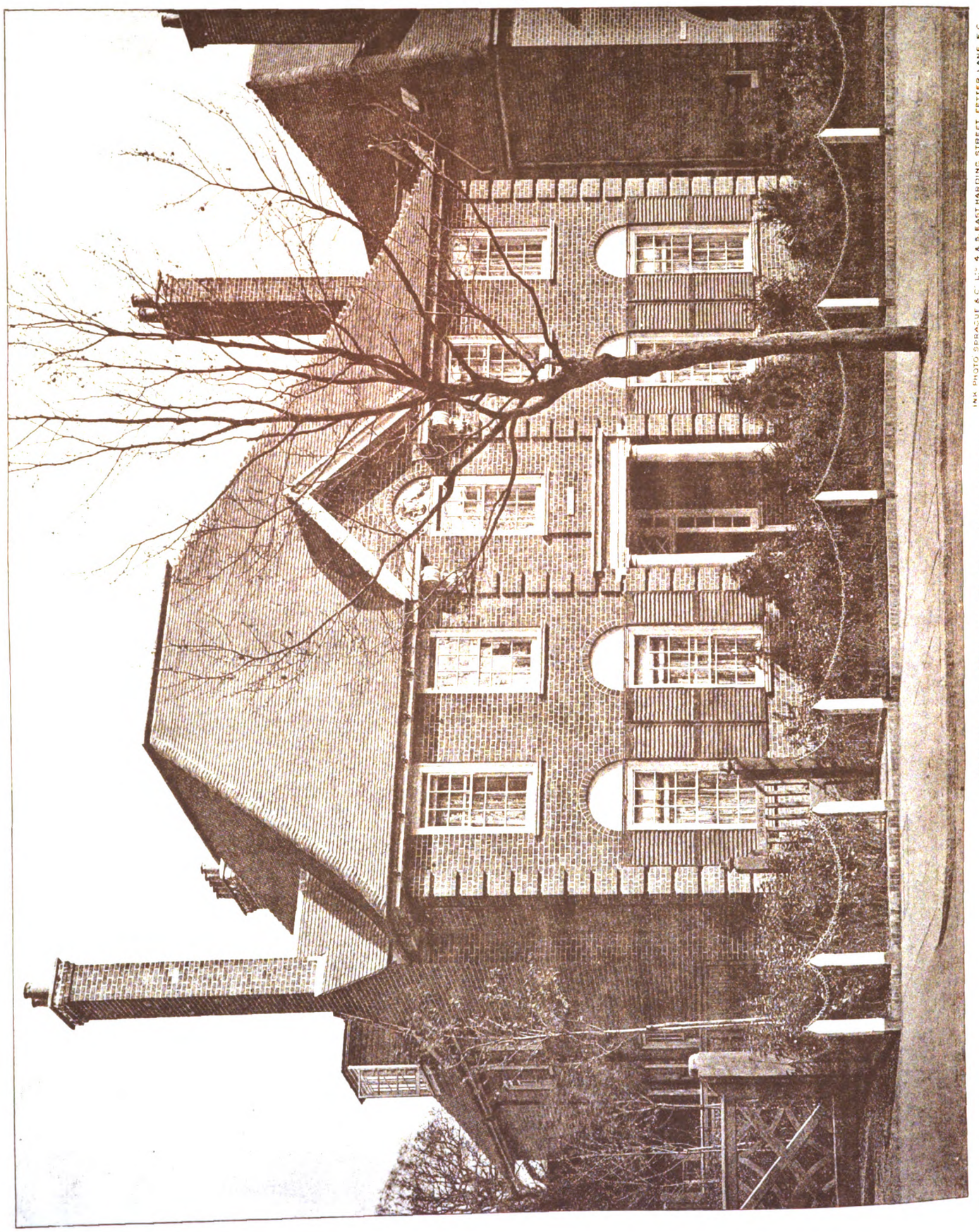
Scale of Feet

dome to be covered with copper. The joinery on ground floor to be carried out in oak. The design is by Mr. Walter M. Epps, A.R.I.B.A.

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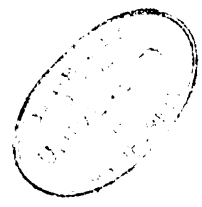
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HOUSE IN HEATH DRIVE, HAMPSTEAD

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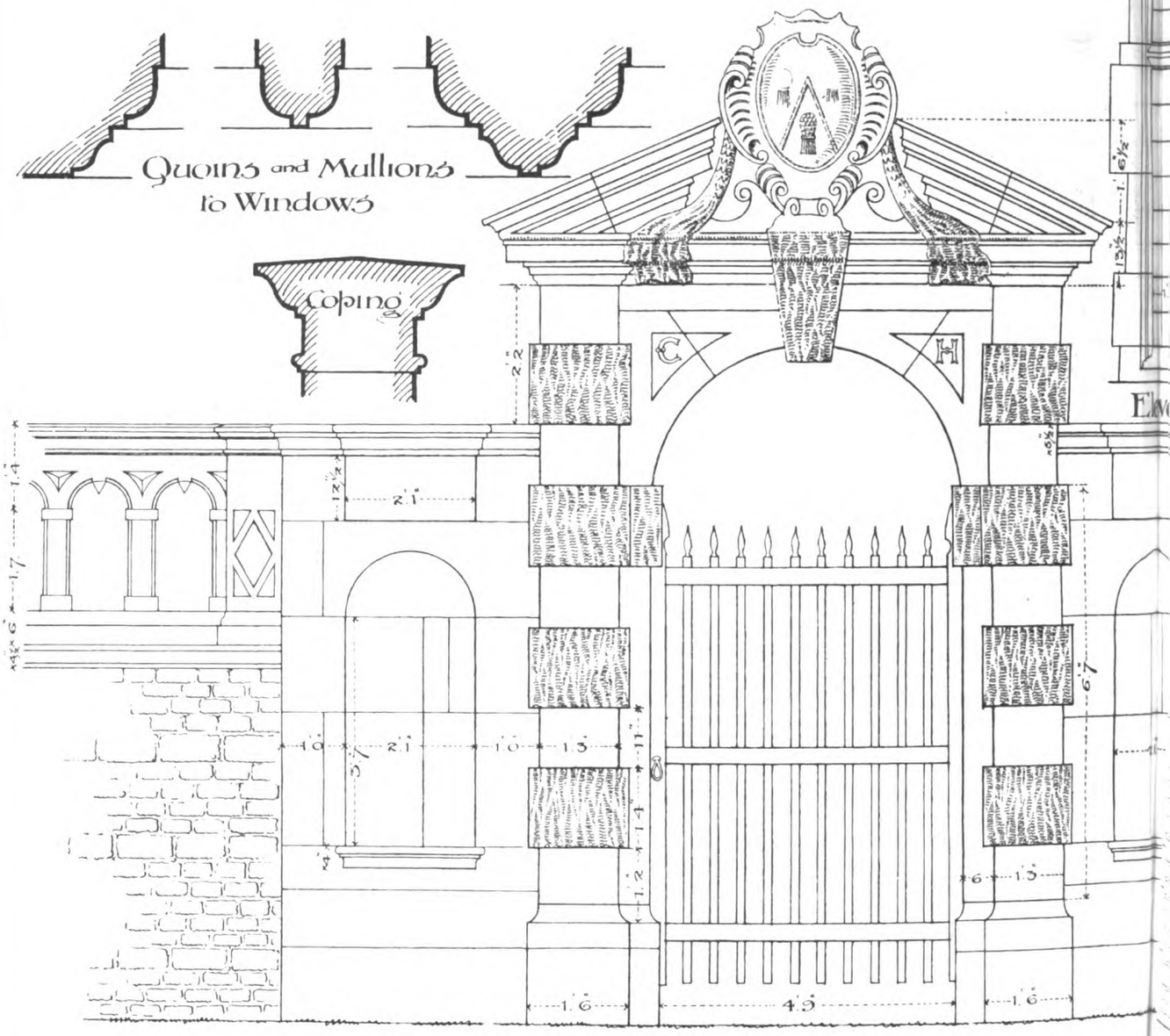


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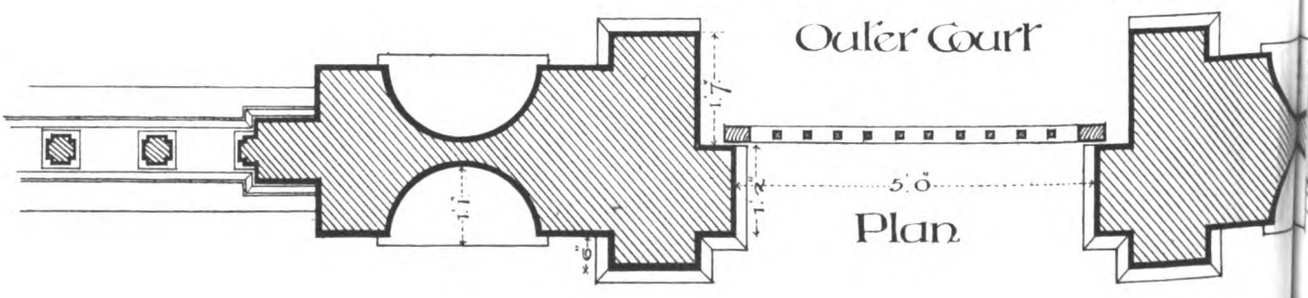
Details of Kirby Hall Northants

Quoins and Mullions to Windows

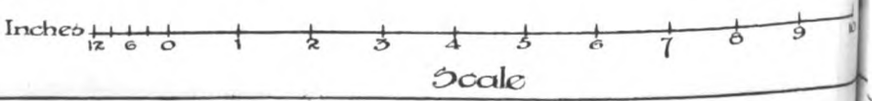
Coping



Elevation of Gateway Outer Court



Plan



Scale

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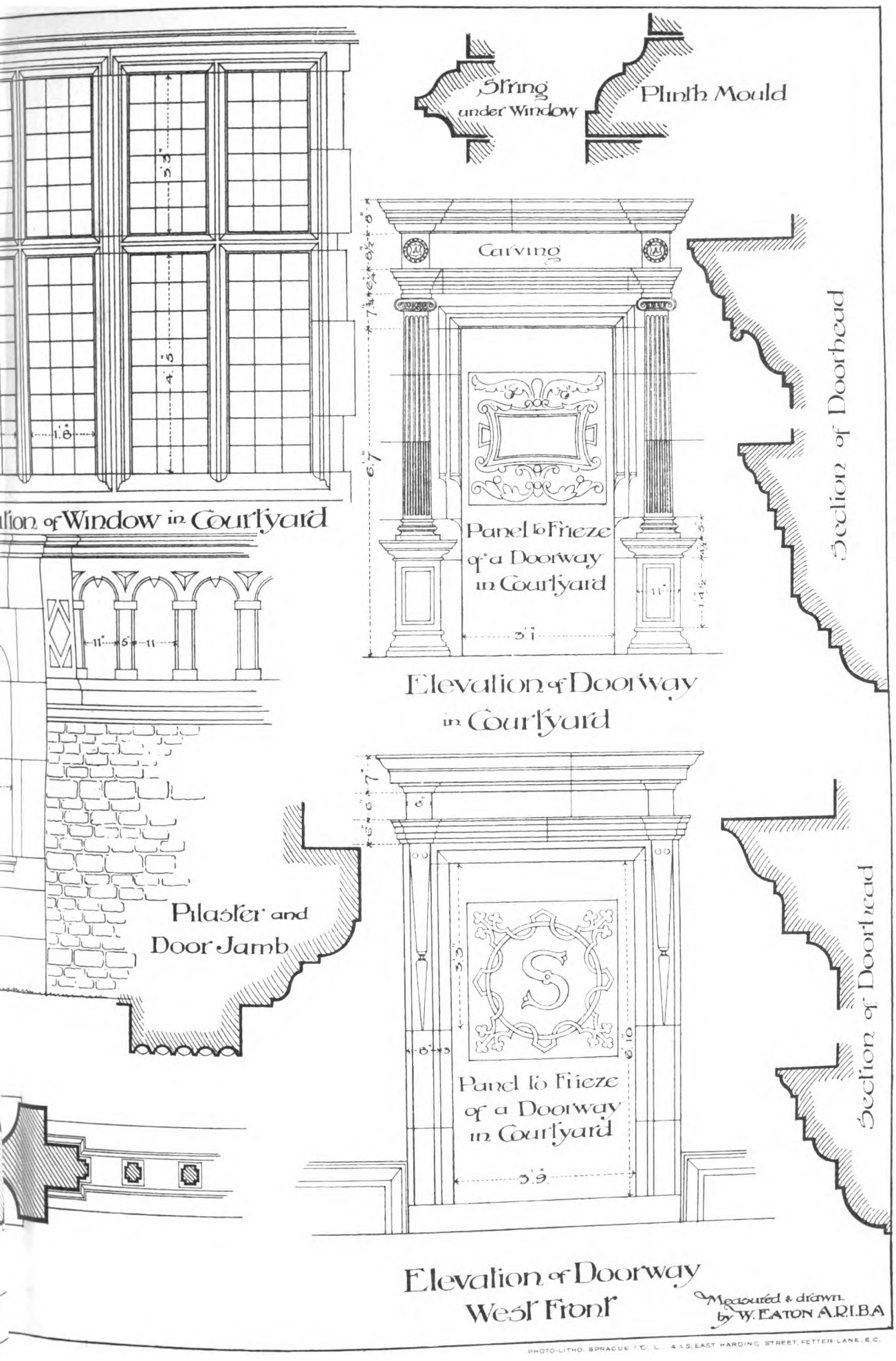


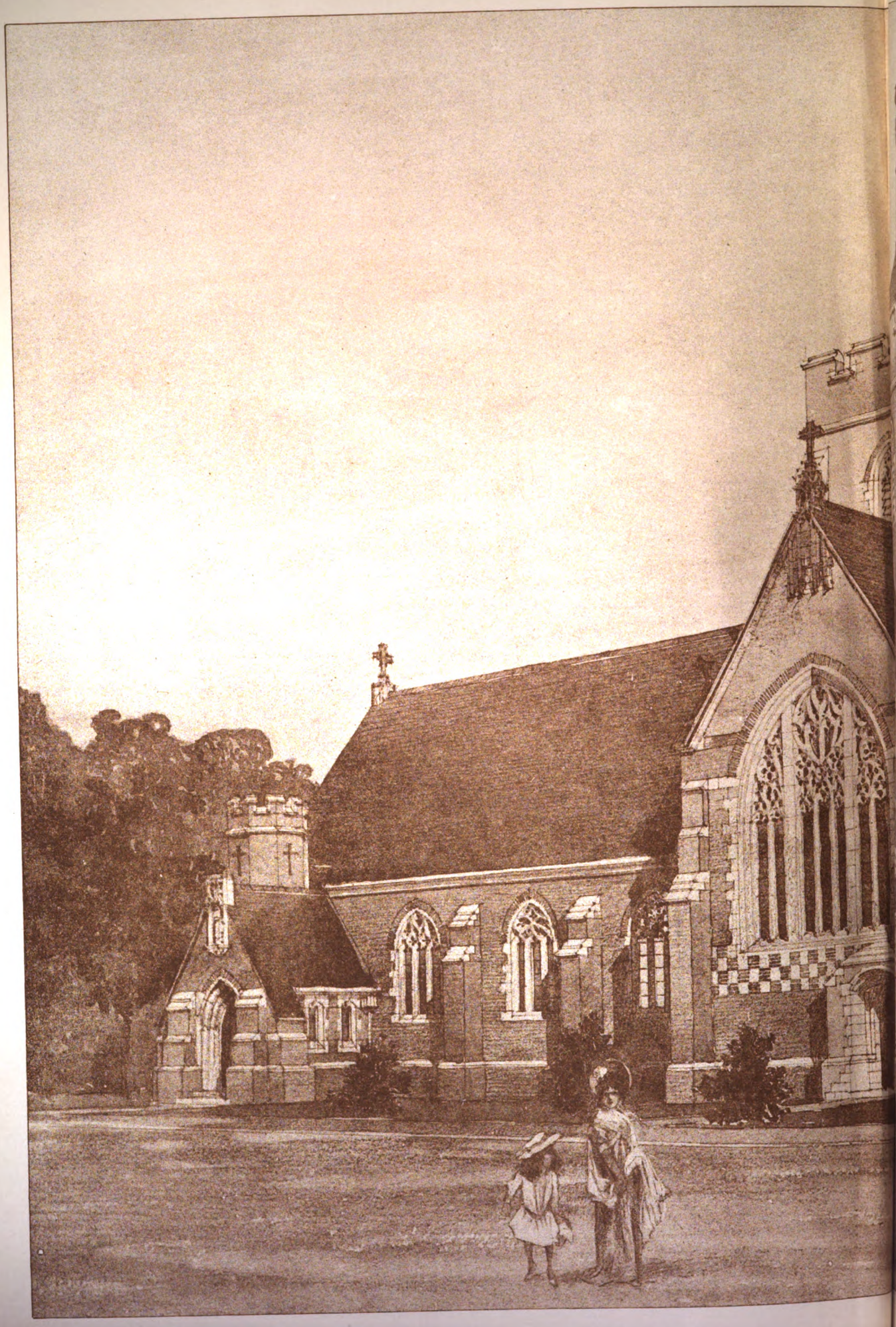
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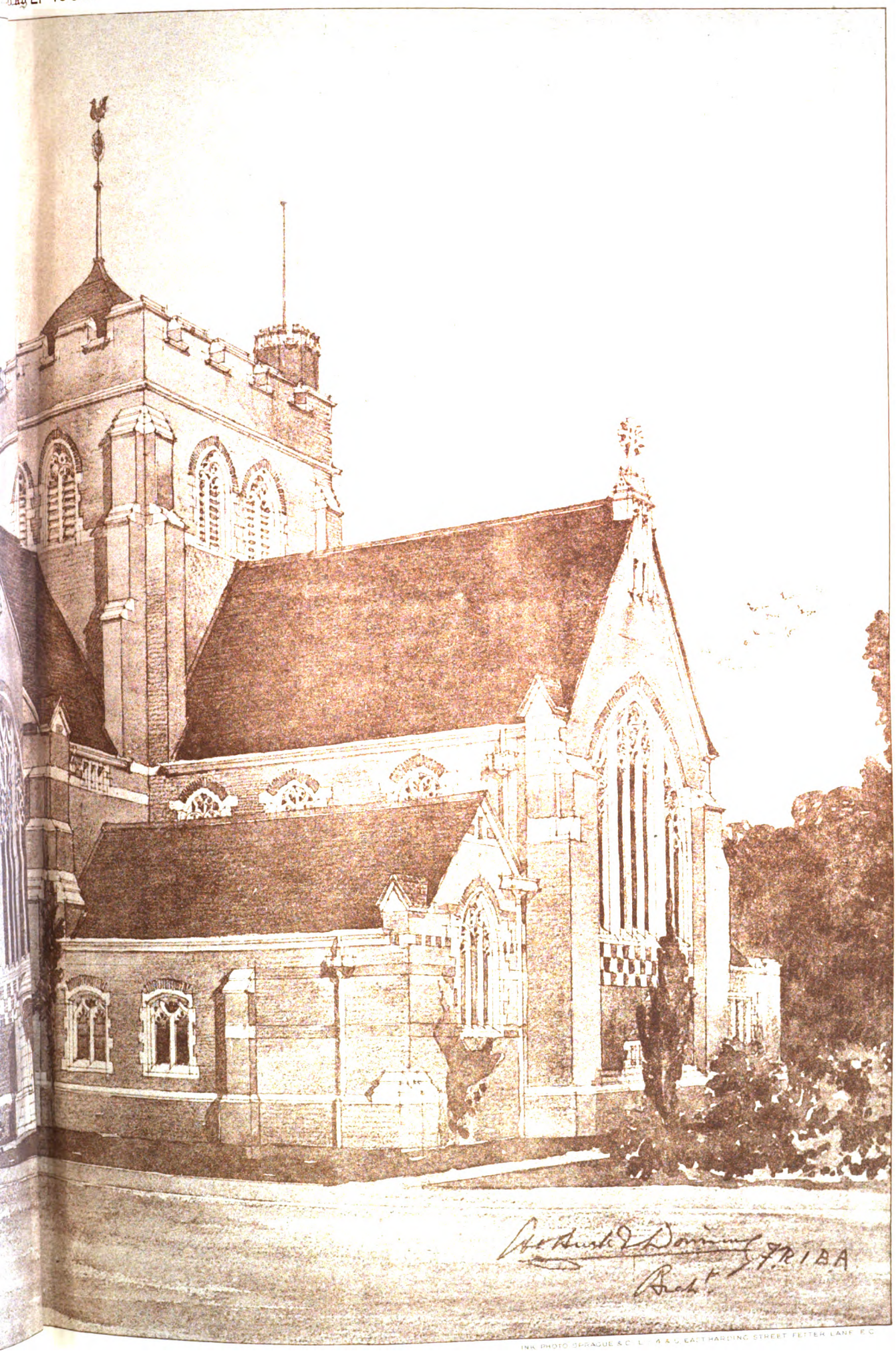
S. BARNABAS' CHURCH, MY[illegible]

H P BURKE D[illegible]

SOUTH-EAST

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May 21st 1909.



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CHURCH, SURREY: SOUTH-EAST VIEW.
H. P. BURKE, F.R.I.B.A. Architect.

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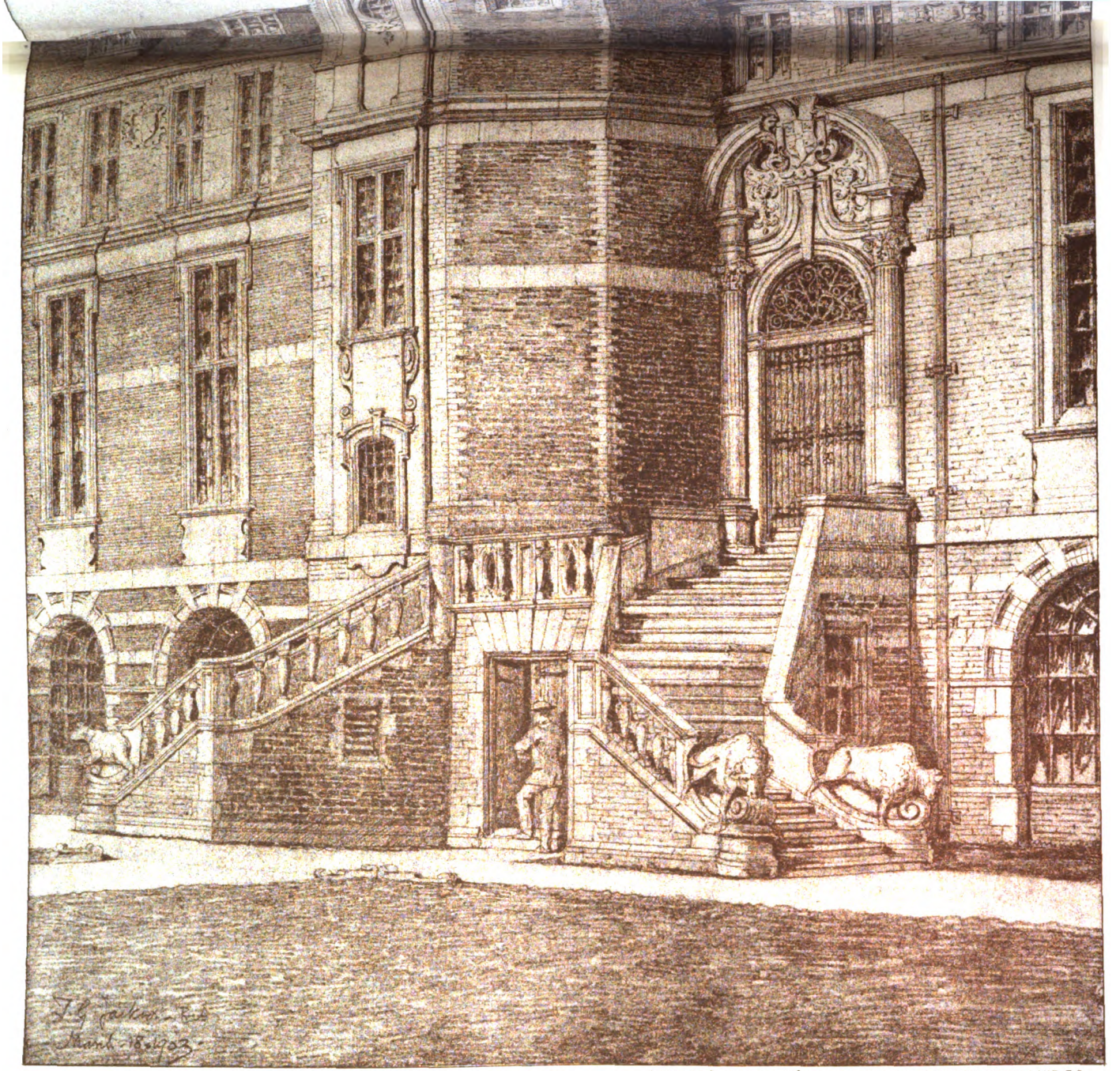
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SEDGWICK MEMORIAL
Museum - Cambridge
Principal Entrance -



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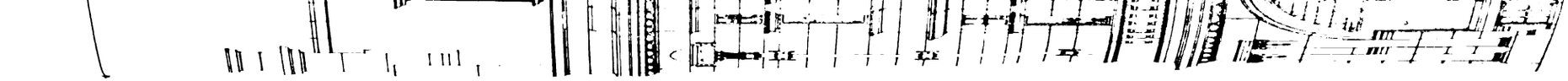


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SEDGWICK MEMORIAL MUSEUM, CAMBRIDGE: PRINCIPAL ENTRANCE.

T. G. JACKSON, R.A., Architect.

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FRONT ELEVATION.*

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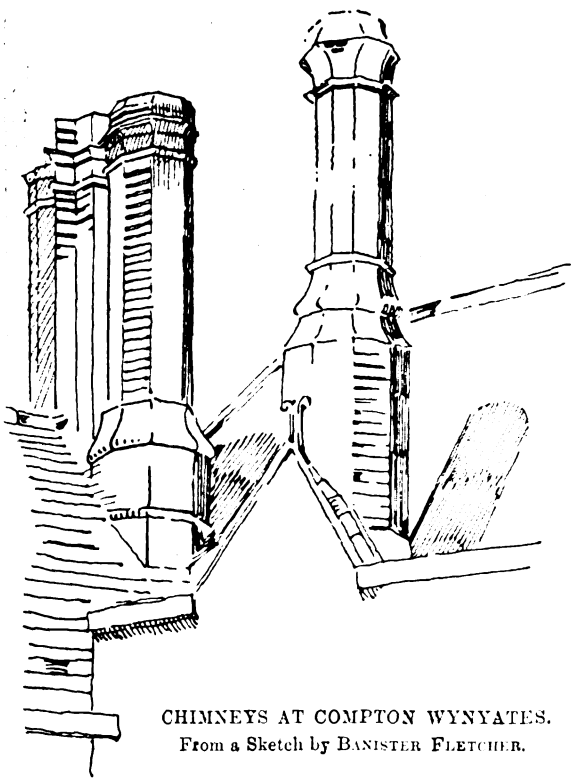
DESIGN FOR A BANK.

By WALTER EPPS

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CHIMNEYS AT COMPTON WYNYATES.
From a Sketch by BANISTER FLETCHER.

JACQUES ANDROUET DU CERCEAU.

AMONGST the treasures that we value most in our library is a reprint, published in Paris by A. LEVY in 1872, of DU CERCEAU's "Des plus excellents Bastiments de France," which, in our student days, we managed to pick up cheap at an auction sale when Mr. BATSFORD, *père*, was not present. It is therefore with peculiar interest that we welcome the volume * which Mr. W. H. WARD and Mr. BATSFORD, *fils*, have produced.

JACQUES ANDROUET DU CERCEAU lived in the sixteenth century, being born, as Mr. WARD tells us, probably about 1510, and residing and working in France till 1584, when he vanishes from history. He was, therefore, living at the time when French Renaissance architecture commenced to mature and to shake off the mediæval tradition that so largely influenced the work carried out under FRANCOIS PREMIER. His drawings, therefore, of what as a contemporary he regarded as "Des plus excellents Bastiments" of his time are invaluable, not perhaps so much as records but as intelligent criticism. Our thanks therefore are due to Mr. WARD for bringing before us a selection of the valuable collection of drawings by DU CERCEAU that is preserved, almost forgotten, in the British Museum.

The demerit of these original drawings is that they clearly do not record the buildings as DU CERCEAU saw them, except in a general sense, but as he thought they ought to be if improved in small matters of detail. Nor do the drawings as a rule agree entirely with the plates in his book for which the originals were presumably prepared. The publication, therefore, that Mr. WARD has given us represents DU CERCEAU rather than the châteaux of France in the sixteenth century, in so far as it reproduces the original drawings, but the author has justified the title of his book by collating DU CERCEAU's work with other sources, and so producing a volume which is an admirable epitome of the architecture of the more important châteaux and gardens of France in the sixteenth century. We include advisedly the architecture of the gardens, for to DU CERCEAU and his contemporaries the design of the architectural or formal gardens was as much part of their work as that of the house of which they formed the setting.

Mr. WARD has carefully selected plans and historical data of the buildings illustrated, so that his epitome may be valuable from the student's point of view as well as interesting to the curious.

The qualification of DU CERCEAU to fill the part of an intelligent critic is proved by the fact of his career put before us by Mr. WARD, by the many published evidences of his study of the antiquities of Rome, as well as of the Renaissance architecture of France, and by the records of his designs for the châteaux of Verneuil-sur-Oise, of Charleval and of the Maison Blanche at Gaillon, besides those for ideal châteaux that are given in the present volume.

The drawings in the British Museum collection are excellent specimens of draughtsmanship, and one can only regret that the conditions attaching to the publication of architectural books in this country have necessitated the reduction from the size of the originals that is the only fault we have to find with this very delightful volume.

* *French Châteaux and Gardens in the Sixteenth Century.* A series of reproductions of contemporary drawings hitherto unpublished by Jacques Androuet du Cerceau, selected and described with an account of the artist and his works by W. H. Ward, M.A., A.R.I.B.A. (London: B. T. Batsford, 94 High Holborn, MCMIX. 25*s.* net.)

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

A MEETING of the Institute of Architects was held on Monday evening last at Conduit Street, W., Mr. Ernest George, president, in the chair.

Sir WM. B. RICHMOND, K.C.B., R.A., read the following paper on

Smoke Abatement.

I am gratified that you have asked me to read a paper upon the smoke question, because I feel convinced that a powerful body as ours is can not only do much to convince public opinion upon this important question, but that it could exercise influence upon all governing bodies which require to be pushed to act and to find means to alleviate, if not entirely dismiss, a nuisance, an unenlightened condition of affairs which is detrimental to health as well as to all kinds of property and even also to commerce. It is unnecessary for me to tell you what you all know as well as I do, namely, that smoke and the products, acids, &c., are detrimental to buildings as well as to all hard or delicate surfaces upon which they are deposited.

From the purely æsthetic side of the question there can be no doubt, namely, that a deposit of black upon surfaces which are intended by their designers to appear white contradicts the common sense of all our designs. White shadows and black faces constitute an absurdity even to the tyro, and how much more galling must it be to you when you see your elaborate mouldings and ornaments screaming an ugly lie. It appears to me to be sentimental rubbish which even for one moment defends the colour of that portion of the west front of St. Paul's which has been made the black and unintelligible mass, wholly contradicting Wren's scheme. Gloom is certainly not dignity, nor does dirt and blackness constitute nobility of aspect or add to any historical memories, save those which a firm Legislature ought long ago to have tackled. The black condition of the outside of so many of our public buildings and priceless works of art in architecture is not a thing to be proud of for a moment, but rather to be ashamed of, in that the inertness of public opinion and the insensitive attitude of governing and public bodies which have continued and do continue to delay, not only to legislate firmly, but to see also that their legislation is put in action. Until we have cleaned London from the smoke of factories which do come under the Act it is useless to attempt to tackle the domestic chimneys.

What we have to do is to frame the clause in the Public Health Act in such a way that prosecution is made easy and not difficult, and that could be done by the elimination of the word "black" from the clause, substituting instead "all or any." The London County Council has had this change of wording before it for some little time, accepting a deputation from the Coal Smoke Abatement Society which was listened to with marked attention. I believe that if this Institute would frame, and pass a resolution in accordance with the proposed change in the wording of the clause and send it to the parliamentary committee of the London County Council, the councillors on that committee would be strongly influenced to pass the revision of the word in the clause. Continued expression of public opinion, especially that which is in embodiment hammering at it, is the only way to persuade public bodies to act firmly and promptly. The Local Government Board is steadily remiss in sustaining or supporting the execution of Acts of Parliament in their relations to this Act; the present Minister we hoped to find

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our friend, but on the contrary all his promises before he got into power are not worth the breath with which they were uttered or the ink with which they were penned. The sustained force of public opinion is the only remedy for Government official apathy and dilatoriness; there is nothing the Government official dislikes more than being prominently shown up in the Press—and it is excellent medicine for him. There is no doubt that public opinion is roused against the monstrosity of London dirt, and, slow as it is, except where pure commercialism is involved, the unthinking public begins to see that smoke meaning waste, and dirt meaning expense, should be, as far as possible, made an unnecessary evil.

One is bound to fear that on a question of æsthetics the abolition of smoke would take a long time to effect, but once prove to the purely commercial mind that his pockets are lighter for it and he will immediately change the tone of his argument. The cost in hard cash to every individual in London arising from dirt caused by smoke and smoke alone is prodigious; the destruction it evokes is terrible. Even what appear to be hermetically sealed cases do not keep it out. Many a time have I glazed, and as I thought finally pasted in the glass in a frame, pasted the backing board and imagined that I had conquered the invasion, when to my disgust, perhaps only a few months after the operation has been completed, I have found the inside of the glass blackened with fine soot powder and the drawing irreparably damaged. To all pictures soot is a deadly enemy even when dry, the deposit left by one black being an essential oil so powerful in its corrosive elements that a solvent which would remove the stain, however slight, would have to be strong enough to destroy varnish and paint. This fact was told to my father by Faraday during the sitting of a Royal Commission when the removal of the pictures in the National Gallery to South Kensington was in contemplation; I think the Commission sat in 1860, since which time we know that South Kensington is now almost as deeply clouded by dirt and smoke as Trafalgar Square, and there, in South Kensington, are treasures for which the Government and individuals have paid hard cash still unprotected by a little manly legislation, a legislation which would not injure but benefit all classes, including the manufacturer-offender, because all smoke is waste fuel.

One of the greatest fallacies is, surely, that stringent laws concerning cleanliness may damage trades. There is only one class which benefits by our smoke, the class of the washerwoman and charwoman; every other trade or occupation is injured, even the very vested interests of the ultra-commercial, because dirt obliges extra labour, and extra labour is expensive. The gas companies might suffer, but what are these among so many? One of the ridiculous travesties of common sense is the fact that the electric light stations in London have been, and some of them are, the chief offenders, creating darkness to produce light! The tram electric stations also are terrible producers of black smoke. From one in my neighbourhood I have seen the smoke travel on the atmosphere for at least a mile; in fact, Bedford Park, a rural district, is severely injured by this plague and selfishness on the part of a company. The Local Government Board declines to take action, though by law it is commanded to do so in default of the district authorities. Why is this? What is at the bottom of it? Votes! perchance; or vested interests; anyway it is disgraceful! The alteration in the wording of the Act would render it easy for magistrates to convict. Under its present reading it is difficult to prove black smoke to exist at all. Whether or no it looks black depends on the tone and colour of the sky, and on its position in relation to the sun at various times of the day. I do not like to venture to state the number of buckets of black water removed from my mosaics and windows in St. Paul's, nor for the quantity of black sediment left at the bottom of the pails after the water had lain still awhile; it was astonishing and aggravating. Now, if this smoke is a nuisance—and as to that there can be no doubt whatever, and that in a large measure it can be removed—it is in the region of a national question, and a far more important one than many Acts of Parliament which only waste the time of the House, and are only such as may possibly, if ever enforced, do some good to certain sections. This is a question which concerns everybody, touches everybody more or less, the poor as well as the rich; for the poor it makes it impossible for their homes to be clean, it makes it impossible for them to grow vegetables in their gardens, it injures their lives, because smoke precludes the admission through it of the most health-giving violet rays; the darkness leads to depression and depression to drink. It is harmful to every building: stone, marble, iron, steel, copper, bronze, even gold is injured by it. Precious fabrics must be kept under glass, and even then they are not immune from damage; it destroys in time the surface of oil pictures; it has injured and still goes on injuring the precious marbles in the British Museum and South Kensington. The sulphuric acid contained in each smut is a poison of great strength; it will rot copper wire in time; cords, string even of strong hemp are eaten into, and many is the picture which has fallen from a wall, the accident being due to nothing but the rotting of copper wires or cords through the action upon them of sulphuric acid. All these things which are just mentioned are known to all of you; it is no news that is told, it is just a reminder, as it were, in a very swift-going period, with many important current enterprises all in the forefront, especially coming to architects, who are the most hampered and shackled section in the whole artistic community by what is called civilisation, which in reality is obstructive to good and noble art, being nothing in reality but commercialism gone mad because agriculture has been wrested from us by machinery. Just a reminder that you, as all of us are prone to do, sometimes may want water and forget the bucket.

You want your buildings to be as you have designed them, and perchance are apt to forget the cause; it takes a good deal of coalition and a still greater persistence of drumming, worrying, to make any Government, and especially the English, attend to needs which do not immediately belong to party politics and seat-saving or seat-getting. If the smoke nuisance were made such a popular cry that it became necessary for any "party" to take it up to get in, we should very soon have the deed done; but when we learn, as we are learning, the hopeless muddles concerning the very existence of England as a country, while amateurs in essential matters rule, how can it be wondered that a great problem such as the smoke nuisance is comes to be regarded as a superficial nonentity?

We are taught by proof that nothing will really move any Government in their snug places in Parliament or officials in their offices but a regular bombardment of public opinion; when that is roused officials become human, and unwillingly are forced to see that the old red tape is rotten, and new must be provided which in its time will become also rotten, then must come again the gyrations of the old wheel of pressure. One thing one always mistrusts—the promises of those who are either in office, or out of office, or going to get office. A Government must be worried while it is in power, and that can only be done by the weight of public opinion.

All and every harm to health, to the joyousness of life, to the preservation of property, public and private; to energies, and to the higher cultivation of the sense of the value of both nature and art, and above all the essential of every stream of light obtainable in this overgrown and artificial city, has been stated over and over again. Statistics upon every branch of the subject are ready to hand, and the most unimaginative Englishman can follow statistics, if nothing else. Therefore what is wanted is the gathering together of statistics which shall show how in various departments of art, industry, health, even morals, this nuisance of smoke is detrimental to the country at large. It will be resisted by monopolists, of course, and by the self-interested classes; it might become a cry of interference with manufacture and labour; but that plea will very easily be broken down. It is an old excuse and one we know of perfectly well, but it is one which, by education of the masses to see for themselves, will very soon find its proper level in the region of untruth.

Before we begin to make an attack on household smoke let us set the law in motion as it now stands, and use all our endeavours, public and private; yet it will be well to bear in mind that there are grates and there is fuel which are practically smokeless. It is too much to suppose, and undesirable also, to look forward to the German stove heating in our houses—that I, for one, hope will never come. The open fire is a grand institution, and there is no goddess of Olympus more snug, more given to good fellowship, than Hestia; still, for general heating of a modern detached house, has the holocaust no recommendations? Gentle diffused warmth reaching, say, from 58° to 60° over the entire house would indeed add to comfort and probably also to health; then the open fire would be just a great luxury, and for it wood might be used in place of coal. I suppose afforestation is a coming thing, anyhow it ought to be; in that case ere long wood should be cheap. And how infinitely more pleasant is the heat it promotes, and absolutely innoxious its

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gas is as well as its ash, than coal gives off. I wish, and I am by no means alone in wishing, that the poorer classes would combine in tenements, even in streets, and have one cookery place in a given area, and further that all workmen's houses or rows of such were provided with heat as they are now provided with gas or even electric light. All these items in time, if tried now in some district or districts, might become customary. Then we should have begun at the right end for the diminution of smoke from private dwellings. It is no use to legislate till something has been offered equally pleasant as the open fire; but that might come to be regarded as a luxury more than a necessity, if some system of combination or system of general heating were devised and promoted.

To bring my remarks up to a point, leaving out all other points than the law as it stands, I suggest that the Institute should forward a memorandum to the London County Council, and as quickly as possible get it signed by every member, praying that in the clause in the Public Health Act of 1891 relating to smoke the word "black" shall be omitted, or, if not, the "black," "and all other smoke" be inserted. This change of a word or short part of a sentence would enable magistrates to know where they are with the law. Plaintiffs would then only have to prove a nuisance, and not have to prove its colour—an almost impossible thing to do.

Dr. DES VŒUX, in proposing a vote of thanks to Sir Wm. Richmond for his paper, said the greatest obstacle the Smoke Abatement Society had to meet was the indifference of people generally. When he began to fight the cause of the Society he believed every Londoner would be interested in the agitation, but he was mistaken, and the dark days of winter were so soon forgotten that the fight had to be kept up all the year round. A good deal of the fog in London, he said, was attributable to domestic cooking, and it was little use legislating against the nuisance caused by manufacturers if kitchen chimneys were allowed to go on as of old. He could not help believing that if the Institute were to take up even the one side of the question as it related to cooking in private houses an enormous amount of good would result. It was perfectly easy to cook without making smoke, and he believed many people held that certain forms of cooking were preferable when done by gas. If cooking by gas was largely introduced into kitchens he felt perfectly certain gas would be afterwards used for heating the rooms upstairs, and before very long London would be a greatly improved city to live in. The Smoke Abatement Society had gone to the London County Council to have the law changed, and the public control committee had recommended that the word "black" should be removed from the clause of the Public Health Act. A second recommendation of the committee stated that "all chimneys" should include all buildings in which the process of manufacture was carried on, and the chimneys of any building or place carried on under statutory powers. The County Council also sought to include any Government factory or workshop. There were enormous factories at Woolwich or thereabouts, and at certain times of the year the smoke from the chimneys passed over London, doing great harm, and there seemed no reason, therefore, why Government factories should be exempt from law. Recommendations were also being put forward that in certain cases the County Council should be allowed to act either in conjunction with or at the request or in agreement with any of the sanitary authorities. There were certain sanitary authorities which carried out the Public Health Act very well and some did not, and the County Council were desirous of acting with other independent authorities. They also wished to have the power to control the nuisance of smoke from electricity works and refuse-destroyers. The last recommendation was that the County Council should have power to take action outside the district of the London County Council. The proposed alterations in the Act would ultimately have to be considered by the finance committee of the County Council, and the speaker was afraid that that committee would decide the change would be too expensive to carry into operation. If the Institute, however, would bring its influence to bear upon the matter, and show the committee that the County Council was trying to do its duty and that London was behind it, the change in the wording of the clause might become an accomplished fact.

Mr. PAUL WATERHOUSE seconded the motion, and said they wished to thank the lecturer on another issue. Agitations were conducted as a rule not by people who lived in the sublime realm of art, and he felt that they as artists owed a special debt of gratitude to Sir Wm. Richmond for the dirty work and smoky work he had undertaken on their behalf and mankind at large. Something had been said about indifference, and the speaker thought it would be well to analyse it. Among the precepts of their bringing up they were taught that certain things were inevitable and must be endured. The fogs were looked upon as a visitation from heaven; they took them for granted, which perhaps was a mistake. Then perhaps as architects they had another excuse—they were always contending with difficulties. In all their work they found that the whole brunt of it consisted in dealing with troubles, and they rejoiced in them—such things as small sites and light and air cases. One of the London difficulties was smoke. They knew that they had to contend with black upon their buildings, and so a great many architects tried to realise in the first conception of a design how it would look when dirty. They looked upon the difficulty as one to be met and not to be removed.

Sir ASTON WEBB, R.A., agreed that a great deal might be done in the way of gas fires, and he believed that the destruction caused by a smoke-laden atmosphere was a serious hindrance to art, for people would not decorate their buildings with sculpture or paintings when they knew that within a few years the work would be invisible. Marble buildings in London became brown toned, and not only London, but in every big town in England a thick veil gradually spread over the buildings and brought them down to a uniform level. He felt therefore the Institute should be interested in the abatement of the smoke nuisance, and he was sure they would co-operate with the London County Council for a revision of the wording of the Public Health Act. Smoke darkened their windows, degraded their houses and depressed their spirits, and in time would make them commonplace people.

The vote of thanks was passed by acclamation.

Sir WM. RICHMOND, in his reply, remarked that smoke abatement was not only a national question but one which affected the whole world. He had been invited to Paris to help incorporate a society similar to the one in London, and in Rome the authorities had also asked his advice; Venice and Cairo suffered, and he was told that even Japan and India were now affected by smoke. As the leading nation, he held England should set the example in abating the nuisance and so make for the higher civilisation of the world—the promotion of beauty.

THE SOCIETY OF ARCHITECTS.*

(Concluded from last week.)

OCCASIONALLY, sites are purchased on an estate that has been cut up for building purposes, and the plots sold subject to certain restrictions as to frontage line, class of building that may be erected, &c. These questions should be carefully considered, and in making calculations care must be taken to make allowance for the portion of the site in front of the building line, and which cannot be taken into account in calculating available area. Even where there are no restrictions it is well to set the building well back from the road.

Having settled the question of position and assured himself that there is nothing objectionable in the shape of building restrictions, the architect advising a committee should make careful inquiries in regard to what are known as easements; especially should he find out if any of the adjoining owners have acquired a right of light or air over the proposed site that would be interfered with by any buildings it might desire to erect.

Inquiries should also be made of the local surveyor as to drainage, &c., and any special by-laws that might injuriously affect the proposed scheme—*i.e.* some local authorities prohibit buildings being erected of a greater height than the width of the road. This becomes a very important question in the case of a corner site with a narrow side road.

In order to build economically the site should not, if possible, be below the footpath level, the subsoil should be solid "virgin" earth, and any very steep gradients either in the land itself or in the road are objectionable and costly. Made earth is most to be feared on sites ostentatiously advertised as fine deep gravel or sand, since it pays the builder well to excavate and sell these materials and to substitute rubbish which costs him nothing, and for taking which indeed in some cases payment is made to him.

Always avoid a long, narrow site. One approximately a square is more acceptable for a school, for it should be remembered that ample space on all sides of the building

* A paper on Secondary Schools read by Mr. G. T. Forrest on May 13.

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is necessary. The amount of land necessary for a complete scheme should be carefully considered, especially in growing suburban districts where the price of land very quickly increases in value, and adjoining owners who bought in the early days of the district are apt to ask prohibitive prices. Consider well, therefore, all possible contingencies, and provide enough land for present and future requirements. It need hardly be added that the presence of wires crossing a site forms an encroachment equally with the fixing of a post or standard, and rental for wayleave should be arranged for accordingly.

Type of School Favoured.

Whether a new secondary school shall be a school for boys or girls only, or a mixed or dual school, is a matter for the educationist to decide, and depends in a large extent upon the population of the district and the provision already existing.

The choice between a mixed school and a dual school is a somewhat difficult matter and one which concerns the architect, so that a definition of the two becomes necessary.

A mixed school is one where there is a common staff for both boys and girls and the sexes are mixed in all classes, while a dual school is one where the sexes are not, except in very special circumstances, mixed, but the staffs are interchanged as occasion may require.

Generally speaking, I do not think that many education authorities have favoured the dual arrangement, which, however, has advantages which perhaps it would not be out of place to mention here. In the first place, it is more likely to be acceptable in a district where the co-education of boys and girls above elementary school age is a novelty. Again, it serves to protect to some extent the full development of the boys' section and the girls' section in the school along their own individual lines, rather than making each new feature the result of a compromise between the requirements of the boys and those of the girls. It may also be added that the dual school gives an opportunity to appoint a senior mistress to watch specially over the interests of the girls, an arrangement which has obvious advantages.

Accommodation and General Principles to be Observed in Planning.

Generally speaking, a secondary school can be commenced with a minimum of accommodation—viz. class-rooms, hall, science and preparation rooms; and such things as cookery and manual training-rooms, gymnasium, art-rooms, &c., can be added afterwards.

In small secondary schools it is sometimes arranged that one science-room is made sufficient for the whole of the science teaching in the school, but for a secondary school of any size at least a chemical laboratory, a physical laboratory, lecture-room, preparation-room and dark-room are required.

In some English counties a new system of arrangement has recently been tried with great success. Some directors of education do not agree with the system of taking theoretical work at one time and practical work at another, on the ground that the students get a more thorough grasp of their subject by combining the two parts in one lesson. This system is working well, I understand, and the science teachers after trying it like it. With this view all the science benches are so arranged for the students, and are made so that they serve as tables for taking their notes, the students using stools to sit on during the theoretical portion of the lesson, and during the practical work placing the stools under the benches. Whether sinks and reagents are required to each bench depends upon the extent of the chemistry course, but in ordinary secondary schools it has been found sufficient to have these on the side benches only.

The physical laboratory can be adapted for electrical work if the requirements of the school need it. In boys' schools magnetism, electricity and mechanics are generally taken in this room; and in girls' schools botany, as well as the ordinary physics course. A good balance-room should always be provided and fitted with slate benches set perfectly level for balance work.

A preparation-room is required with easy access to both physical and chemical laboratories. This should be fitted with a good sink, shelves for reagents, and either a separate draught chamber or access to one of the draught chambers in the chemical laboratory.

With regard to the art-room, excellent results in lighting can be obtained by adopting the principle of the ridge and furrow roof where it has not been possible to get a direct north aspect.

As to cookery-rooms, these should be large and airy, preferably at the top of the building. Good scullery accommodation is also required.

The manual-teaching room is better on the ground floor, or isolated, owing to the noise. Practically no fittings are required beyond benches, tool racks and work cupboards.

In girls' schools three changing rooms are required—one for the mistress, one for the girls and one for the other teachers. The girls' room should be planned contiguous to the cloakroom, so that they can change their garments after playing hockey, &c. Arrangements should be made for swimming-baths when money will permit. The head mistress's private room, cloakroom, lavatory and changing room should be *en suite*.

Hot water should always be supplied to lavatories from kitchen fireplace, and a hot cupboard to dry clothes should never be omitted. Lead flats, if possible, should be used for growing plants.

With regard to a room for needlework, if the school curriculum is so arranged that there is always needlework in hand, a special room should be set apart for cutting out and drafting, and fitted with long tables on trestles; but very often this subject is taken in the dining-room, and many lady principals are of opinion that a geography room is more important than a room for needlework, fitted up with places for maps and apparatus. Note that a magic lantern must always form part of the equipment of this room.

In dual schools be sure and keep departments common to both sexes in the centre of the building, thus obviating overlapping.

With reference to the classrooms, the sixth-form room should always adjoin the library, and should have direct access to the room. In some schools the two rooms are divided by a folding partition, thus allowing them to be thrown into one. Where a gymnasium is provided it should have a gallery for scholars, and if the gymnasium is situated outside it is best to make the changing-rooms sufficiently large and easy of access from the playing fields.

Assembly Hall.

It is always desirable to have a principal entrance for the general use of the school entering direct into the assembly hall for public functions, &c. This section is usually set apart for the office, head master's or head mistress's room, committee room, &c. With regard to the assembly hall itself, it is not desirable that it should form a passage way. This point is an important one. The hall should be ample enough to seat the whole of the pupils, with a good margin to allow of sufficient seating accommodation for prize-giving and entertainments, &c. Six square feet per pupil should be taken as a minimum allowance, and any further space will prove of great advantage. If the hall is used as the gymnasium provision should be made for the storage of chairs. Side lighting should be in all cases the rule, as it makes the question of ventilation much easier. One end of the hall should be wainscotted so as to allow of names being painted on, and so prevent those horrible wall boards so often seen and which are so very ugly.

Science Rooms.

No special rule can be laid down for fitting up the science rooms of secondary schools, as the size and character of the school must be very carefully considered in determining the requirements, but as these rooms are so important I propose to consider a few vital questions of laboratory planning and equipment. There are certain general principles to be observed in laboratory planning, and a neglect of these may lead to the production of a laboratory apparently perfect on a cursory examination, yet so defective that to conduct ordinary work therein is a matter of considerable difficulty.

First and foremost, laboratories should be capable of expansion and modification; (2) fittings should be so disposed round the room as to minimise the unavoidable movement of pupils; (3) the arrangement of benches, &c., should insure ease of supervision on the part of the instructor; and (4) the storage accommodation should be ample, and wall space should be left for additional fixtures.

These four considerations should be constantly kept in view, and no fitting should be introduced which to any great extent tends to subvert them. With regard to the general structural nature of the rooms, the laboratories should be lofty, and either top lighted or the side windows so planned that the sill is at least 6 feet from the floor. By this means no wall space is wasted and the light is better diffused. The walls should be wood panelled to a height of 6 feet to enable all apparatus to be easily fixed and easily moved. Glazed tiles or bricks so often employed, though admirable as far as light and ease of cleaning are concerned, are almost fatal

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when change of fittings are required. It is perhaps superfluous to remark upon the necessity for perfect rigidity in the flooring, the ordinary system of joists and flooring boards being quite inadequate.

Chemical Laboratory.—General Arrangement.

The main desideratum in a chemical laboratory is plenty of room for the students to work. The working benches are either single or double, but single benches have the advantage that all students face the same way and so are under better supervision, but they are very extravagant as regards space. Wall benches are bad and should in all cases be avoided; only when space is extremely limited should they be employed. They obliterate all the wall space and leave no room for cupboards and other fittings. Gangways between benches where students work should not be less than 6 feet; for a single row 4 feet will suffice. Each student will require a minimum bench space of 3 feet 6 inches by 2 feet.

A considerable space should be left clear in front of the demonstrator's table so as to afford room for the students to assemble to receive collectively any remarks from their demonstrator. It is always a decided advantage if perfect symmetry can be secured as an aid in securing the orderly issue and disposal of apparatus and reagents, and reduces the need for movement in the laboratory.

For the same reason reagent shelves other than those on the benches should be placed symmetrically about the room and not all collected into one position, so that no student has to move far to secure any reagent that may be required.

I might mention that before the best method of fitting up the benches can be determined it is necessary to know to what degree the chemical teaching is to be carried. For instance, a very simple form of bench would suffice for a school where few of the pupils would proceed to analysis. At one school I know of they have benches arranged for four students with a plain top, and while a gas jet is supplied to each pupil there is one tap for water and a sink placed at each end which serves for two pupils. There is no partition in the centre (this form being out of date), but a row of white glazed tiles on which to stand bottles. This arrangement is suitable for elementary work, but would hardly be sufficient for a school where there were advanced pupils.

With regard to the detail for bench fittings, each pair of students should have at hand one water nozzle, fixed about 2 feet above the level of the sink, one side nozzle for filter, pumps, &c., one nozzle for condensers, two gas nozzles, terminals for electric current, one balance in a solid and well-made case, one receptacle for rubbish (broken glass, &c.), and space for bottles. If reagent shelves are used on benches, all gas nozzles, electricity terminals, &c., should be recessed under the shelves, raising them on a wood fillet from the bench level. The working space is thus entirely unencumbered, and glass apparatus is not liable to be broken by being pushed against a projecting gas nozzle. In planning the lockers beneath the benches regard should be paid to the maximum number of classes likely to use the laboratory. With regard to the drainage, the V-shaped trough is the most satisfactory. This may be made of 1 or 1½ inch red deal boards joined so as to form a V trough about 6 inches deep, and having protecting fillets to prevent splashing. The trough is thoroughly caulked with a mixture of pitch and tar put on hot. This trough collects the drainage from the sinks and delivers it into a sludge box. The overflow from the sludge box is delivered into a similar trough laid in a chase in the floor, which conveys it to the downspout outside. The gas pipes should be of ample bore and the pressure good, otherwise when many burners are in use at the same time the supply will not be sufficient.

Physical Laboratory.

The main desideratum in the physical laboratory is a table free from vibration and of sufficient width to allow of a student being able to place his apparatus in the proper position. The narrow single bench which many prefer in a chemical laboratory should be avoided. Separate tables suitable for four students should be used, say 8 feet by 4 feet. It is always advisable to leave the bench tops unencumbered. With this object in view, gas taps, &c., should be placed in a row at the ends of the tables, and all tables should be fitted with cupboards underneath. It is not necessary to lay on a water supply to the students' benches; two wall sinks with heaters and drainage boards will as a rule be sufficient. Every physical laboratory should contain a large stock of small drawers, say 12 inches by 3 inches, for the purpose of storing the innumerable small appliances in constant use. Lever handles to the doors of the cupboards should be used, as the ordinary piece of hardware is often difficult to unfasten, and leads to shaking and perhaps injury to sensitive apparatus within the cupboard. All cupboards should have flat tops and glazed doors.

Lecture Room.

The lecture room should be readily accessible from both the chemical and physical laboratories. A space should always be left at the back of the room for a lantern stand, and another on the right of the lecture table for the use of a lantern in optical work. It is a good plan to fit the front of the lecture table with glazed cupboards. If the "Kelvin" sliding blackboard is used, see that the pully wheels are of large diameter; the small ones in common use render the board difficult to move. The electric service employed for adapting the electricity from the supply mains to experimental purposes is all-important, and requires careful consideration from every point of view before the plant is laid down and wiring fixed. It is important that the wires should be accessible and not embedded in the walls. The electric service, however, is of too wide a scope to deal with in this paper.

Desks.

The single desk is the type recommended in the case of secondary schools, and most of the single desks have lockers, though this is not insisted upon. Three different sizes are generally obtained to allow of pupils of different heights and ages. Adjustable desks with complicated mechanism are not as a rule found to work satisfactorily. In one high school for girls which I had occasion to visit some little time ago, the seats or chairs varied in size to suit the desks, and were all separate and not attached to the desks in any way. Some people object to this, but at this particular school the head mistress liked the pupils to be able to move their chairs and sometimes have them close to the desk and sometimes further away from the desk. She also found it a great convenience to be able to take all the chairs from the classrooms to the hall when that room was required for a concert or a large meeting. The gymnastic mistress went round at the beginning of each term to see that each girl had a desk and a chair of the right height. Whatever system is adopted, special care should always be paid to securing desks of practical construction and to their satisfactory placing in the classrooms, inasmuch as the order and discipline in a school are very materially dependent thereon.

Ventilation and Heating.

As the ventilation of a building or school is such a complex question, it is not advisable to discuss the question in a general paper of this description. Whether mechanical or natural ventilation is most suitable is largely a matter of opinion, as there are many strong advocates of both systems. At the present time there seems to be a current of opinion against mechanical ventilation. This, I think, is due to the rather careless methods of many of those who have put in mechanical ventilation without giving it sufficient care, while there are always some people who will come down upon mechanical ventilation as soon as they learn that the building is mechanically ventilated. Perhaps if they had not been so informed no remark would have been made. Of course, there are always schools in which the introduction of mechanical ventilation is quite unnecessary. Except in the heart of large cities, secondary schools for both boys and girls are generally situated in the outskirts, or at all events in the better quarters, where nearly always large open spaces can be easily obtained. In these schools it is not really required. Further, you have in these schools some twenty-five to thirty pupils only in a classroom with a much larger cubic content per child than in the case of an elementary school. All this goes to help the ventilation and renders it less necessary to resort to mechanical means.

The choice of an efficient heating system for a school is always a difficult matter, but experience has taught me that, all things being equal, there is nothing to surpass the ordinary low pressure hot-water system, provided the radiating surface is properly calculated and allowed for. I have never yet seen a properly installed low pressure heating installation fail or give the least trouble. Consequently I have adopted this system almost without exception on account of its economy and efficiency. When we consider the immense advantages of this over all other systems of heating, it is not surprising that lately there should have been such a great development It is necessary, however, to take certain precautions which I shall endeavour to point out.

The following is quoted from a recently published book on school-planning:—"The heating engineer will, of course,

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determine the amount of piping required to heat the building to the required temperature, making, of course, the necessary allowances for loss of heat through walls, &c." This I believe to be the ordinary procedure adopted, the scheme being left entirely in the hands of the heating engineers.

No doubt this would be all right, provided the lowest tender was not always accepted, but I am afraid that this expression has become a sham, as they nearly always are accepted. On that account, therefore, I have, for a good many years now, discarded the practice of asking heating engineers to submit schemes, for the simple reason that many of them, for the sake of getting the job, cut down out of all reason the radiating surface in their scheme, with the result that I have seen tenders vary from 90*l.* to 180*l.* The lowest tender is accepted, and when the school is opened the heating is a failure. I am therefore of opinion that the architect should invariably get out his own heating scheme, with detailed specification.

To avoid failures, however, the following points should be carefully noted, and I trust I may be pardoned if I deal at some length with this very important branch of school-planning. In manufacturers' lists the boilers are usually rated up to their full power. It is a good practice, after calculating all the pipes and radiators in square feet of radiating surface, to allow a liberal margin of power. One-third margin of boiler power over the actual work will result in a great economy of fuel, and have the further advantage of keeping up the heat for a longer period than six hours without attention.

It is poor economy to put in a boiler that can just do its work. Always select a boiler having a deep fire-pit, as unless the depth of the fire or fuel-holding capacity is in the boiler it is very difficult to get a boiler to burn or keep in twelve hours without attention and keep a reasonable temperature in the apparatus over night. Always see that a safety-valve is fitted on the boiler, and preferably a dead-weight safety-valve—*i.e.* a valve weighted and the weights protected by a cast-iron case. If cast-iron socket and spigot pipes are used, they should invariably be of the medium strength, and it is almost needless to say that in a building of more than two storeys high the heavy should be used.

If wrought-iron pipe is specified, it should be of steam quality and strength and of British manufacture. British practice is to paint the various qualities of wrought-iron pipes as follows:—Steam quality, red; water, blue; gas, black or unpainted.

I believe it has been known for unscrupulous contractors to alter the colour of the various qualities so as to gain the difference in the price, but a good firm would not stoop to a trick of this description.

The reason for specifying British manufactured pipes is that a good many foreign makers supply wrought-iron pipes as steam quality which are lighter than the British makers' gas quality.

Radiators should have perfectly plain, smooth surfaces, as decorated or ornamental radiators only harbour dust.

In selecting radiators it should be remembered that the wider the distance between the sections the better, owing to there being a greater radiating efficiency when the air is allowed free movement across the sections; being wider also admits of easier cleaning. In fixing the radiators to the mains there ought to be a boss cast on the main pipe for both flow and return, drilled and threaded to receive the size of pipe required to supply size of radiator. This makes a permanent and lasting job. A cheaper method is to put on pipe clips or saddles; the disadvantage of this method is that there is simply a hole bored in the pipe and the saddle clamped on with indiarubber joints, such joints not being permanent, as rubber contracts with the heat and the nuts have to be screwed up occasionally, with the result that the rubber flattens out on the pipe surfaces and usually projects over the holes for the radiator supply pipes, very often throttling the supply to the radiators.

With regard to the heating surface in classrooms, &c., having the usual amount of window space required by the Education Department with two outside wall exposures, and to get an inside temperature of sixty degrees with the outside thirty and, say, two air changes per hour, the surface required is fifteen super feet per 1,000 cubic feet, and thirteen for rooms with one exposure, and eleven for halls with no exposures. With three or four air changes increase the heating surface twenty-five per cent.

Usually expansion cisterns are put in far too small; a good practice would call for some reasonable proportion between the size of the apparatus and the size of the expansion tank; up to 1,000 square feet of radiation the tank should not be less than 20 gallons capacity; 1,500, 30 gallons; and 2,000, 40 gallons. Care should be taken that the cistern should have depth, and the ball tap worked in a water line of not more than 4 or 4½ inches.

Circuits should always be valved and the valves placed in the boiler-house and subject to no persons handling other than the caretaker, so that he may know exactly the conditions under which his mains are working.

In arranging main circuits it is advisable not to overload the mains with too much heating surface in radiation. The following I have found by experience gives good results:—Pipe 2-inch bore, 350 square feet; 3-inch bore, 700 square feet; 4-inch bore, 1,100 square feet, on a one-storey building, and so on in proportion.

In considering estimates and schemes (when these are submitted) the architect should carefully examine the plans and select those on the best lines which interfere least with the architectural features of the building.

If these details which I have roughly gone over were adhered to by engineers when tendering, it would be found that the great differences in the amount of estimates would disappear, with the result that better-class work would be obtained. If, however, under these conditions a very cheap estimate was obtained for a scheme, it either means a dead loss to the firm or shoddy and improper work if not carefully supervised.

Artificial Lighting.

In secondary schools situated in large towns liable to fog and where work is carried on in the afternoon or evening the question of artificial lighting becomes one of great importance. Now that the medical inspection of school children has become compulsory, it behoves the school architect to see that the doctor shall have no good reason for tracing cases of visual fatigue to defects in the lighting of the school premises.

Unlike many of our elementary schools, secondary school buildings are usually situated in the suburbs of large towns, or at least in the districts where gas, &c., is obtainable. It would therefore, I think, be out of the question to waste the time of the meeting with any remarks upon oil lamps. Let us rather confine our attention to the discussion of the two best-known modern artificial illuminants, gas and electricity.

First of all let us see the requirements necessary to produce satisfactory results. These are (1) sufficient illuminant; (2) steadiness of the light; (3) colour of the light; (4) light that will give as little vitiation of the air as possible.

Up till quite recently it is surprising how relatively small an amount of consideration has been given to the problem of artificial illumination in schools. During the past *nine* years I have had occasion to visit and report upon a great many schools of different types, and I regret to have to state that the misapplication of artificial light was everywhere apparent, and mark you, misapplication represents actual waste.

Now, however, the competitive development of gas and electricity is steadily educating the architect to a higher standard of artificial illumination. This standard is the outcome of steady development of efficiency in the illuminants themselves as well as in the methods of application. The general question as to whether gas or electricity is the more suitable illuminant for a school is a large one, but after careful study and inquiry I have come to the conclusion that incandescent gas is the better of the two illuminants, and a safer one for the pupils' eyes. I think this will be best explained by defining certain fundamental properties which govern the correct application of artificial illumination.

The even distribution of light is the underlying principle which governs the correct application of artificial illumination. This is essentially so in schemes of interior lighting. To attain this end endeavour should be made to follow as far as possible the distribution and characteristics of daylight illumination—namely, downward and oblique direction, steadiness of the light, and broad diffusion in order to avoid sharp and deep shadows, not, however, seeking to entirely eliminate shadows, as these, by forming contrasts, are helpful and materially assist the eye in its judgment of the form of objects.

In all forms of artificial illumination the intrinsic luminosity or the intensity of the brightness of the luminous surface should be kept as low as possible, or, in other words, the surface from which the light emanates should be as large as possible because (1) the strain on the eye will be as small

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as possible; (2) the shadows will not be deep, and the difference between light and shade will be reasonable.

Eminent lighting authorities lay down the rule that the maximum allowable luminosity should be below five candles per square inch of illuminating surface. Obviously this means that some method of diffusing the light, either by means of shades or globes, should be adopted wherever the radiant is directly in the field of vision, so that the diffusing surface may be within the limits of a comfortable working intensity. Let us see how gas and electricity compare in this respect.

The strong position of gas as an illuminant is due entirely to the invention of the incandescent mantle, which has so enormously increased the illuminating efficiency. The improvements in lamps and mantles during recent years has been steadily progressive. The colour of the light emitted as in the "Graetzen" lamp is almost white and of considerable penetrating power.

Take electric light. Recently several metallic filament lamps have made their appearance, the most efficient of which appears to be the "Osram." The efficiency of this lamp (32 candle-power) is about 1¼ watts per candle. As the great majority of filament lamps are supplied in clear globes generally insufficiently shaded by reflectors of shallow depth, and are used more often than not within a comparatively short range of the eye, too great regard cannot be given to the serious menace to eyesight which this implies, owing to the image of the glowing filament falling on the less used portion of the retina. The filament lamp is more insidious in this respect because of its low candle-power. The luminosity of an inverted mantle of the "Graetzen" type is probably about 25 candle-power per square inch; therefore, in order to produce the best lighting effect, it is advisable to use suitable glass. This should be of sufficient density to prevent the direct rays striking the eye, obscuring the light, and yet not too dense to obscure too much of the light and so seriously affect the economy. The most suitable globes are those known as opalescent and made of "Jena" or similar glass.

The amount of gas consumed by an inverted burner should be always carefully adjusted so as to get the best results, and if the pressure of gas in the street mains is a varying one, either a volumetric governor of the size necessary to pass the requisite amount of gas should be fitted on each burner, or a pressure governor should be fixed on the meter. In some districts the pressure in the street mains varies as much as 50 per cent., so that without some governing arrangement it is manifestly impossible for the burner to give its best and most economic results.

As an example of the necessity of governing, I have found that with Newcastle gas the best results from a "Graetzen" burner are obtainable when the gas is being consumed at the rate of 3½ cubic feet per hour. This burner, however, unregulated has sometimes been found to consume 8 cubic feet per hour, with the result that the maintenance of glass and mantles has been very excessive; whereas, with ordinary reasonable usage, the number of mantles used for ordinary indoor lighting should not exceed three per annum.

In concluding this paper I may be pardoned if I lay stress on the necessity of designing schools from within rather than from without. To sacrifice the interior so as to get an external effect is insincerity in architecture. It may mean inconvenience to those who use the building, and often results in insanitary conditions prejudicial to body and mind.

Appropriateness in design is the correct aim in art, and this arises where the design is the natural outcome of the purpose for which the building is intended. The present-day public elementary Council school, clean and excellent as it is, if somewhat bare, offers quite sufficient contrast to the homes from which most of the children come, and is therefore well adapted to give them a start on the road to a higher standard of living; but to children, especially girls, accustomed to the refinement of a cultivated home, plain utilitarianism in the erection of a building is likely to present a forlorn and forbidding appearance. Although it may, and indeed does, cost more to make a handsome building, there ought to be set against this the fact that refined and artistic surroundings have a high educational value. Therefore the necessity for a due observance of strict simplicity and practical utility in their erection should not, and must not, prevent the endeavour being made to render the school as a whole, and the several rooms in particular, pleasing to the eye both in form and appearance, whereby there will be called up in the minds of both teachers and scholars agreeable and pleasurable sensations, which may in a measure contribute to exercise a stimulating and exhilarating influence on their faculty of taste and artistic sense.

So much is spent nowadays on teaching art directly that some allowance might be made for influences of this kind, which are none the less strong because imbibed unconsciously.

Mr. P. B. TUBBS proposed a vote of thanks to Mr. Forrest for his paper. He had hoped, he said, to gather a good deal about the planning of secondary schools, but they had learnt more about fittings and the interior arrangement of such buildings. With regard to the question of heating systems, the speaker said he made it a practice in competition estimates for that kind of work to allow a margin of 50 per cent. of the boiler power, and to compare closely the estimates submitted before accepting any tender.

Mr. ELLIS MARSLAND seconded the motion.

Mr. B. R. TUCKER said it was true they had not heard much about the planning of schools, but he thought that perhaps was a detail which could be gained by observation. The information in the paper about ventilation and heating was of immense value, and he agreed with the lecturer that incandescent gas light was superior to electricity in its practical advantages. Birmingham had tried both means of illumination for its art galleries, and had finally adopted the incandescent light. He was opposed to mechanical ventilation, and he would therefore have liked to have heard some remarks upon windows and sashes.

Mr. E. J. NALDRETT said he approached the matter from the point of view of a school committee man, and wished to hear the author's opinion on two points. He had to arrange for the erection of schools to be built at the least possible cost, and he asked, therefore, did the regulations of the Board of Education referred to by the author represent the minimum which must not be fallen short of in all details? The second point was the important question of cost, which had not been dealt with in the paper, and it would be interesting to hear what would be the approximate cost of a school for 150 to 300 scholars.

The PRESIDENT, in summing up the discussion, said they knew that the question of cost depended upon the site on which the building was erected and upon the quality of the school. Secondary schools which might be classed in some instances as technical institutes could not be compared with an ordinary secondary school for girls, so that, taken generally, no definite idea as to cost could be given, but he supposed a school for 150 to 300 scholars would work out at about 35*l.* to 40*l.* per head. With regard to planning, he did not see how Mr. Forrest could have suggested any one plan unless he had brought drawings and pointed out how a school should be arranged. The author had given them the most necessary rules to be observed, but the arrangement of the rooms would be left to the architect.

Mr. FORREST, in his reply, said he did not take a school with an ideal plan and go over it in extenso for the reason that districts and areas varied greatly in their requirements. They found different schemes in different counties, and so an ideal plan which could be followed in every competition was not possible in a paper of that description. With regard to the rules and regulations of the Board of Education, his experience was that they must be strictly adhered to. The cost of schools on the lines he had indicated to accommodate about 200 to 250 children would be about 45*l.* and not exceeding 50*l.* per head. With regard to estimates for work, he said that when a contractor was known to be honest and respectable they had to accept the lowest tender.

NOTABILIA.

THE two opening articles in *Pearson's Magazine* for May are entitled "The First Royal Academy" and "The Charm of the Terrace." The first gives a concise account of the origin of the first Royal Academy exhibition in their Pall Mall premises in 1769. Nine years before, a number of artists who had shown their works in the room of the Society of Arts were so encouraged by the profit of 100*l.*, that as the Society of Artists they continued to organise them for the benefit of the Foundling Hospital. Until 1765 they worked harmoniously. In that year there was a split, and three years later one section reappeared as the Royal Academy. The article is interestingly illustrated. The second article alluded to above is written to show "the importance of an arrangement of terraces in giving an imposing setting to a hill-top house, with some interesting notes on pergolas, without which no garden to-day is considered complete."

THE June number of the *Pall Mall Magazine* is of great interest. It opens with an article by Count Zeppelin, the famous aeronaut, on "The Conquest of the Air." This is

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followed by "England's Steel Walls," being a non-technical description by Mr. Harold Spender of Middlesbrough—the land of iron and fire, where the material for our Navy comes from. The illustrations for it are not, we are pleased to say, from photographs. The two pictures from the Academy are *Mrs. Astor*, by Sargent, and a study by Sir L. Alma-Tadema. "Algernon Charles Swinburne" is from the pen of the late William Sharp. One of the stories has a couple of full-page illustrations by S. Seymour Lucas.

Acetylene for the current month gives an illustrated account of the installation of an acetylene plant for lighting the village of Down, with 2,000 inhabitants. The present price is 5*s.* per 100 cubic feet, but in spite of this most of the houses and shops of any size are connected with the mains, as well as some of the country houses in the vicinity which formerly maintained private plants. The third of the Cantor lectures delivered by Mr. Leon Gaster on "Modern Methods of Illumination" is given.

"James Cavanah Murphy" is the title of an article by Count Plunkett, director of the National Museum of Science and Art, Dublin, in *The Irish Builder and Engineer*. His chief work was the study of the antiquities of the Peninsula; he spent twelve or fourteen years on the analysis of the Alhambra.

Correspondence

[*The Editor will not be responsible for the opinions expressed by Correspondents.*]

The Invention of the System of Forced Circulation of Hot Water for Heating.

Sir,—In the amusing evidence of Mr. E. T. Hall, F.R.I.B.A., taken by the Departmental Committee of the Local Government Board on Machinery and Engineering Staffs at Poor-Law Institutions, he appears to claim to be the inventor of the system of pumping hot water for warming buildings. The actual words used in his lengthy reply to Question No. 1041, p. 56, are:—

"My practice has been to endeavour to improve the system of heating formerly adopted. . . . I realised this some time ago, and thought that hot water could be pumped from a central station. . . . I first worked this out in conjunction with the contracting engineers without any consulting engineer at St. George's Institution in the Fulham Road in 1900-03. . . . In my judgment it is the best and most economical for heating hospitals, workhouses and asylums."

The last sentence reminds me that when, with an introduction from Mr. J. H. Blakesley, I called on Mr. E. T. Hall at his office, 57 Moorgate Street, on April 17, 1899, *re* the a'Court & Binny heaters and their system of forced circulation for heating by hot water and hot-water supply, Mr. Hall pooh-poohed the principle, and said that his practice was to use a single pipe for both the flow and return, and that he never had any difficulty in obtaining a good circulation; in fact, with the hot-water supply the only complaint (at some institution in Greenwich or Woolwich) was that the water was too hot and scalded the nurses' hands.

I gave Mr. Hall a printed pamphlet (8 pp., 8½ inches by 11 inches), dated 1898, fully describing the system ("invented by Mr. W. M. Binny, and patented by MM. a'Court & Binny," according to the pamphlet), and told him that it was being adopted at the Hospital for Sick Children, Great Ormond Street, by Mr. C. T. Walrond, A.M.I.C.E., the consulting engineer to that institution. This installation was very completely tested by me, and the first part of the report to my clients (Messrs. Burn Bros., who were the sole licensees for the system) is dated August 4, 1899. While one of the tests was being conducted on June 17, 1899, the late Mr. Henry Law, M.I.C.E., and Mr. T. W. Cutler, F.R.I.B.A., representing the Royal Sanitary Institute, visited the hospital, and I explained to them the system and the methods I was adopting for testing it. The system was also installed in the Carlton Hotel in 1899. These dates are all prior to 1900-03, when Mr. Hall says he "first worked this out," and they closely precede that working out, so that probably the information given to Mr. Hall on April 17, 1899, assisted him (possibly sub-consciously) in his labours.

I am not claiming that Mr. W. M. Binny is the inventor; he may or may not be; but what I do wish to make clear is that Mr. E. T. Hall is not the inventor, as Mr. Binny's work certainly was the earlier and was brought to Mr. Hall's notice.

Having referred to the "Minutes of Evidence" in the foregoing connection, it is also interesting to note that Mr. Hall tried hard (answer to Question No. 1038) to impress upon the committee his view that in connection with the construction of hospitals, asylums and workhouses the architect should have control of everything, including all engineering and the direction and supervision of all professional or technical experts.

In spite of his eloquence on this point, which was endorsed by the Council of the Royal Institute British Architects in their letter dated October 19, 1908, to the committee, it is satisfactory to note that the Departmental Committee of the Local Government Board in their report dated January 9, 1909, state (section 51):—"On the whole it seems preferable that, where the engineering work is of an important character, a consulting engineer should be employed directly for the work. He should be engaged jointly with the architect from the inception of the scheme, and should work in conjunction with him."—Yours very truly,

A. S. E. Ackermann, B.Sc. (Engineering), A.M.I.C.E.

GENERAL.

At a Meeting held at Lansdowne House it was resolved to form a committee for the purpose of making suitable recognition of the public services of the late Duke of Devonshire. It has been decided that the memorial shall take the form of a statue of the late duke to be erected at the junction of Horse Guards Avenue and Whitehall, and the site has been given by the Westminster City Council. The execution of the statue has been entrusted to Mr. Herbert Hampton.

Mr. F. Ll. Griffith, Reader in Egyptology, has offered to present Oxford University with 8,000*l.* to establish a fund for the encouragement of Egyptological study in the university, as a memorial to his late wife. The money is to be employed for research, for publication of the results of researches and for travel and exploration, but may not be employed for the stipend of a professor or reader, or for the payment of any lecturer, or for providing lectures on the subject.

Professor Sir Hubert von Herkomer, R.A., will preside at the concluding meeting of the Indian Section of the Royal Society of Arts on Thursday afternoon, the 27th inst., when a paper on the "Function of Schools of Art in India" will be read by the Principal of the Bombay School of Art, Mr. Cecil L. Burns. A collection of drawings by Indian students will be on view.

The Case of Mackison's Trustees *v.* the Town Council of Dundee is again to figure in the Law Courts. In the Outer House of the Court of Session and in the Inner House, on appeal, judgment was given against the pursuing trustees. The pursuers have filed an appeal to the House of Lords, and intimation to that effect has been made to Dundee town clerk. The case will probably be debated before the Lords in October.

The Perth City Council (West Australia) some few months ago invited competitive designs for a new town hall. Designs were received on March 22, and from a cable message received last Monday we learn that the design submitted by Messrs. Grainger, Kennedy & Little has been awarded first prize, the amount of the premium being 400*l.* The cost of the buildings will be about 60,000*l.*, exclusive of land and furnishing. It is expected that an early commencement will be made with the clearing of the site and the erection of the building. Messrs. Grainger, Kennedy & Little are erecting the administrative buildings at the Melbourne town hall, the drawings for which were illustrated in our journal some months ago.

Mr. Lawrence Bright, of Third Avenue, Sherwood Rise, Nottingham, architect and surveyor, who died recently, left 33,914*l.*

The Society of Architects have received twenty-five sets of designs in competition for the travelling studentship, which is of the value of 25*l.* and carries with it the silver medal of the Society. The subject set this year was a secondary school, the details of materials and cost being left to the competitors. The Council have awarded the studentship to Mr. Chas. H. Hudson, of 12 Almeaida Street, Islington, N., an assistant in the office of Mr. A. W. Roques, M.S.A., 10 Basinghall Street, E.C. In view of the high merit of some of the designs and the number of competitors, they have awarded a special prize of the value of 10*l.* to Mr. G. Ll. Evans, 29 Bridge Avenue Mansions, Hammersmith, W., an assistant in the office of Mr. Arthur W. Sheppard, A.R.I.B.A., 43 Chancery Lane, W.C. The drawings will be on view at the Society's premises, Staple Inn Building, Holborn, W.C., for one week commencing June 7, when admission will be free. Afterwards they will be exhibited in various provincial centres.

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The Architect.

THE WEEK.

THE special general meeting of the Royal Institute of British Architects held on Monday last for consideration of the Council's proposals for the revision of the by-laws under the new Charter made good progress, thanks to the able chairmanship of Mr. EDWIN T. HALL, and passed twenty-seven by-laws in an hour and three quarters, an average of just under four minutes per by-law. This very satisfactory progress was largely due to the handling of the meeting by its chairman, but principally to the generally non-contentious matter of the by-laws considered and to the maintenance of the spirit of give-and-take that has been characteristic of all meetings of the Institute since the scheme for the latest new Charter was brought forward.

THE meeting was, too, a justification of the principle that only Fellows should be allowed to vote on the making of by-laws. Most of the talking was done by Associates, and when any Associate had a reasonable amendment to suggest he always found two Fellows to propose and second it, so that, even though voteless, the Associates as well as Fellows have their views represented in the by-laws as adopted.

THE first debate occurred on the question of nomination for membership of non-Metropolitan architects and members of the Architectural Association, which, as the existing by-laws stand, might be made by non-members of the Institute, or even by paid officials. Although some objections were urged the principle was adopted of giving the power of nomination to non-members but denying it to the paid officials.

A GOOD deal of time—more than was really necessary—was spent over the exact wording of the by-law regulating the election of Fellows by the Council, but at length it was decided that at least twelve members of the Council must vote in favour of a candidate. As it is professedly admitted on all hands that the election of a Fellow by the Council is to be a very rare and exceptional honour, there would, we think, have been no valid objection to requiring the unanimous vote in favour by all the members of the Council present, even if the whole forty happened to turn up. The chairman made a slip by suggesting that there might be a member of the Council present who would not vote either for or against a candidate. Any architect who cannot obtain the approval of every member of the Council for his election is unworthy of the high honour of being elected by the Council alone.

THE by-laws regulating the election and privileges of Licentiates were passed in double-quick time. There are no Licentiates at present. An attempt was made to impose an entrance fee, and a general impression seemed to prevail, in spite of the chairman, that the Licentiates are being admitted at too cheap a rate; but nobody cared to press the point, and the Council's suggestions were adopted.

THE last by-law considered was the first of a really debatable character, being that regulating the constitution of the Council. The proposal by the Council that two past-presidents shall be included, thus raising the membership from thirty-eight to forty, was adopted after the defeat of an amendment limiting the proposal to the two immediate past-presidents. Then came the glorious victory of the Associates—voteless but not voiceless; they raised the number of Associate members of the Council from four to six. Loud cheers and a prompt decision that enough had been done for one evening. So the meeting was adjourned.

ALTHOUGH there was never much doubt about the matter, it is a cause for congratulation that the Guild of St. George has accepted the invitation of the Sheffield Corporation to renew the loan of the collection in the Ruskin Museum for another twenty years, thus evidencing the satisfaction of the Guild with the way in which the museum has been cared for in Sheffield. It is well to know that the privilege accorded to the town is appreciated as it should be, and thus that there is ground to believe that what RUSKIN wished—an ennobling of the thought and an increase of the happiness of the people of Sheffield—is being achieved by the collections of the Master.

THE Surveyors' Institution at their visit to Cardiff discussed a paper on "State *v.* Estate Forestry," by Mr. S. H. COWPER-COLES, Lord GLANUSK's agent, in which the author seemed to speak rather despondingly of the prospect of afforestation in Glamorganshire, where the waste land is subject to manorial rights and privileges connected with hill farms and small holdings, while in his experience planting above a level of 1,200 feet was not satisfactory. He thought the land was not suitable for growing hard wood and that they would be limited to coniferous trees of exotic type, and with these they had had little experience. Although they could grow magnificent larch they could not sell it in the Welsh coalfield; it went mostly to Lancashire. One good point that Mr. COWPER-COLES made was the value to water catchment areas of afforestation, as attracting a larger rainfall and ensuring a steady and constant supply of water.

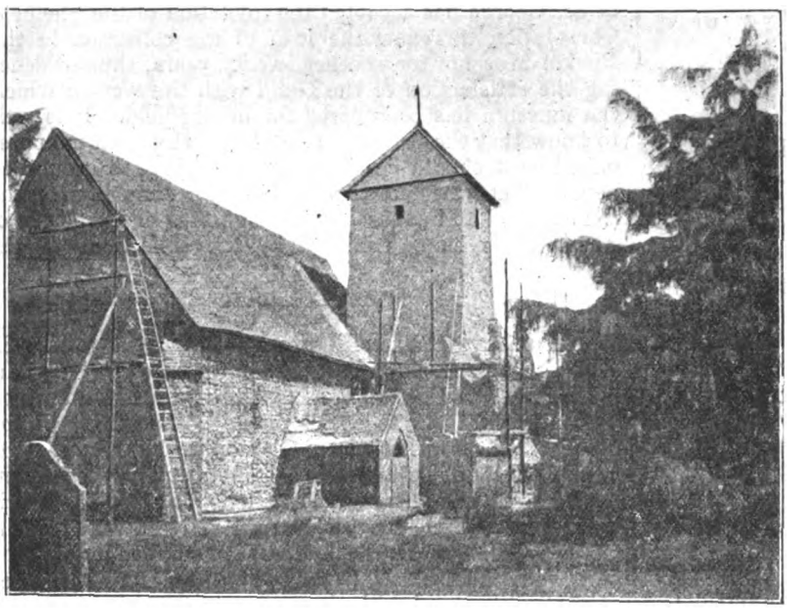
ANOTHER subject considered by the Surveyors was the amendment of rating law and procedure, particularly as regarded valuation for assessment by unpaid parish officials, subject to local influences, rather than by professional surveyors. It was urged as desirable that all property should be valued once in five years, but not that there should be a quinquennial valuation for the whole valuation area at a fixed date.

AT the annual meeting of the Liverpool Committee for Excavation and Research in Wales and the Marches, Professor JOHN L. MYRES, the hon. organising secretary, presented the first annual report on the preliminary surveys that had been made in Chester and at Caerleon-on-Usk, and foreshadowing the coming work of excavation at Caerleon and at Caersws in Montgomeryshire, two of the most important Roman stations in Wales, from the exploration of which great things are hopefully anticipated.

THE Scottish Presbyterians in London have had the laugh of the County Council. A notice board outside a Presbyterian church bore a representation of the burning bush with the inscription *Nec tamen consumebatur*, and the minister was one fine day requested by the County Council to take out a licence for using armorial bearings. In acknowledging the receipt and protesting his ignorance that for this notice board a licence was necessary, he suggested that an official should be sent to determine whether another ornamentation within the church should also be described as an armorial bearing. This consisted of two Scotch thistles, with the motto, *Nemo me impune lacessit*. The cream of the joke is that no official was sent, but the minister received a letter, we understand, saying that his "explanation" was satisfactory.

MR. JUSTICE JOYCE has granted an injunction restraining the trustees of the Wesleyan Twentieth Century Fund from building the new Wesleyan Memorial Hall, now in course of erection from Messrs. LANCHESTER & RICKARDS's design, to such a height as to interfere with the access of light and air to the Westminster Hospital. The learned judge appears to have based his decision on a report by Mr. JOHN SLATER respecting the effect of the new Wesleyan building as intended on the lighting and sanitation of the Hospital.

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KINGSDOWN CHURCH, KENT.

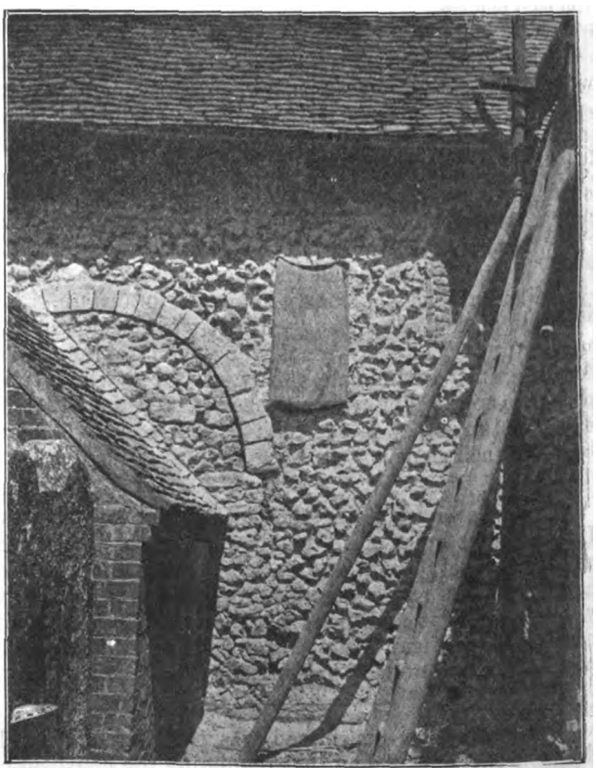
DISCOVERY OF AN ELEVENTH-CENTURY FRESCO.

UNTIL quite recently the little Kentish church of St. Edmund, King and Martyr, at Kingsdown, was an ugly-looking building covered with the brown Roman cement compo, beloved of churchwardens in the early years of the nineteenth century. This plastering having fallen into a sad state of disrepair, the present rector, the Rev. F. W. Warland, determined to have it stripped off, with the intention of pointing up the underlying masonry if in sufficiently good condition. Before the work was commenced the church appeared to be merely a badly treated fourteenth-century building, and, as described in Murray, "very plain, and without distinctive character." A small nave, with smaller chancel, a few fourteenth-century windows, two of them in the north wall with fragments of contemporary glass; a hideous gap at the west end, with wooden frames that had evidently taken the place of the original tracery; a fifteenth-century Perpendicular traceried window in the south wall of the chancel, an inserted red-brick window, with random fragments of heraldic glass, traditionally brought from a neighbouring manor-house and clearly originally bearing the arms of the De Lucys; and a small square tower, of indeterminate date, on the south side of the nave, formed all the architectural features.

The stripping of the old compo has revealed much of the lost history of the church, as well as some interesting features. The west window was a three-light one, part of its mullions and sill having been brought to light, and from the character of its scoinçon arch, without doubt contemporary with the two-light windows in the north wall of the nave, and, like them, filled with reticulated tracery, and therefore of about the date A.D. 1325.

It is, however, in connection with the present south wall and the tower that the most interesting and important discoveries have been made. In stripping the south wall, the workmen discovered in the wall four semicircular cut stone arches with squared edges, two in the nave, one between the nave and tower, and one in the south wall of chancel. These arches are clearly insertions in an earlier work, and for safety have a considerable space of the older wall left between as piers. In the east wall of the tower is a lofty semicircular headed archway with plastered jambs and soffite lined out in red line, with quâ stone-jointing decoration. This arch has later been filled in, and a smaller doorway formed in the filling. There seems to be some evidence of an archway on the west side of the tower, but the indications are not indisputably clear. On the south wall has been discovered a small semicircular headed window, of which more anon.

The most thrilling discovery of all is that of a small window in the south wall of the present nave, with a semicircular concentric splayed arch. The external opening is six inches wide and thirty inches high, the internal three feet two inches wide and five feet five inches high. On the internal splay is the fresco decoration which we show in our illustration. This is executed in yellow, red, and brown ochres on a white ground, and is in a wonderfully-good state of preservation. The *intonaco* is very thin, and the artist has evidently worked at full speed to complete his painting in time, for in colouring the soffite he has splashed the jambs and left the splashes. The subject of the picture is clear. On the right jamb (west) Abraham is about to slay his son, and the uplifted weapon is apparently the jaw-bone of an ox. One of the parishioners, we hear, suggested that it might be "Samson killing the giant with the jaw-bone of an ass," but the left-hand picture clearly corrects this somewhat involved explanation. Abraham is carrying the wood and Isaac the lamb for the burnt sacrifice about to be offered on the altar shown between them. The first indication of the presence of this painting was obtained from the stripping of the old plaster outside the church. The external arch was exposed, and the filling being somewhat loose was pulled out for resetting, when part of the painting appeared. Interested and excited by the discovery, the builder obtained the rector's permission to cut away the internal plastering, and was thus able, with care, to remove the filling and reveal the painting.



KINGSDOWN CHURCH, KENT.—Part of South Wall.

Now we come to the data that enable us to form our diagnosis. The damage to the picture on the right jamb was done in the insertion of one of the four semicircular arches to which we have above referred, and the filling in of the window was probably contemporaneous with the formation of these arches, the haunch of one of them just penetrating the right jamb. We must here explain that the whole church is built of undressed flints, with the

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exception of dressed stonework to architectural features. The flint-work above the inserted arches and the small window in the south wall shows distinct lines of coursing and a herring-bone bonding of the rough flints in adjacent courses. The tower has flint quoins of carefully selected stones, admirably square though undressed. The small window in the south wall of the tower, of which we have already spoken, and which is slightly wider but otherwise of about the same size as that with the fresco painting, has its arch built of carefully chosen natural flints of flat but wedge-like form, forming natural voussoirs. Although freestone is used on the outer edge of both these windows, there does not appear to be any indication of their having been glazed at any time. The four inserted stone arches are of chisel-worked freestone, square-edged. The flint-work masonry of the north, west, and east walls is pure random rubble, without any trace of coursing or herring-bone bonding.

On these data we base the following diagnosis. The present south wall from end to end is part of a church built during the first half of the eleventh century, probably between A.D. 1025 and A.D. 1050. The window with the fresco was an original one of this church and the painting was executed within the dates we have assigned. Although we found this opinion chiefly on the architectural evidence, it is we think supported, as may be seen in our illustration, by the character of the figure drawing and costume. Later in the eleventh century, possibly about A.D. 1080, the original church was enlarged by a southern addition, and the four semicircular arches made the arcade between the new and the old. The fresco painted window was filled in at this time, partly, as we have already pointed out, for safety, and partly because it was no longer in an external wall. There are straight joints between the east and west walls of the tower, and the original south wall and the tower therefore was probably part of the later eleventh-century work. In the fourteenth century, probably about A.D. 1325, the older eleventh-century building was pulled down, with the exception of its south wall, and the west, north and east walls of the nave and chancel were erected. At this time, if not before, the extension made in the latter part of the eleventh century was also pulled down, for there is a fourteenth-century doorway inserted in the south wall. In the early part of the fifteenth century the traceried window on the south side of the chancel was inserted, and later in the same century the small red-brick windows in the nave, with the fragments of the DE LUCY glass.

Thus the removal of the old compo has opened up a very interesting piece of architectural history, as well as brought to light a remarkable example of early fresco painting, which owes its preservation to the fact that in the eleventh century there was no Society for the Protection of Ancient Buildings, but a disregard of the work of their predecessors by men who felt that provision for the requirements of their own day was the foremost consideration. The principle then adopted seems to have actuated all subsequent custodians of this little church down to the nineteenth century, for it would be difficult to find in a building of its size more complete indifference to the art of the past than is here exhibited. And yet it is due to those whom some would call the "vandals" of the latter part of the eleventh century that we, to-day, are able to see in its pristine freshness the production of an artist who lived and worked before WILLIAM OF NORMANDY invaded this country. We trust that proper steps will be taken to preserve this remarkable example of early English art.

The Plans prepared by Mr. R. S. Lorimer, A.R.S.A., F.R.I.B.A., for a chapel for the Order of the Thistle, to be constructed at the south-east corner of St. Giles's Cathedral, Edinburgh, alongside the Royal entrance, were approved by the trustees. On the 22nd inst. Mr. Lorimer and the trustees were received by the King at Buckingham Palace. Mr. Lorimer explained the proposed plans to the King, who looked into every detail, and entirely approved of what was proposed as far as regards the structure.

COMPETITION FOR MIDDLESBROUGH PUBLIC LIBRARY.

TWO hundred and three sets of designs for a Library to cost 12,000*l.*! It must be very encouraging to a committee to have such a response to their invitation, or, on the other hand, it may point to a lamentable want of work amongst the architects of Great Britain and Ireland, for there are plans from England, Scotland, and Ireland—but none from the Colonies. So it must be presumed that as the successful man has to pay his own travelling expenses, these fortunate islands are at present free from that form of competition. Most of the designs comprise four imperial sheets of paper, and many six or seven, so that there are more than a thousand sheets of drawings for a conscientious assessor to examine.

Having said this as to the amount of work done, it is a natural sequence to the quality, and here there is little cause of congratulation, for at least 60 per cent. of the designs are utterly unsuitable for the purpose, whether judged by fitness of plan or architectural quality in the elevations and sections; whilst as to the draughtsmanship, those of our readers who have seen the quality of the work shown in the drawings of a Continental competition will be inclined to despair. It would be a kindness to many of the competitors to tell them frankly they have mistaken their vocation. Many are the eccentricities displayed to attract attention. One set has the walls a lovely rose-pink (think of rose-pink walls in Middlesbrough!), the stone dressings a delicate green, and the roofs a vivid Prussian blue, whilst many others seem to have considered their plans an opportunity for a chromatic display, colouring the different rooms in striking blues, greens, reds, and yellows, with the result that it is really difficult to disentangle the plan at all. Another curious feature that has degenerated almost to a fantastic trick is to use so thick a line both for prominent and subordinate features that the drawing becomes confused and it is necessary to rule in lines of centres, either columns, arches, or pediments, well into the sky-line and deep into the foundations to help the ordinary mortal to see what is meant; and others go one better by outlining the mass of thick lines with a stout river of black, measuring quite one-sixteenth of an inch—or to eighth scale, six inches. Surely these are signs of degeneracy.

A further division from the before-mentioned good and bad might be made of those who ignore the instructions issued by the Library Committee, and it is a moral question whether an assessor should not at once rule out all those who fail to comply with expressed particulars. It is certainly hard on those who flog their brains to meet the requirements and honestly abide by the conditions. Some of these need to be borne in mind in forming an opinion of the merits of the work displayed; and one in particular seems to have given great trouble—viz. the requirement that the boys' and girls, rooms should be served at a common counter—the two rooms divided by a glazed partition—but each part to have a separate entrance. Again, one room is asked for 23 feet by 10 feet for receiving, repairing, and cataloguing, and to be on ground floor. Both these items are very differently provided for by the competitors. The first seems to have caused many to put extra entrances to solve the difficulty, and the second has been met in several cases by putting separate rooms and on different floors.

The design placed first is No. 171, by Messrs. RUSSELL & COOPER, of London. The news-room is placed at the spot specified in the conditions, and is divided from the main block by a strip containing the janitor's and receiving-room—the janitor facing Grange Road and the receiving-room the back passage. Nearly opposite the centre of the news-room and at right angles is the main entrance, showing a well-designed entrance-hall having doors leading to borrowers' space and ladies' room on either hand, whilst the stairs face anyone entering. Between the stairs is a double door leading to the news-room—no doubt very happily placed, but not strictly in accordance with the conditions, which stipulate for *no* public connection between news-room and other parts.

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The lending library is well arranged, and the children's library beyond has the book store in the centre (and so in touch with the general book store and attendants) and boys' and girls' rooms on either side, with a corridor and separtte entrance for this department. This is not strictly in agreement with the conditions, which stipulate for boys' and girls' rooms divided by a glazed partition—not by a book store.

On the first floor the librarian is placed over one of the juvenile rooms, and there is a small staircase at the end of children's corridor by which he may go down, but the position of this room is not good. To reach the main lending library he must either go through the juvenile book store or traverse the whole of the reference library and go down main stairs to reach the news or ladies' room. Over the other juvenile room is a cataloguing room, stipulated to be on the ground floor, but placed on the first.

The reference library has deep galleries on either side, projecting 12 feet into the room, and as there are no windows under these the book recesses will be very dark, but at a distance of 18 feet from the floor is a range of long shallow windows—the only light to this large room—and the before mentioned deep galleries cut even that off from the greater part of the floor. The conditions stipulate for top light only to this room, and no windows in wall. Windows are shown and no skylight, which is what most people understand by "lighted from the roof direct." The elevations are simply treated in brick with white stone dressings, and are not particularly pleasing. One long roof and ridge runs from end to end. There is the usual break in the elevation of two very broad stone pilasters carried up to cornice and joined above it by a familiar rusticated semi-arch, and the windows of the ground floor lending library float in the mass of brick work between these breaks. This design could be carried out for the money provided.

No. 13 is placed second, and is by Messrs. Wenyon & Potter, of Dudley. It has some points in common with the one placed first, viz., the juvenile rooms are at the same end, but each room has a separate entrance from the street, and the book store is behind the two, thus forming a room divided by a glazed partition as asked for. The main entrance centres with news-room, and has stairs on either side, and the not-asked-for door into news-room between. The law library on first floor is over the juvenile rooms, and has a curious feature, a large oval cut through the floor of store above, thus allowing the light to reach it from a skylight many feet above. The elevations are honestly treated, but look somewhat meagre and insignificant. Whether there is a roof light to reference library is not clear from the plans. This design could be done for the money.

No. 83 is placed third, and is by Messrs. Cooper & Slater, of Blackburn. The juvenile room difficulty is solved by putting it at the Grange Road end, with separate external entrances, but there is no light to the book store. The gallery in reference library has windows in the wall, and without a roof light this room would be dark. The elevation is much more imposing than either the first or second designs, and has a tower, but could never be done for the money.

No. 49, by Mr. W. Haywood, of Birmingham, is a very striking design, but it could not be carried out for the sum provided.

No. 153, by Messrs. Clark & Moscrop, of Middlesbrough, has a very dignified elevation, but the plan is not so good—four public entrances are too many for such a building.

No. 40, by Messrs. Wills & Anderson, of London, is a courageously simple treatment, very refreshing to look at after many of the grandiose attempts, but is perhaps a trifle too rustic for a public building in a large town.

No. 3, by Messrs. Clapham & Tanner, of London, has many good points in plan, but the main entry is poor and narrow; the girls' room is too deep from window to be well lit, and the janitor would depend entirely upon artificial light. The elevations are treated with long bands of alternate stone and brick, and would not be satisfactory.

No. 58, by Messrs. Wallis-Bowden & Grant, of Westminster, has a very simple yet dignified elevation; the ladies' room would be dark, however—it is too deep from the window wall.

No. 91, by Mr. C. E. L. Parkinson, of London, must be meant for a Gothic joke; surely the author never meant it as a serious contribution.

No. 73, by Messrs. Leeming & Leeming, has a very nice elevation, but the main entrance is so restrained that it would have to be looked for. There is a tortuous passage, not asked for in conditions, between side and main entrance, and a very deep gallery in reference library that would make much of the floor dark.

No. 47, by Messrs. Withers & Meredith, has a pleasing elevation, but rather spoilt by putting the bases of the large columns almost on the ground; a plinth would much have improved it. The arrangement for juvenile department is not good; a lobby separates them from the counter and therefore from efficient supervision.

No. 141, by Messrs. Mould & James, of Newcastle, has a good elevation, but the public would not easily find the entrance to the main thing—the lending library.

No. 184, by Mr. E. F. Smith, of Walton-on-Thames, has made a queer slope to the back wall of the lending library, and as his plan is the only one showing this it is to be presumed that some measurements on the plan of site have been misread.

No. 202, by Mr. G. Drysdale, of London, is another merry trifle; why make the elevations difficult to understand by putting the Dunning Street and Grange Road elevations in line and joining them up by a cleverly drawn imagination of blast-furnaces and chimneys?

No. 96, by Mr. H. Lord, of Manchester, has a good plan, but the elevation is treated strangely, for blank walls are shown where windows ought to be, and rooms lit from the roof for the sake of balancing the elevation. It is true the reference library is required to be entirely lit from the roof, but that scarcely seems reason enough to do the same thing to others. Mr. Lord is not the only competitor who does this for symmetry; indeed, very many do it.

No. 70, by Messrs. Arnott & Morrison, of Edinburgh; but five entrances are too many for a building of this character. The elevation honestly grasps the difficulty of the blank wall of reference library, and treats that block as a separate feature.

No. 154, by Messrs. Vaux & Mark, of Sunderland, is so wonderfully coloured on plan that the ordinary eye cannot readily grasp its good points, and as the sections are treated in the same way—that is, separate rooms are coloured in different and very vivid colours—they are even more distressing. The elevation is very pleasing.

No. 39, by Messrs. Child & Watts, of Nottingham, is a thoughtful and pleasing design, but the plan is spoilt by a poor entry, and the double attic story above main cornice is unrestful and fidgety.

No. 123, by Mr. T. G. Davidson, of London, is a picturesque treatment of the subject, but the windows are too small for library purposes.

No. 72, by Mr. A. McKewan, of Birmingham, is a nice design, but strangely got-up with red-brown lines and a greenish yellow wash; what the materials are to be is left to the imagination; the conditions say the elevations may be coloured to indicate materials, but this seems too liberal a translation.

No. 8, by Messrs. Hicks & Charlewood, of Newcastle, has a striking elevation, and here again the difficulty of the reference library has been honestly treated, but several points of the plan are open to criticism, such as a poor entry for a public building, and rooms too deep from the window wall.

No. 177, by Messrs. H. Jones & Cummings, of Westminster, is very original and picturesque in treatment, but the broad frieze, so effective in the drawing with its lozenges of brick, would not be very satisfactory in execution.

No. 78, by Messrs. Cox & Williams, of London, is a merry design; it can hardly be taken seriously. It is beautifully got-up, has many good points in planning, but windows really are a necessity—even for a library.

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No. 90, by Messrs. WARWICK & HALL, of London, is perhaps the most architectural design in the competition. It is scholarly and refined, and would undoubtedly be one of those buildings that would not tire with constant acquaintance. The truncated gable strikes a wrong note, and there are some faults in the plan, notably a rather poor and narrow entrance hall, and the juvenile problem has not been satisfactorily dealt with.

No. 43, by Mr. J. H. MARKHAM, of London, is a very pleasing design, well got-up, and is particularly noticeable for the fact that there are no string-courses or cornices. It is doubtful, however, whether in a town such a treatment would not be somewhat bald and flat.

No. 98, by Mr. J. B. FULTON, of London, is very pleasing. The elevation is very good indeed; the centre feature is a trifle squeezed up, and windows are omitted for the sake of balance.

Altogether the Middlesbrough Corporation have good value for the premiums. Deducting the first premium as it is merged in the commission, there is 50*l.* spent for about 1,000 sheets of drawings, or, say, one shilling per sheet. As Whatman paper costs 4*d.* per sheet, and most drawings are on strainers, it is evident the architectural profession is the most generous one in the world.

GRIMSBY TOWN HALL COMPETITION.

THE Competitions Committee of the Royal Institute of British Architects have received satisfactory explanations in respect of those conditions of this competition which appeared to be objectionable.

BERKSHIRE COUNTY COUNCIL OFFICES COMPETITION.

WITH regard to the conditions of the above competition, the Council of the Royal Institute have received a satisfactory reply to their suggestions for the amendment of paragraph 1 of the printed conditions.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE annual dinner of the Royal Institute of British Architects was held on Wednesday evening last in the Whitehall Rooms, Hôtel Métropole, Mr. Ernest George, President, in the chair.

Among the guests were the Ven. Archdeacon Sinclair, Sir Lawrence Alma-Tadema, Sir Ernest Waterlow, Sir Henry Howorth, Sir Melvill Beachcroft, Sir Aston Webb, Sir James Linton, Sir William Emerson, Sir Charles McLaren, M.P., Sir John Taylor, K.C.B., Sir Henry Tanner, Mr. Frank Dicksee, R.A., Mr. J. S. Sargent, R.A., Mr. Thomas Brock, R.A., Mr. Henry Morris, Mr. Philip Norman, Mr. Philip Morrell, M.P., Mr. P. A. Molteno, M.P., Messrs. Maurice B. Adams, J. Macvicar Anderson, F.R.S.E. (Past President), John A. F. Aspinall, R. Frank Atkinson, Maxwell Ayrton, Herbert Batsford, W. C. Beetles, B. E. Bell, H. F. Bidder, Professor Reginald Blomfield, A.R.A., Detmar Blow, Edward Boehmer, G. E. Bond, Alderman Sir T. Vansittart Bowater, C. W. Brooks, F. S. Brown, George T. Brown, John J. Burnet, A.R.S.A., James T. Cackett, Rhodes Calvert, Vere Calvert, Sydney H. Caslon, Christian Christensen, F. Dare Clapham, Max Clarke, S. D. Clippingdale, M.D., Thomas E. Collcutt (Past President), John Collings, Howard Colls, A. S. Cope, A.R.A., Alfred W. S. Cross, Arthur G. Cross, E. Guy Dawber, Rudolf Dircks, R. S. Dods, C. Fitzroy Doll, David G. Driver, F. Eiloart, Frederick R. Farrow, T. Phillips Figgis, William Flockhart, Frank Fox, Arthur Franklin, Percival M. Fraser, Edward Gabriel, Matt Garbutt, Alan George, J. Melton Gibbs, James S. Gibson (Vice-President), G. L. Gomme, F.S.A., Montague Goodall, Alexander Graham, J. Braidwood Gray, Edward Greenop, Edwin T. Hall (Vice-President), Stanley Hamp, F. H. A. Hardcastle, Henry T. Hare, Ewen Harper, W. H. Harrison, Edward Haslehurst, Charles Heathcote, George T. Hine, George Hornblower, George Hubbard, F.S.A., A. A. Hudson, C. E. Hutchinson, Edward B. I'Anson, G. Thrale Jell, Harry Osborn Jenkyn, Joseph Jennins, J. J. Joass, J. Keeble, Otto Kyllmann, P. Ogden Lawrence, K.C., W. H. Lever, M.P., W. J. Locke, T. H. Loveless, Edwin L. Lutyens, J. Y. W. MacAlister, F.S.A., Mervyn Macartney, F.S.A., Bertram McKennal, A.R.A., Herbert C. Marshall, E. Vernor Miles, Professor Gerald Moira, H. Percy Monckton, H. Greville Montgomery, M.P., Albert W. Moore, Alan E. Munby, John Murray, G. Ernest Nield, George Northover, Paul Ogden, C. Stanley Peach, Captain Walter Peake, H. A. Pelly, S. Perkins Pick, S. Wilfred Pike, William A. Pite, Horace Porter, W. E. B. Priestley, M.P., Charles H. Read, LL.D., Professor C. H. Reilly, F. G. Rice, W. E. Riley, Percy Robinson, William Robinson, Reginald St. A. Roumieu, Ernest Runtz, E. Monro Runtz, W. Howard Seth-Smith, George Sherrin, Frank Short, A.R.A., Gilbert M. Simpson, Graham Simpson, F.R.C.S., John W. Simpson (Vice-President), John Slater, J. Osborne Smith, Lewis Solomon, S. A. Stanger, H. Heathcote Statham, Alexander R. Stenning, Frederick J. Stevenson, Augustus W. Tanner, Chas. Tanner, Henry Tanner, jun., W. J. Tapper, Herbert G. Tayler, A. G. Temple, Sir Brumwell Thomas, Hamo Thornycroft, R.A., George Traill, Percy B. Tubbs, Frederick Wallen, W. F. Wallis, W. H. Warner, Dr. R. J. Waugh, Thomas B. Whinney, W. Henry White, Frank W. Wills, A. Needham Wilson, George E. Withers, William Woodward, Percy S. Worthington, Alfred B. Yeates, Clyde Young, Morgan H. Young, and Iân MacAlister, Secretary.

The loyal toasts of "The King, the Queen, the Prince and Princess of Wales, and other members of the Royal Family" having been passed with musical honours,

Mr. JOHN W. SIMPSON submitted "The Houses of Parliament," remarking that without that security and peace which the wise and statesmanlike measures of the Legislature afforded to architects there could be no continuity or advance in the art which they practised. As artists they remained outside the strife of legislative wars, though they were sympathetic with the political troubles of others. Perhaps it was for that reason that the architect was politically rather a peculiar study. A Parliamentary scheme for improvement in building would find him in the ranks of the advanced revolutionary Radical, and yet any proposal for the restoration or reconstruction of an ancient monument would be opposed by the architect, thus proving him to be a staunch Conservative.

Sir CHARLES MCLAREN, M.P., in response to the toast, said the House of Commons was constantly voting large sums of money to be expended under the auspices of architects, though he fancied the lower House was more distinguished as an enemy to architecture than a friend. Its history showed that it had done more for the pulling down of ancient monuments than the preservation of them. The House of Commons, he said, was always ready to vote money for architectural and artistic purposes, and he suggested that it was the Treasury that should be blamed for the mean grants given towards their realisation.

Professor BLOMFIELD proposed the next toast, "Art, Science and Literature." He thought they might take it for granted that all architects worthy of the name were artists in intention. He had read recently in the *Times* that the status of architecture in England was higher than it had ever been since the eighteenth century. That was a high compliment to architects, though he believed that if they kept their eyes open they would find excellent work was being done in London and all over the country by men whose full reputation had not yet been reached. In spite of that he was afraid that architecture at the present moment did not receive the recognition in England which it deserved, and he asked who was responsible. He did not think the public were to blame—they had a very excellent public; he believed it was the gentlemen behind the public—the critics. There were, he was glad to say, critics of knowledge and discrimination, who handled their art with the utmost intelligence, but unhappily there were other critics or writers hostile to their art. Lastly, there were writers who absolutely ignored the existence of architects, and who did not recognise the fact that there were a great number of very able men who were devoting themselves to the practice of architecture. In the past architecture was a very great art and occupied a great place among the arts, and it ought to occupy that place again. With regard to the sister arts of painting and sculpture, he felt he need not say very much before such an assembly, because all present loved those arts and found in them a source of most delectable pleasure. Alluding to sculpture, he spoke of the magnificent technique, the fine lines and high personal qualities of Mr. Brock's memorial to the late Queen Victoria, and described it as a distinct gain to London.

Sir LAWRENCE ALMA-TADEMA, in responding for painting, said there was some difficulty in explaining what the word "art" meant. Perhaps sometimes by means of an emblem one could suggest a little what art might be. He remembered the King of Sweden once describing art as the flower of the tree of life, and the simile was a good one, for life would be like a tree in winter if there was no such flower as art to cherish and make men happy.

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Mr. Henry Morris, President of the Royal College of Surgeons, replied for science, and Mr. W. J. Locke for literature.

Sir Melvill Beachcroft proposed "The Royal Institute of British Architects," and referred to the improvements made in London since the London County Council came into existence twenty-one years ago, and suggested that the City was rapidly becoming worthy of being the capital of the Empire.

The President, in replying to the toast, said:—

We celebrate to-day our seventy-sixth anniversary, and it is seventy-two years since, under its then president, Earl de Grey, the Institute of British Architects received its Royal Charter. Since our gathering last year, the most important incident is that his Majesty has been pleased to grant us the new or supplemental charter for which we applied. This enables us to make rules for the better ordering of our house, for the regulation of ourselves, and we hope for the benefit of the community. The said revision of the charter and by-laws is the result of a movement that stirred, if it did not divide, our camp. Architects, especially those in the provinces, found that work which should come to them too often went to auctioneers and others who ventured to include architecture in their sphere of usefulness. In our enlightened metropolis some will get not only their groceries, but architecture and decorations from the Army and Navy Stores, from their upholsterer or from like professors of our art. This is a trouble, but it must be met by keeping our own work at a high level, and by a growing perception of what is good on the part of the public. To have all architects licensed or registered has been proposed, though this would not prevent the employment of outsiders; we should also have to admit all sorts and conditions of those in practice. We prefer to insist that in future all shall enter through the schools, obtaining their diploma or certificate, which will distinguish the architect from the quack, and we look for further legislation to accentuate the difference. The change will come gradually by a wise organisation of our training schools, bringing all into line, and demanding that a certain standard of efficiency shall be attained by those who would enter our guild. This will be the preparation for Associateship, and our Fellows will be chosen only from those who have passed the schools with a sound knowledge of the constructive art; thus ensuring the public against ignorance and incompetence. A board of examiners cannot guarantee that a man is an artist.

To meet the exigencies of the hour the charter makes provision for a new class to be styled Licentiates, under which head we hope to receive into the Institute the large number of practising architects who have outgrown the days of schooling and examinations. Till of late the Institute has not been an educational body, having helped only by the awarding of prizes and travelling scholarships. A distinct advance has been made in the system of training, and our young men will start with a better equipment than their seniors enjoyed; we hope they will do better work. Students of ability are coming to the front every year and carrying away our scholarships. It would be a grand thing for these promising men, and a public gain, if some of these had an opportunity of carrying their studies further, in a higher school, acquiring a knowledge of what is really great in art. A special school has been suggested for these diploma men, among whom a distinctive prize, a "Prix de Rome," would be awarded. We feel that Englishmen may have their "School of Rome" and be under the influence of the noblest monuments, as well as Frenchmen, Germans, and Americans, who have that advantage. A British School of Rome exists, and with its members we have been conferring; it is doing admirable work. It consists of archæologists, savants, professors and men of letters, and they cordially invite us to join them in any project we may have. Their present arrangements would not accommodate us or meet the requirements we have formulated for our architectural school, but an amplification of the present institution would please us better than to start a separate venture. Our committee, which has been considering this scheme, will shortly have a definite proposal to bring forward. We should like to think that in time painters, sculptors and architects will be comrades in such a school. Ways and means are always an important feature in any enterprise. We have funds which may fairly be employed in this educational scheme, which is one that may appeal to generous donors who are interested in the growth of art among us. Hitherto the general public has declined to know anything about architecture as a fine art; a good building has not always been appreciated, nor a bad building always found out. There are indications of a growing knowledge in the matter, and of a higher criticism, and this I am sure will be responded to by ourselves. Buildings that may be classed under the head of architecture remain much in the minority, but if taste improves we may find even the speculator giving us honest buildings, on simple lines, instead of "jerry" work with foolish ornament. As a rule the community gets what it wants; our hope is that it will learn to want the best. For the execution of work we have skilled craftsmen, and our admirably furnished technical schools will increase knowledge and power. These schools we value most as providing evening classes for the practical mechanic; they are not a substitute for the good system of apprenticeship. There is with the schools always a danger that a boy gaining a useful training in colour, in modelling or drawing (most helpful to him in his craft) will think that he must, with this smattering, become an art student, paint pictures, produce statues, or become an architect, thus swelling the ranks of the useless unemployed. A good mechanic is a nobler object than a bad architect. It is disturbing to think what will be the future of our many promising men who are starting with every advantage and with a sound knowledge of their calling; there seems hardly work enough to go round. We have fallen upon bad times and, I believe, with few exceptions, architects' offices and builders' shops are very quiet. Those who should be building houses either have not the money or are spending it on motor-cars or on Old Masters. We are waiting for the world to mend. Fortunately, public works and municipal works are not feeling a similar check. We are only just realising that our cities are not all that they might be. We have beautiful buildings but they occupy positions, as if by accident rather than design, for the most part hemmed in, often by mean surroundings. We owe much to our Government for the "Town Planning" Bill, by which in time we hope to gain healthy and open spaces, dignified approaches, and the beauty that comes of a well-studied "lay-out," with architectural treatment. Changes must come by degrees to the already crowded cities, but when new ground is broken and new suburbs are taken in hand, builders will conform to some well-studied plan. We owe much to Mr. Henry Lever, our guest to-night, for his generous endowment of a school of architects, for the special study of town planning. In the interests of art we architects must be willing to sink some of our individuality for the sake of continuity and harmony, symmetry and balance. We have been too anxious, on each narrow frontage, to stamp our own mark. Our personal originality is not a matter of importance, requiring a public memorial. A great thing is to be prepared beforehand for future developments, and we are formulating, for general guidance, rules that should be observed, and which would generally apply to such scheming. The possibilities of our own city are being studied; while our allied societies are considering their own several cities and towns with a view to their best development, they will then be ready with advice when changes are required. The Bill of Mr. John Burns gives us the opportunity of making representations, criticisms, or suggestions before any new scheme is sanctioned, and we hope to use a helpful influence. We have made a good fight from time to time in the interests of some valued building or monument, to save it from destruction or from being "Grimthorped." We have sometimes failed in our immediate object, but good has been done. We have shown the honest Philistine that there is a second way of viewing things, and that to many the intrinsic beauty of a subject is a real possession that must not be carelessly swept away. The æsthetic side has been too often overlooked where changes have been made for convenience and economy, when a noble conception might have been realised. Curiously, the American architects in Conference have just made inquiry of us as to the British rules or regulations for securing architectural treatment or style. With regret we replied that every man is a law to himself, no regulations deal with the quality of beauty; it is not taken into account. We are thankful for the appointment of the Royal Commission for the Preservation of Ancient Monuments, which is under the chairmanship of our distinguished guest Lord Burghclere, and on the council of which is our vice-president, Mr. Leonard Stokes, while Mr. Forsyth is vigilant on the Council of the National Trust for Places of Historic Interest. We have a Building Act, which we are all supposed to know intimately. It was simple once, but it has become overlaid with laws till it is now as big as the catalogue of the British Museum. It is being revised and enlarged, and it proposes to spare architects' responsibility for their work. It will define for us all details of construction for the insides of our steel-framed buildings, as well as for the party walls and front walls

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which should be under its regulation. The work of the architect's office will be transferred to the multitudinous, overworked clerks of a public office; causing delays that will be disastrous to building operations. We have urged the objections to such a drastic change and I believe our arguments will be graciously considered in Committee. Our vice-president, Mr. Edwin T. Hall, has been indefatigable in his efforts in this cause. An Act would be simpler that defined the things that must not be done in building. Steps are now being taken to secure the protection of "copyright" to the works of the architect, equally with those of the painter, sculptor, and literary man. At the various international conferences this has been insisted on, the British section only showing indifference to the matter. Now, at the representation of our Institute, our Foreign Office has practically accepted the principle, and Mr. Belcher and Mr. Simpson are only pleading for Parliamentary ratification of the Berne Convention, which included architecture with other arts. Plagiarism and the borrowing of ideas will perhaps remain as general as at present, but our drawings and studies will be our own, as a painter's rough sketches are his own, although he may sell the picture for which they were made. This ownership will be clearly established in face of sundry legal decisions in the past. The client pays for the house we build him, and not for the processes we may employ in the making of it. A good client lately showed me with pride a group of cottages that seemed familiar, though in strange surroundings. "These," he said, "are copied from those you did for me on the other side of the park," and I had not the heart to tell him his was an act of piracy. The copyright for which we ask will secure to us our documents as well as other privileges of which we have doubtful possession at present. Last year we had the honour of conferring our Royal Gold Medal upon Monsieur Honoré Daumet, who was also our guest. This year it has been decided with his Majesty's approval, that the medal be given to Dr. Arthur J. Evans, in recognition of his discoveries in Crete, a priceless addition to our knowledge of the past. He has devoted his life and means to the great work of exploration. Dr. Evans would be with us now but that he is burrowing below ground in Crete. He comes to us in November to tell his story, and to receive the decoration. Our Royal Institute may be reported as in a healthy and prosperous condition. Our roll of 2,300 members is larger than heretofore. We have our seventeen allied societies in the United Kingdom, three in South Africa, one in Canada, and one in Australia. We have been consulted on various matters by those in office, and we have an increasing influence which I hope has been used for the general good. On behalf of the Institute I can only thank you for the way in which you have honoured the toast.

Sir ASTON WEBB submitted the toast of "The Guests," Mr. W. H. Lever, M.P., responded, and at a late hour the company dispersed.

AUSTIN FRIARS CHURCH.*

IN A.D. 1252, having obtained authority from Pope Innocent IV., the Eremite monks of the order of St. Augustine settled in London, and by the bounty of Humphrey de Bohun, Earl of Hereford and Essex, commenced their work in the heart of the town on the spot now occupied by the Austin Friars Church and surrounding property.

Their rules forbade them to hold property, except presumably the land and buildings which they occupied and in which they worshipped. They cultivated learning and fulfilled the useful function of schoolmasters. They were habited with black gowns with a white habit, with cloth hood and black leathern belt. They were not a numerous settlement, and possessed a good reputation for character and discipline.



VIEW OF INTERIOR OF AUSTIN FRIARS CHURCH, LOOKING EAST.

The outline of the old arch at the intersection of the nave and transept is clearly visible above the organ, also the outline of the east window, probably inserted when the Dutch Community began to worship therein and blocked when the organ was placed there.

In A.D. 1354 the grandson of the original benefactor rebuilt the monastery. The church seems to have been a very spacious structure, as the nave and aisles, which are the only portions remaining to this day, measure 153 feet in length by nearly 100 feet in breadth, so that the transepts and sanctuary must have extended a long way eastwards from the present end.

Stow tells us that the roof was high pitched with a barrel ceiling, and the crossing was surmounted by a very graceful spire or steeple, which was the admiration of the citizens, who vehemently protested against its destruction by the Marquis of Winchester after the dissolution of the monasteries.

The original roof over the present building existed up to fifty years ago, when a disastrous fire took place, entirely destroying it, and it is a matter of great regret that its form was not reproduced on the old lines at the restoration following.

It is probable that the church, with its monastic buildings and garden, covered in all an acre or more of ground. The

* Part of a paper read at a meeting of the Upper Norwood Athenæum by Mr. Frederick Higgs.

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old map of London, made in the sixteenth century, shows a very large space of ground on the side and back of the church building.

At the time of the suppression in Henry VIII.'s reign the church was very rich in monuments, burial within its precincts being much sought after and a high fee for the privilege was obtained. Besides the founder and his grandson, the great Hubert de Burgh, Earl of Kent, rested there; also several of the nobility who suffered death from time to time by execution on Tower Hill and Cheapside. Many others obtained sepulture by purchase.

One writer mentions thirty-six visible monumental slabs, seventeen with one or more figures and sixteen with shields or inscriptions. To-day in the nave alone the slabs on which brasses were originally placed are very numerous.

At the dissolution in 1534 there were only thirteen friars in residence, all of whom received pensions or other emoluments. The property was granted by the King partly or successively to Wriothesley and Sir Richard Rich, but passed eventually to the Earl of Wiltshire, afterwards Earl of Winchester, except the nave and transepts of the priory church.

This nobleman cleared out all the monuments, raising money on them, and pulled down the transepts, chancel, spire and the monastic buildings, selling part of the materials and using the remainder to erect the house known as Winchester House for his sole use and benefit.

Stow quaintly writes under date 1603 as to this:—"The goodly steeple and the east part of the church have lately been taken down and houses for one man's commodity raised in place thereof, whereby London has lost a goodly ornament, and times hereafter may the more talk of it." He evidently dared not say much at that time.

At this period a number of well-to-do Dutch refugees had come to reside in London and other parts of the country through the religious persecutions prevalent at that time in the Netherlands, and through high-placed influence they obtained a grant from Edward VI. of the remnants of the church as a meeting place where they could worship God according to the light that was in them without let or hindrance. They put it into repair, and in the process reglazed the windows. There is a small fragment of this glazing in the south-eastern aisle window, having thereon the inscription "Jesus Temple," which was the name they loved to give it. The Bishop of London was appointed special guardian of their liberties, and arbitrator in all questions arising out of their fellowship.

On the ascension of Mary Tudor the Dutch refugees were all sent back to their own land, and the church was unused; but when Elizabeth succeeded they came back and resumed, with their former trades and occupations, the use of the old church building for worshipping God in, which use has been continued uninterruptedly down to the present time.

There is in the strong-room an unique collection of original letters and documents relating to the Dutch Church and its affairs from its foundation onwards, among others being one from William Prince of Orange and Nassau, dated 1597, appealing to his fellow-countrymen to aid in his wars against Spain; also one from that great painter Albert Dürer. The registers date, baptisms from 1563 and burials from 1602. The communion plate is 1602.

In the vestry is a Jacobean pastor's chair almost as old, four excellent Chippendale chairs, and a grandfather clock dated 1679.

The community is well-to-do, maintains a pastor—owing to whose kind consent we have been able to inspect their ancient building—do a great deal of good in the way of charity to needy Hollanders in our city, and maintains almshouses at Charlton. Long may they live and flourish! The worthy and well-informed verger, Mr. Rus, is quite delighted to show his building to visitors who are interested in the history and work of his community and of the grand fane in which they worship.

There are some interesting features in the old building worthy of notice. Like the Temple Church, the arcade columns are exceedingly slender, but show no signs of inadequacy to the work laid upon them. The exterior walls are built of squared block chalk with an external face of Kentish rag. The whole building leans over southwards more than 12 inches. This list is tested from time to time, but there is no sign of movement, and it is probable that the deviation took place centuries ago. There is a half altar stone, now deposited in the north aisle, which probably belonged to one of the chapels of the monastery previous to 1534. Besides the floor slabs before referred to there is otherwise little of note.

ILLUSTRATIONS.

PROPOSED GARRISON CHURCH, KHARTOUM.

WE reproduce the water-colour perspective of the above building, which is exhibited in this year's Royal Academy. It is proposed to build the above church for the use of the British garrison stationed in Khartoum on a site adjoining the barracks on the south bank of the Blue Nile. It is designed to accommodate a congregation of 700 at an estimated cost of £E.10,000. The materials are local red brick with bands and dressings of white sandstone from the Gebel Auli quarries, a few miles up the White Nile, and the roof of red Marseilles tiles. To English eyes, perhaps, the building is not particularly ecclesiastical in style, but in a country where craftsmen are unknown and skilled labour at a premium it is necessary to obtain effect by simple means. Coolness being one of the first essentials in a building of this character for the tropics, an arcade and wide projecting eaves have been introduced in order to shade the external walls as far as possible. The church was designed by Mr. O. Beeston Hatchard, town architect, Khartoum.

ELEVENTH-CENTURY FRESCO IN THE CHURCH OF ST. EDMUND, KING AND MARTYR, KINGSDOWN, KENT.

CHURCH OF ST. EDMUND, KING AND MARTYR, KINGSDOWN, KENT.—INTERIOR.

THESE plates are in illustration of our article (p. 346) on the "Discovery of an Eleventh-century Fresco." The photographs from which the illustrations are prepared were taken by Mr. James W. Borland, an amateur photographer on our staff.

MAIDENHEAD SECONDARY SCHOOL FOR BOYS.

THE site for this building presented exceptional difficulty as regards levels, as many pockets existed where sand had been excavated for trading purposes. The conditions required accommodation for 150 scholars, with possible expansion, and the central assembly hall to be used for a dining-room, a science-room, library, &c., and a small house for the caretaker. The grounds were to be laid out with special provision for four fives courts, cricket and hockey grounds, reserved garden for botanical specimens, pavilion, &c. The cost was not to exceed 5,000*l*. The design here given was submitted in competition by Messrs. Sheppard & Bullock, of 43 Chancery Lane, W.C., and is treated in a simple manner. It was intended that the elevations should be faced with local red bricks, relieved by Box-ground stone dressings, and the roofs covered with Broseley tiles. The windows of all classrooms are carried up to the ceiling level, all double hung, some having the upper portion hung on centres for ventilation. The aspect of the principal classrooms is south-east.

OXFORD COLLEGE SERIES, QUEEN'S.—INTERIOR OF HALL.

THE illustration given this week of Queen's College is in completion of those in previous issues, with the historical account of the College by the Provost, Dr. Magrath.

OXFORD COLLEGE SERIES, THE BODLEIAN LIBRARY.

An account of the Bodleian Library is given on p. 355.

Cambridgeshire as a field for archæological research has not in the past been worked as fully as might be, and the Cambridge Antiquarian Society is making a serious effort towards carrying out the systematic excavation of the numerous unexplored sites within the county. Southern Cambridgeshire and the Isle of Ely are promising fields for excavation. Newmarket Heath with its tumuli, besides others in the county, would probably amply reward exploration. Roman remains may be expected to be found in plenty in the southern part of Cambridgeshire, which was probably thickly peopled by Romans and Romanised Britons, whilst Cottenham is a particularly promising field.

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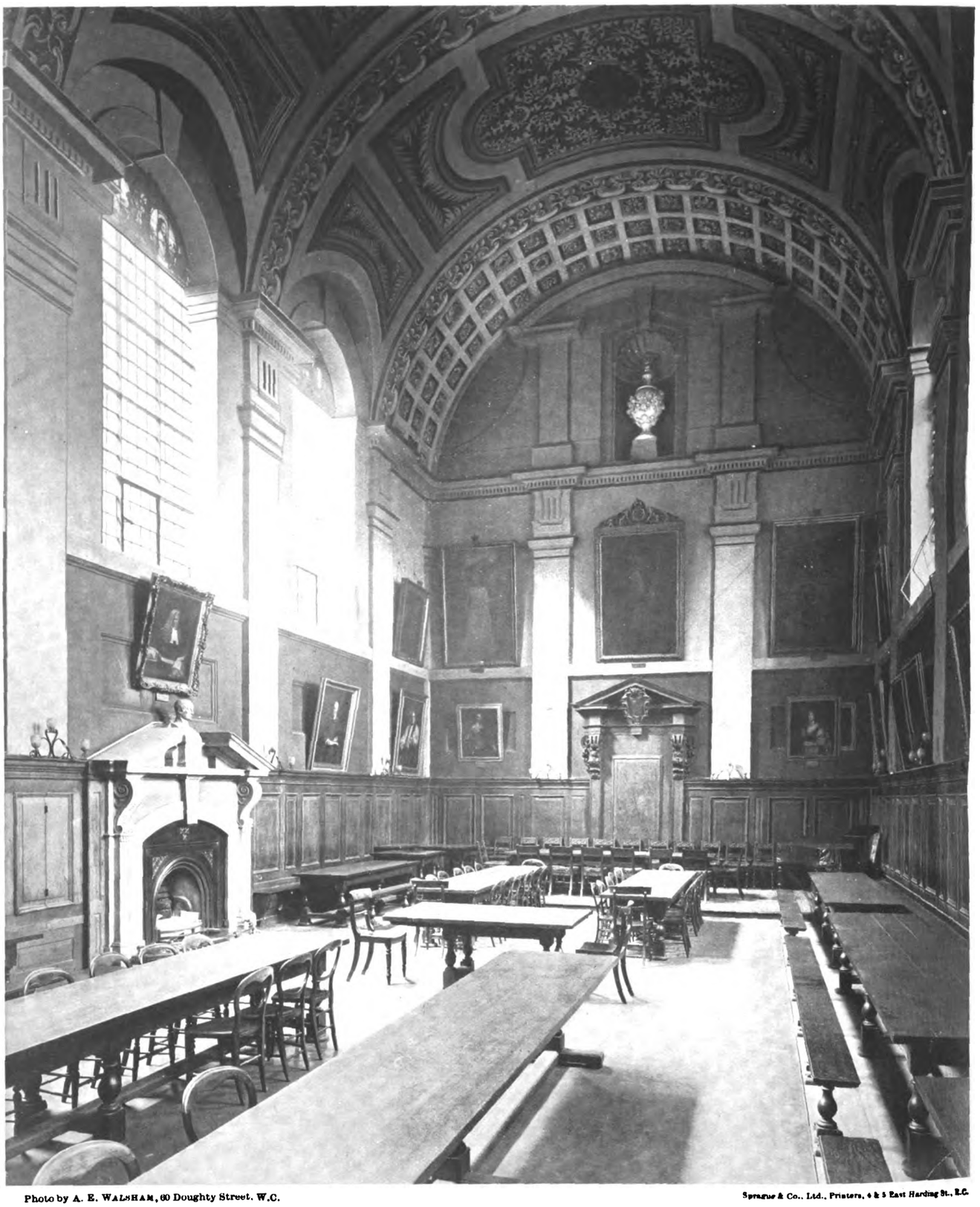


Photo by A. E. WALSHAM, 60 Doughty Street, W.C.

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OXFORD COLLEGE SERIES. NO. 43.—QUEEN'S: INTERIOR OF HALL.

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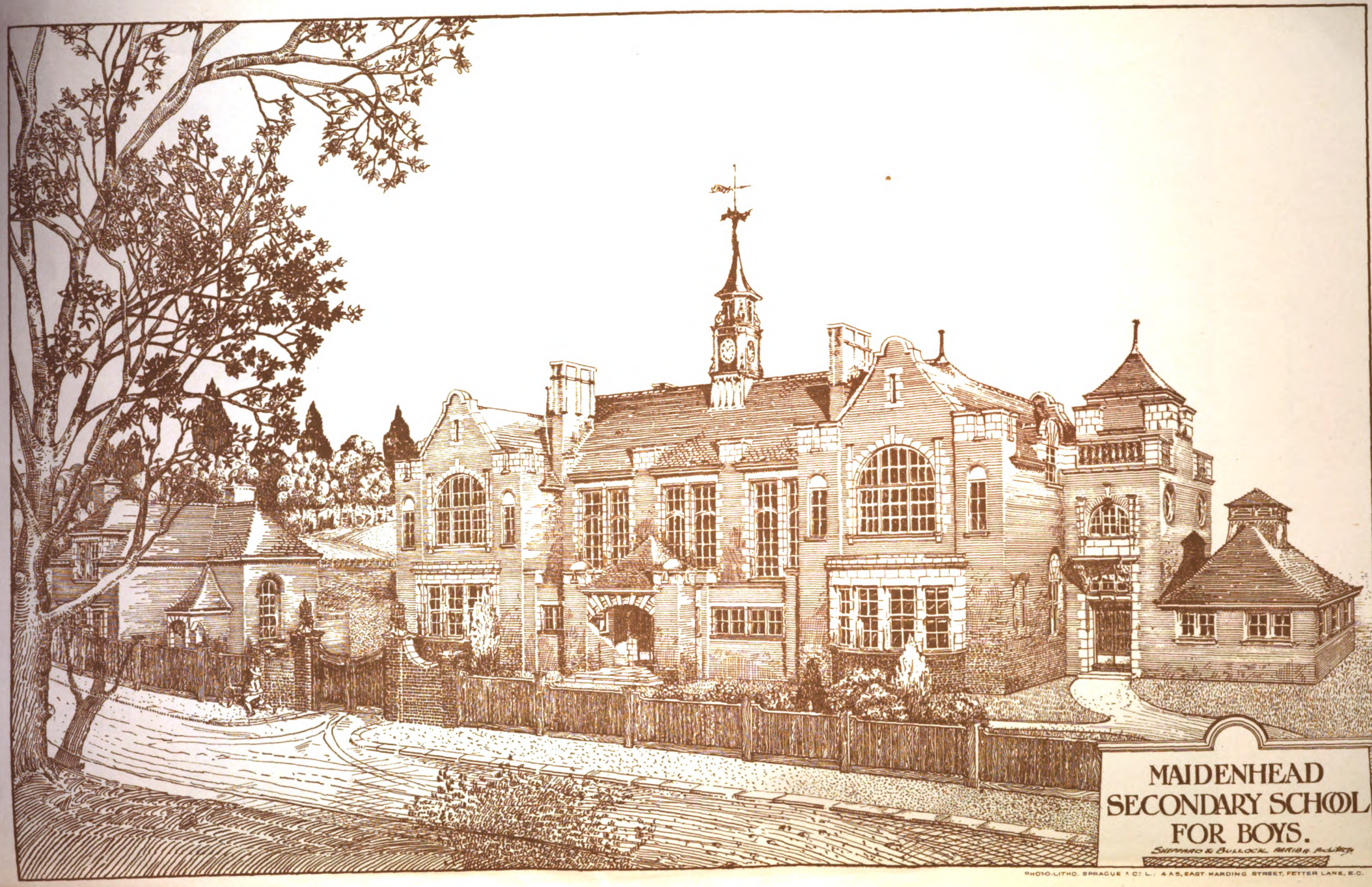


PHOTO-LITHO. SPRAGUE & Co. L.D. 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

The Architect, May 28th 1909.

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ELEVENTH CENTURY FRESCO IN THE CHURCH

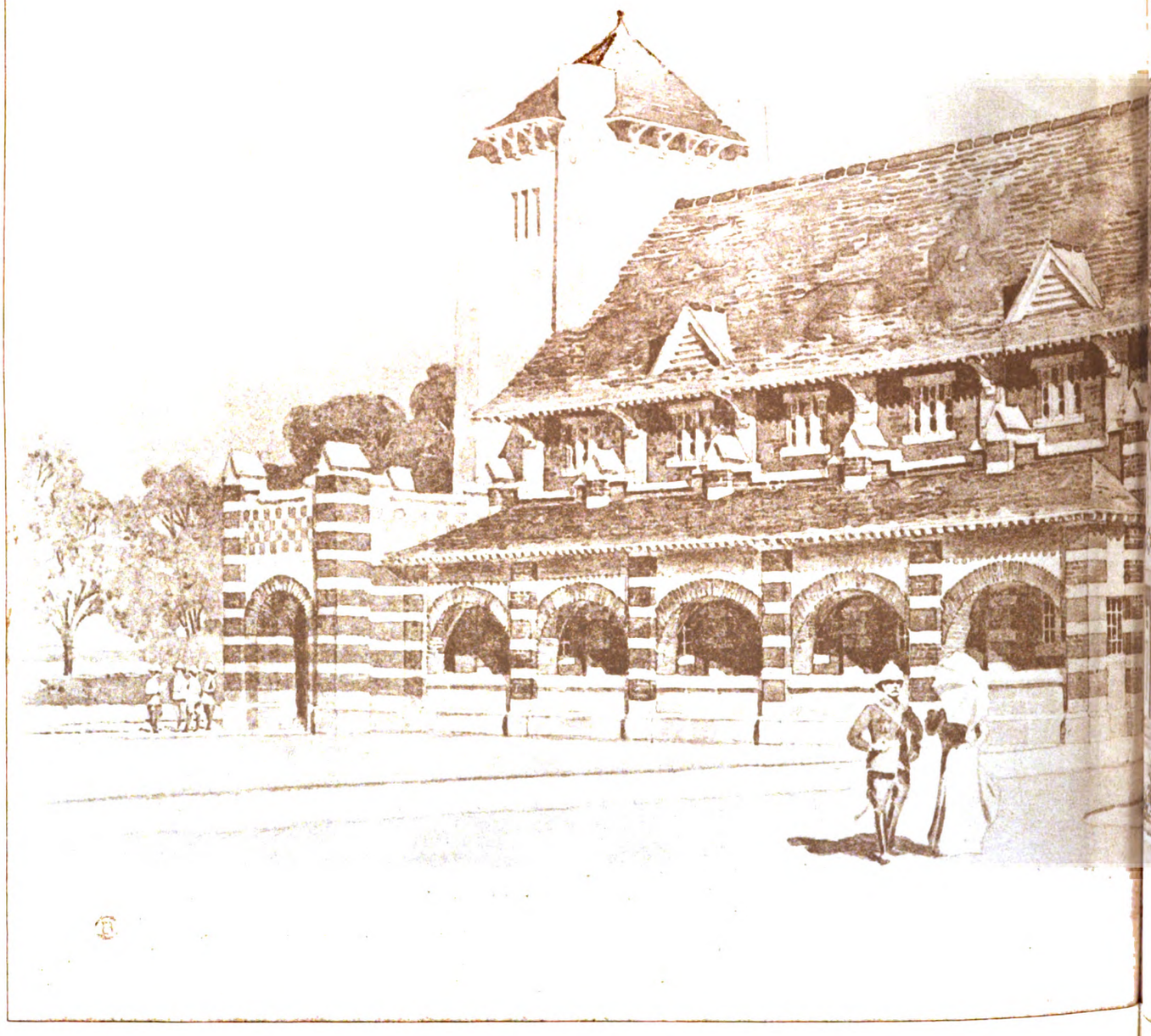
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PROPOSED GARRISON CHURCH KHARTOUM.

OLIVESTON HAGGARD JOHN ARCHITECT KHARTOUM.

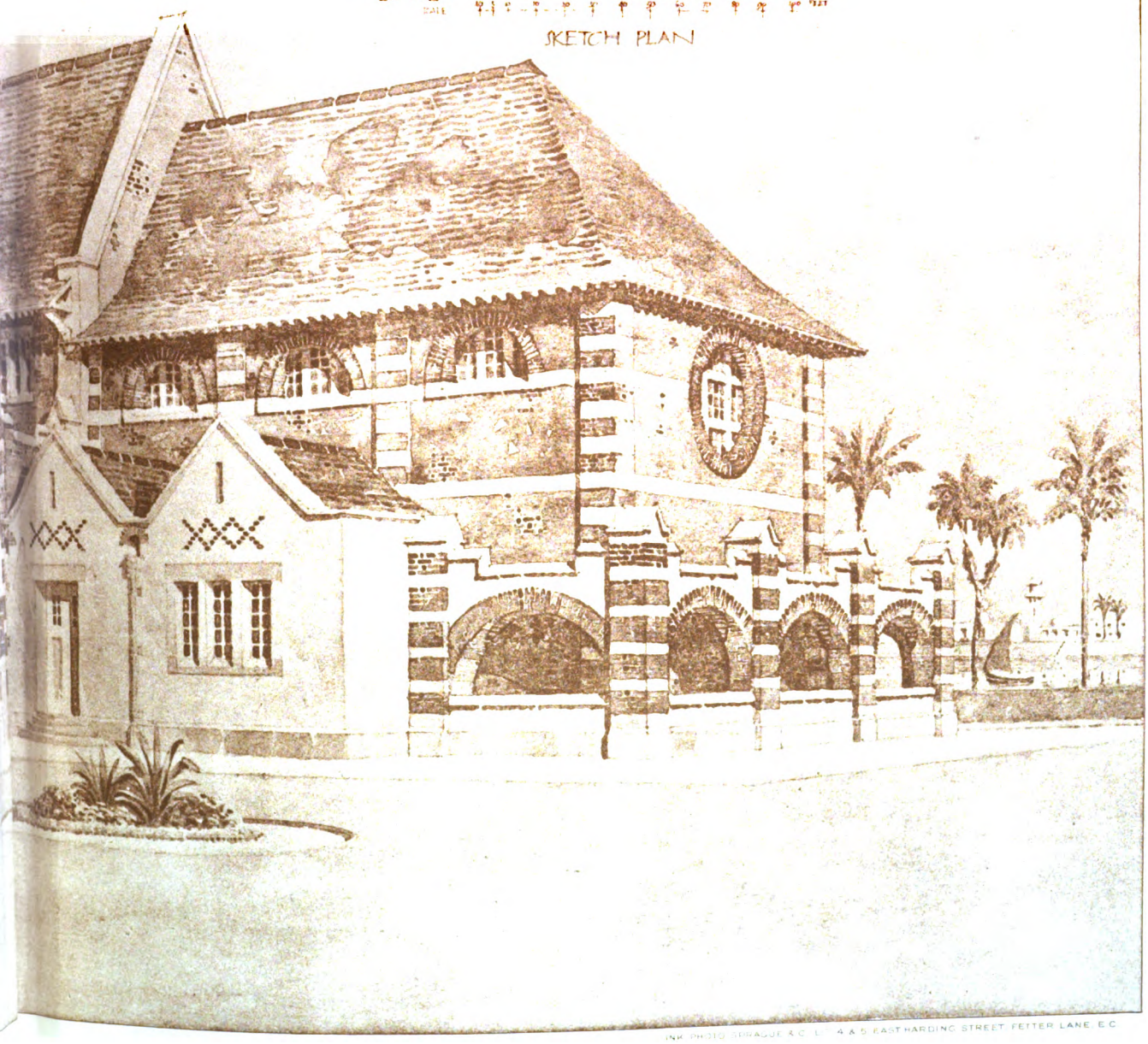


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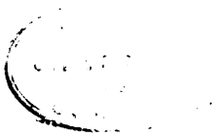


SKETCH PLAN



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ND, KING AND MARTYR, KINGSDOWN, KENT.

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CHURCH OF ST. EDMUND. KING AND MARTYR, KINGSDOWN, KENT: INTERIOR.

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OXFORD COLLEGE SERIES. No. 44.—THE BODLEIAN LIBRARY.

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THE INCORPORATED CHURCH BUILDING SOCIETY.

THE annual general court of the above Society was held in the Church House, Westminster, on Friday last, when the chair was taken by the Archbishop of Canterbury. Mr. Joseph Monday, the secretary, presented the ninety-first annual report. The general summary of the operations of the Society since its formation in 1818 showed that the total number of applications for aid was 11,120. The grants made numbered 9,160—viz. in aid of the erection of 2,565 additional churches and chapels, and of rebuilding, enlarging or otherwise improving the accommodation in 6,595 existing churches and chapels. By these means more than two million additional seats were proposed to be obtained, of which about three-fourths were to be set apart for the free use of the parishioners. The amount given by the Society towards these works was 926,851*l*. The estimated amount of further expenditure on the part of the public is 16,978,453*l*.

In the course of the report it is stated that:—

In asking for the Society increased financial support there is need to ask also for a more intelligent interest in the Society's architectural mission; that a right mind and a right aim should control the expenditure of funds upon all our new churches and specially upon those of our expanding suburbs. Never so much as in those dull districts where there is so little of the ideal do we need a standard of beauty and a source of pride. It matters not whether a building be Gothic or Classic in spirit, provided it be good of its kind and the needs of a district and its worshippers are well considered and met. The more difficult it is to raise the requisite funds the more care should be exercised in the spending of them, and the Society has from time to time found it needful to reiterate the view that mere cheapness is not to be commended in the erection of a house of God, which should be devised and destined to endure for centuries. It is no less important to reaffirm that the essential qualities of convenient planning, good proportion, and the dignity and refinement inherent in well-conceived church architecture, even of the simplest character, are much more dependent upon the taste and skill of the scholarly and competent architect than upon a large and often unnecessary outlay disposed by tasteless or comparatively unskilled hands. The inheritance of religious architecture in the country, especially in the Anglican communion, is a precious possession, and the Society is ever ready to encourage and assist the promoters and patrons generally of church building to spend the funds raised for this purpose in such a manner that our great inheritance, and all it means for the Church and nation, shall in no sense be impaired.

In this connection the Society cannot too strongly impress upon those in whose special charge our ancient fabrics are vested that they are responsible for what cannot be recreated, cannot be bought, and when once lost or injured cannot be recovered.

While the reasonable adaptation of ancient and historic buildings to modern needs is not in itself to be objected to, and is even sometimes essential to preserve such a building in active use as well as from decay, no work should be undertaken destructive of its hallowed or historic character, and nothing should be done without seeking the advice of a professional man with a wide experience in this class of work, which is the most difficult that an architect can undertake. On no account should the jobbing builder be allowed a free hand upon an ancient church. . . . The committee take this opportunity of thanking the members of the committee of honorary consulting architects, who give their services so ungrudgingly to the Society by examining with the greatest care the designs submitted to them at their monthly meetings. By the resignation through ill-health of Mr. B. Ingelow and by the death of Mr. W. M. Fawcett, M.A., F.S.A., the Society has lost the services of two distinguished church architects. While deeply regretting the loss of these valued members, the committee cordially welcome Sir Charles A. Nicholson, Bart., and Mr. C. S. Spooner, who have been appointed to fill the vacancies thus created.

The full list of honorary consulting architects now is:—Mr. W. H. Bidlake, M.A., Mr. W. D. Caröe, M.A., Mr. C. Hodgson Fowler, Mr. C. H. M. Mileham, Mr. Temple Moore, Sir C. A. Nicholson, Bart., Mr. E. S. Prior, Mr. G. H. F. Prynne, Mr. J. Oldrid Scott, Mr. R. Norman Shaw, R.A., Mr. C. S. Spooner, Mr. E. P. Warren, Sir Aston Webb, R.A.

The committee desire to call attention to the fact that during the past year the "Occasional Notes on Church Furniture and Arrangement" have been reprinted and published in pamphlet form. These articles were originally contributed to the Society's quarterly magazine, the *Church Builder*, by the eminent architect and antiquary, the late Mr. J. T. Micklethwaite, F.S.A., who was for many years a member of the committee of honorary consulting architects of the Society and surveyor to Westminster Abbey. The committee strongly urge that all lovers of church architecture should carefully study these valuable articles and do all in their power to ensure their wide circulation. If this be done, the committee feel that the high standard in church building which the Society fosters, and which Mr. Micklethwaite did so much to promote, will be maintained. A copy will be sent post free for 7½*d*. on application to the secretary of the Society.

Mr. Edward Warren, F.S.A., in moving the adoption of the report, spoke as follows:—I wish first of all, on behalf of my colleagues, to thank the committee for their kind expressions in regard to the labours of the honorary consulting architects, and to join in the expression of sincere regret for the loss of two of its respected and distinguished members by the resignation of Mr. Ingelow and the death of Mr. Fawcett, as also in the cordial welcome to our ranks of their successors, Sir Charles Nicholson and Mr. Spooner.

This Society is, of course, as all such associations must be, urgently in need of further and continued contributions.

It is as representing a class of contributors who are able to offer only the contribution of such knowledge and skill in architecture as they possess and have attained—not without pain—and as a constant participator in the burthen of study and criticism imposed upon the consulting committee, that I venture to offer a few observations prompted by the share in that task which I have been privileged to bear. Amongst the very large number of plans representing schemes for new churches or the enlargement or alteration of existing ones, old or modern, the percentage which we find it possible (always to our very great pleasure) to approve absolutely is small, but I think I may fairly say that we do find an increasing tendency to accept and obey the main constructional requirements of our Society and to endorse the spirit as well as the letter of those instructions. The number, however, is still large which is sent to us showing not only ignorance of the Society's requirements, but of the ordinary practical needs of a church, and a sad lack of perception of the befitting attributes in honest soundness of structure, simple excellence of materials and quiet dignity of effect.

It is frequently painful to us to have to consider schemes for the building of churches whose submission to our judgment is in itself a proof of slender financial resources, which seem to aim rather at a certain Cockney splendour than at the sober and restrained adequacy which is barely attainable within the limits of the possible expenditure. It is perhaps more than ever painful, to minds trained in the study and love of ancient architecture and attuned to its serene sincerities, to have to sit in judgment upon plans, generally well meant, which nevertheless portend the woeful mishandling of some quiet, delightful, old country church, to which time and weather have imparted an irreplaceable beauty, and in which the direct and simple alterations and naive additions of successive generations have furnished, to all who can read them, instructive pages in the history of our Church and our country. There is often, alas! evidence of a misguided desire to smarten, to Cocknify, or, if I may use the expression, to "suburbanise" the old gray churches of our quiet countrysides by the ruthless application of smart and imitative workmanship in cheap materials, or by the substitution of the unsympathetic and ready-made accessories of the ecclesiastical tradesman for the sober and humble time-worn old fittings and furnishings of our simple-minded predecessors. It is bad enough that a brand new building dedicated to the worship of God should present the thin, hard lines, the cheap symbolism, the thoughtless, joyless travesties of ancient and beautiful things, but it is worse—indeed, to many of us it is heartrending—to witness the perversion of a quiet and lovable old church to the common standard of modern ecclesiastical smartness, with its crudities of encaustic tiling, its horrible machine-made lacquered brasswork, its "reach me down" reredos, pulpits and lecterns, and the pervasive treacly vulgarity of varnished pitch pine.

The brand new must be brand new, of course, and there is nothing wrong in newness. It has, indeed, a distinctive charm of its own, and when a new building is thoughtfully and skilfully planned; proportionate, dignified, substantial and strong, it is a thing to be glad of, wholesome all round, the honest outcome of an honest purpose. But where, as is often the case, it is necessary to add to an ancient church—a thing which I believe you will agree with me should only

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be done under the stress of sheer necessity—I feel that the inevitable newness of the addition requires, in order to do no hurt to the old structure, more care and thought, perhaps more skill, than unhampered new building on a new site; and I think it is generally only on simple directness of purpose and frank declaration of the addition as such—in the use of materials, of local origin where possible, or at any rate of kindred nature and assimilable in time to those of the old building, as well as in avoidance of sham antiquation or mere detail-copying of the original building—that harm is avoidable. See that your walls are comfortably thick, a little over the minimum requirements of this Society wherever possible; that your piers and arches are strong and simple, and that your roof timbers and roof covering are substantial and sound. Forego all adornment, leave tracery out of windows, have chairs instead of pews, avoid all cusping and crocketting, carving or ornament of any kind, but have the building sound and solid, and above all seek sincerity of structure rather than ingenuity. Such would be my exhortation to clergy and architects alike.

In new churches I think my brethren of the consultative committee will agree with me that in most cases submitted to us the elimination of mere ornament would usually make possible better constructed, thicker walled and more substantial buildings, and often the provision of more ample space. I am struck by the, as I think, extremely regrettable tendency so generally displayed to fit a church closely to the mere seating accommodation demanded by local conditions, allowing for unseated floor spaces the merest exiguity of passage ways. This is very different on the Continent, where a much greater sense of the dignity of space appears to obtain in the planning of churches. There is sheer satisfaction to the eyes and indeed actual beauty in the proportionate distribution of enclosed space, and while perhaps it may not be possible for us to increase our minimum requirements in that direction, I suggest that we might accompany their statement in our rules by a suggestion as to the extreme desirability of more ample spaces.

In conclusion, and again, I believe that on this head I may safely speak for the committee of consulting architects. I feel that our work would be more useful, and the influence of this Society upon ecclesiastical architecture greatly strengthened and improved, if more power and wider discretion were given us in recommending for grants, in respect to the architectural character of designs submitted to us, as well as in regard to mere structural sufficiency. Might it not, for instance, be possible to have recognised classes or categories to which, in our criticisms, we could assign the various plans, in accordance with their general merits, and which might influence the executive committee in its decision as to grants? We should like to be able to feel that our grants conveyed æsthetic as well as merely practical approval, and that, if possible, a sort of bonus were bestowed upon unusually excellent and harmonious designs. If it is not possible, in view of our unfortunately narrow financial limitations, to make an increased money award to architectural excellence, we might at least devise some system of "starring," so to speak, designs especially approved by the honorary consulting architects. In this way it would soon get to be felt that where the plans for a new church or for an addition were starred by the Incorporated Church Building Society, the promoters would have leverage for an especial appeal, the value of our grant would be morally increased, a deserving architect would receive express recognition, and your consulting architects would have the gratification of conveying especial approval, and of feeling that the Society was doing its best to secure beauty and fitness of design as well as soundness of structure and convenience of plan. It is generally admitted that a marked and most hopeful advance has been made within the last few years in secular building, but, as my colleague Mr. Prior so ably pointed out to you when addressing the annual general court a year or two ago, the building of churches has scarcely shown corresponding advance—a sad admission, as we shall all feel.

Time was when the Church was the high centre of all artistic activities, the inspiring source of artistry in every craft. Time was when her buildings were the supreme emotional expression of the creative fervour of the land. We can hardly hope, I fear, in this age, when the building instinct inherent in man is dulled by the myriad competing interests of our complex life, to restore that state of things, but we can, and this Society more potently perhaps than any other organisation, bear our testimony to the need for dignity and beauty in the buildings of the Church, and which, as the report so justly signifies, is especially great in these days amidst the mean and sordid surroundings of industrial neighbourhoods, where, if anywhere, an approach to the ideal of beauty, an oasis of refreshment to tired minds and monotonous lives, should be found in the parish church.

THE BRITISH FIRE PREVENTION COMMITTEE.

THE British Fire Prevention Committee, which was founded on the occasion of the great Cripplegate fire of 1897 and which was incorporated in 1899, is celebrating the tenth anniversary of its incorporation this month on the 24th and 25th inst., when a number of distinguished visitors will be attending its meetings, including several from abroad.

The committee's primary object during the last ten years has been to deal with the protection of life and property from fire by the adoption of preventive measures, and it has certainly favourably influenced the reduction of the possibilities of fire and spread of fire during that period, not only in the metropolis but throughout the empire.

The greater knowledge of building materials and appliances obtained by scientific independent tests at the committee's testing station has done much to obtain a better understanding of the value and also the limitations of different methods of construction and equipment, whilst considerable influence has also been exerted by the committee in guiding building and fire service legislation in directions where it is most effective to prevent loss of life and loss of property. Probably the most notable event in the committee's life was the large International Fire Prevention Congress of 1903, and the arrangement of the technical exhibits at the Fire Exhibition that was held on that occasion at Earl's Court. No less than 800 delegates attended the Congress, including over 200 from abroad. The reports issued by the committee to its members number 140, and comprise a most comprehensive library on the subject of fire prevention. Special publications have also been issued from time to time dealing with the visits of special commissions formed by the committee to study matters of fire prevention on the Continent. Popular booklets have also been issued, such as children's fables warning children not to play with fire. Among the original founders now deceased probably the best known were the late Mr. Thomas Blashill, F.R.I.B.A. (late Superintending Architect to the London County Council), Mr. Arthur Cates (Crown Surveyor), and Mr. James Sheppard (Insurance Surveyor). Of the founders who have held office on the Executive from the time of its incorporation to the present time should be mentioned Mr. Edwin O. Sachs, F.R.S.Ed. (Chairman), Mr. Ellis Marsland (Hon. Secretary), and Mr. Max Clarke, F.R.I.B.A. Other members who have been doing active service for many years are Messrs. J. Herbert Dyer and Horace Folker (Vice-Presidents of the National Fire Brigades' Union), and Mr. Percy Collins, J.P. Quite a number of the chief technical officers of the Government Departments concerned have regularly supported the committee, notable among them being Sir William Preece, K.C.B., Sir Boverton Redwood, F.R.S.Ed., Sir Henry Tanner, I.S.O., Sir John Taylor, K.C.B., Sir James Williamson, C.B., and Major O'Meara.

To give some idea of the extent of the committee's field of influence, it should be mentioned that one of its sub-committees in New Zealand alone counts twenty-five members. Its list of honorary foreign members and active correspondents includes several distinguished names, not least among these being those of the well-known police chief of Paris, Monsieur Lepine, and the head of the Russian Fire Service, Prince Alexander Lvoff, both of whom have been over to see the committee's work. The objects tested by the committee since its formation number 160 to the end of last year, and it should be understood that the investigation into any one object sometimes requires as many as twenty or thirty testing operations. Notable tests have been those with large reinforced concrete floors, a series of fifty fire-resisting doors, fire resisting glazing, and latterly also with safety devices.

Perhaps a final feature that claims remark is that the whole of the funds required for the establishment of the Committee's Testing Station and the execution of its work have been raised voluntarily, that over 20,000*l.* have been expended in ten years on the work of the committee, and that the whole of the services rendered by the committee and their officers are rendered voluntarily, members, as a matter of fact, even bearing all their own out of pocket expenses.

It is customary to decry the research work done in the United Kingdom as compared with the research work done elsewhere with the aid of Government grants and subsidies, but the British Fire Prevention Committee's Testing Station

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has so far not been rivalled in any other country, although imitated in the United States, France, and Germany, with the aid of Government funds, and from the outset both the arrangements for investigations and the actual reports have not yet been surpassed anywhere.

BODLEIAN LIBRARY.*

THE first actual University Library at Oxford, and indeed the first of mediæval times, was commenced about 1367 in the north-east corner of St. Mary's Church, to accommodate the books collected and bequeathed by THOMAS COBHAM, Bishop of Worcester. In 1426 the University authorities embarked on the formation of an independent library, and in this they were greatly aided by Duke HUMPHREY of Gloucester, son of HENRY IV., a munificent patron of the new learning. Their efforts met with such success that twenty-two years later they informed him of the necessity for larger quarters and offered to make him founder. The new building was completed in 1480, and still forms the central portion of the great reading-room.

One of the early troubles, and it was one that endured through succeeding centuries, was in connection with the "lending department." Bishop COBHAM laid down that a scholar might have the loan of any book of which there was a duplicate copy, providing he left a pledge exceeding it in value. In course of years the amount of the pledges decreased as the value of the books increased, with the result that thefts became of scandalous frequency. It is related that one historian, who had been refused any further opportunities for abstraction, obtained a special licence from HENRY VIII. to take out any MSS. he might require. The annals contain constant references to the same dishonest practices which have been through all centuries the one weakness of bibliophiles. Indeed, it is hinted that Sir THOMAS BODLEY himself had on occasions of great temptation rather broad ideas as to meum and tuum.

In 1550 the Commissioners appointed under EDWARD VI. for the reformation of the University visited the library, full of that iconoclastic zeal that wrought such irreparable harm all over the country. All MSS. ornamented with illustrations or rubricated initials, whether missals or not, were destroyed or removed, as conveying Popish doctrines. The rest were left unprotected and found many strange uses. In 1555 the work of destruction was completed by the appointment of delegates to arrange for the sale of the shelves and stalls of the library.

It was four years after this disgraceful date that THOMAS BODLEY came to Magdalen College from Geneva University. In 1563 he was elected Fellow of Merton College, and held various offices until he went on the Continent at the age of thirty-two. He later made an unsuccessful attempt to get elected into Parliament, but achieved considerable reputation in the diplomatic world. Becoming tired of intrigues and jealousy he, to use his own often-quoted letter, "concluded at the last to set up my staff at the library door in Oxon, being thoroughly persuaded that in my solitude and surcease from the Commonwealth affairs I could not busy myself to better purpose than by reducing that place (which then in every part lay ruined and waste) to the publick use of students." Accordingly in 1597 he wrote to the Vice-Chancellor as follows:—"There hath bin heretofore a public library in Oxford, which is apparent by the room itself remaining, and by your statute records. I will take the charge and cost upon me to reduce it again to its former use." The offer was accepted, and various offers of help were received. Merton supplied the timber. In two years the beautiful roof which still shows BODLEY'S arms on the bosses was completed with other work. In 1600 BODLEY turned his attention to collecting books. He prepared a Register in which to record the names of all benefactors with their gifts. These two large volumes in vellum are one of the treasures of the Bodleian.

* See Illustration.

The first library-keeper was THOMAS JAMES, Fellow of New College, who signalised his appointment in 1601 by presenting over sixty printed volumes as well as MSS. There seems, however, to be some doubt as to whether he honestly got possession of the latter. Mr. JAMES was apparently a forceful character, for almost immediately after accepting the post he demanded that his salary of 5*l.* 13*s.* 4*d.* a quarter should be raised. It is unlikely that he was very successful, for sixty years later the occupant of the office received only 33*l.* 6*s.* 8*d.* a year. He also applied for permission to marry, despite the statute as to celibacy. Though BODLEY after long hesitation consented to grant an exception in his case, the rule of celibacy was rigidly enforced on all librarians for the next two hundred years.

Sir THOMAS BODLEY must have had the secret of making friends, for his appeal for books met with an instantaneous and generous response. The men of Devonshire were proud of the family's long connection with their county, and a local historian records "every man bethinks himself how by some good book or other he may be written in the scroll of benefactors." Some of the greatest treasures were given from episcopal palaces. By 1602 the volumes numbered over 2,000, and the library was formally opened by the Vice-Chancellor in that year in solemn procession. In 1605 King JAMES I. paid a lengthy visit to it, and showed more than the usual royal graciousness. He offered to present from all the libraries of all the royal palaces whatsoever precious and rare books the founder might care to carry away with him, and he promised that the grant should be made under seal, lest any hindrance should arise. Though this was duly carried out three months later, there seems to have been very little acquired. Nearly twenty years later JAMES presented to the Bodleian the folio edition of his "Works." It was taken to Oxford by a special deputation (the leader of which received a present of 20*l.* from the authorities), and was carried in state to the library by the Vice-Chancellor, with twenty-four doctors in their scarlet robes. The literary monarch was greatly flattered, more especially as "Cambridge had received them without extraordinary respect." A later transaction with royalty was not so fortunate, for King CHARLES I. borrowed 500*l.* "out of Sir TH. BODLEY'S cheste." Hope was not abandoned for its recovery until nearly a century and a half later.

The first catalogue appeared in 1605. The arrangement was according to classes; but in the second this was given up in favour of an alphabetical order. Dr. JAMES, in alluding to the growth of the library, remarked that already there seemed to be more need of a library for the books than books for the library. The foundation-stone of the eastern wing was laid in 1610, and the picture gallery was added in 1613-19. An interesting description of the buildings about that time was given by CASAUBON, a Swiss divine and critic, who in 1613 paid his first visit to England. He wrote to a correspondent:—"None of the colleges attracted me so much as the Bodleian library, a work rather for a king than a private man. It is certain that BODLEY, living or dead, must have expended 200,000 livres (about 20,000*l.* at that time if I mistake not) on that building. The ground plot is the figure of the letter T. The part which represents the perpendicular stem was formerly built by some prince, and is very handsome; the rest was added by BODLEY with no less magnificence. In the lower part is a Divinity School, to which, perhaps, nothing in Europe is comparable. It is vaulted with particular skill. The upper storey is the library itself, very well built, and fitted with an immense quantity of books. . . . As long as I remained at Oxford I passed whole days in the library, for books cannot be taken out; but the library is open to all scholars for seven or eight hours every day. You might always see therefore many of these greedily enjoying the banquet prepared for them, which gave me no small pleasure."

In 1610 the Stationers' Company after "many rubs and delays" agreed to give a perfect copy of every book published by their members, on the condition that they

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should have liberty to borrow the books thus given if needed for reprinting, and to examine, collate and copy the books which were given by others. Two years later an ordinance was passed by the company for enforcing this obligation, and according to which a fine of treble the value of the book was to be imposed on any member who failed to deliver over a perfect copy. But very shortly after, complaints were made as to the failure of the company to fulfil their promise. It was rumoured that Bodley gave the Stationers 50*l.* worth of plate as a return. A hundred years later the first Copyright Act was passed, by which a copy of every work entered at Stationers' Hall had to be deposited in nine libraries—ultimately reduced to five.

Sir Thomas Bodley died in 1613 at the age of sixty-eight, and in accordance with his wish was buried with great solemnity in the upper end of the choir of Merton College chapel. The bulk of his fortune, 7,000*l.* it was said, was bequeathed by him for building the east wing of the library, and the completion of the Schools. But the total proved considerably less "by reason of the fraud of his executor, the loan of a great sum of money to Charles I. in his distress, and by fire of London," when the tenements in Distaff Lane were rebuilt. A mural monument was subsequently erected to his memory in Merton Chapel, for which Nicholas Stone, the sculptor, received 200*l.* It is of black and white marble, and on the top is an effigy of the benefactor in a scholar's gown and surrounded by books.

A hundred years after the opening of the Bodleian considerable alarm was raised as to the stability of the Divinity School, and that portion of the library built over it. About thirty-two years before the roof of the former had shown signs of collapse, and these were rectified by Wren. It is rather curious that John Evelyn, in his diary for July 4, 1654, written at Oxford, says:—"After dinner I visited that miracle of a youth, Mr. Christopher Wren, nephew of the Bishop of Ely. Then Mr. Barlow, Bibliothecarius of the Bodleian Library, my most learned friend. He showed us the rarities . . . furnishing that new part of the library built by Archbishop Laud, from a design of Sir Kenelme Digby and the Earle of Pembrook." In 1692 galleries had been erected on either side of the middle room, and as the beams of the roof of the Divinity School were then observed to give from the wall, they were anchored on both sides. But the tight bracing caused the south wall adjoining Exeter College garden to bulge outwards, so that the bookstalls were found to have started from the walls by 3½ inches at the top and 2½ inches at the bottom. The wall itself was 7½ inches out of the perpendicular, and the four great ribs of the school vault were all cracked. Sir Christopher Wren was called in, and on his advice additional buttresses, of great depth and strength, were erected on the south side; the weight of the bookstalls was removed from the roof by their being trussed up to the walls with iron cramps, and the cracks in the vault were filled with lead or oyster shells, and in some places with the insertion of new stones, and were lastly wedged up with well-seasoned oaken wedges. This work went on through the summers of 1701-2. The letters and papers of Wren on the subject, with drafts and reports of the workmen employed, are preserved in the Bodleian. The plan of placing the bookcases against the walls instead of projecting at right angles into the room was popular on the Continent before its introduction in the Bodleian. Wren ultimately employed this method elsewhere, notably at Trinity College, Cambridge.

A plan for warming the library was first adopted in 1821. It consisted of introducing hot air by two small gratings at one end. The system proved of little benefit except to the few who were in close proximity to the stove. In 1845 pipes were laid down throughout the greater part, but with little improvement. In 1855 on the advice of Mr. Braidwood, the head of the London Fire Brigade, the pipes were enclosed in slate casings so as to effectually hinder contact with inflammable material, and at the same time fireproof doors were inserted at the entrances to the great reading room in order to cut it off from the rest of the building. After a few years' use steam was discarded in favour of hot water.

This was chiefly the result of a report by Mr. G. S. Scott, on the enlargement of the library and rendering it fireproof. He suggested an extension of the building throughout the whole of the quadrangle, and that the Divinity School should be assigned as a reading-room, for which use the great amount of light afforded by its large windows appeared peculiarly suited. The subsequent assignment of the Radcliffe Library, however, removed the immediate necessity for further accommodation. In 1902 the Bodleian contained more than 600,000 printed volumes and 31,000 MSS.

Although the library was made the object of other gifts beside books and manuscripts, there does not appear to have been much generosity in presenting objects of architectural interest. In 1620 the first architectural model was presented by Sir Clemens Edmonds. But the greatest acquisition was the bequest of the Arundel marbles. These were allowed to come to serious harm by exposure and wilful damage during the time they were left in the open air within the quadrangle of the Schools. In 1714 they were accommodated in one of the ground floor rooms. More than a century later a subscription was raised for the purpose of adorning the picture gallery with plaster models of some of the finest buildings of Greek and Roman antiquity. As a result the following series by Fouquet, of Paris, was placed in the gallery at a total cost of 400*l.*:—The Arch of Constantine, the Parthenon, the Temple of the Sibyl at Tivoli, the Maison Carrée at Nîmes, the Erechtheum, the Lantern of Demosthenes at Athens, the Theatre of Herculaneum, and the Temple of Fortuna Virilis at Rome. The Sutherland Collection, presented in 1837, includes 309 views of London and 166 of Westminster. Among the former is the well-known series of drawings by Antonio van den Vyngaerde, executed between 1558-63.

Holt is believed to have been the architect of the Jacobean buildings which, with the Bodleian, formed a great quadrangle. The gate tower is a conspicuous feature. In the uppermost storey a gilt statue of James I. was placed. It is said that the sceptre fell from that monarch's hand at the shock of William IV.'s accession.

Such is a brief outline of the history of this famous library. Robert Burton in the "Anatomy of Melancholy" wrote:—"How much are all we bound that are scholars to those munificent Ptolemies, bountiful Mæcenases, historical patrons, divine spirits that have provided for us so many well furnished libraries? How shall I remember Sir Thomas Bodley among the rest?"

TESTS OF REINFORCED CONCRETE BEAMS.

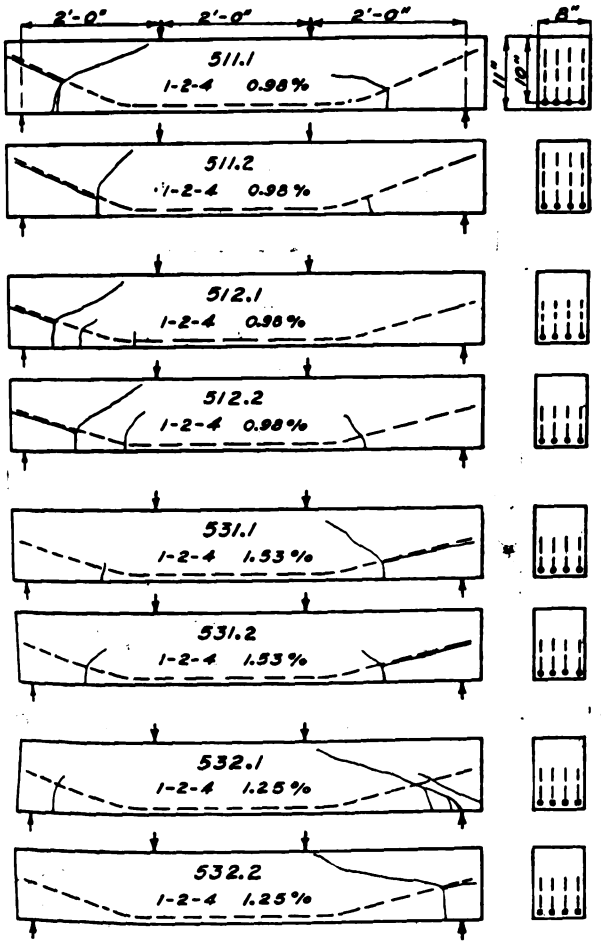
THE resistance to failure by shear and diagonal tension, and the effectiveness of metallic web reinforcement, are discussed in Bulletin No. 29, Tests of Reinforced Concrete Beams: Resistance to Web Stresses, by Arthur N. Talbot, just issued by the Engineering Experiment Station of the University of Illinois. This bulletin of 85 pages gives the results of tests made in the Laboratory of Applied Mechanics of the University. The strength and quality of the concrete itself are shown to have a marked effect on web resistance, and the importance of securing a high grade of concrete in beams subject to large web stresses, even if metallic web reinforcement is used, is brought out strongly. Data are given on which to base the age necessary to enable concrete to take shearing stresses. It is established that the less the ratio of length of span to depth of beam the greater the shearing resistance developed per unit of cross section, and also that the greater the amount of longitudinal reinforcement the greater the shearing resistance. Both effects depend upon added stiffness, a relation which has not been formulated before. Several types of web reinforcement were investigated, bent-up longitudinal bars of different forms, unit frames, vertical stirrups of different sizes and proportions, smooth and deformed bars, &c. The notes and discussions given add to the value of the matter for those who wish to study the details of the tests. The analytical treatment of web stresses, the discussion of the experiments, and the remarks on proportioning stirrups may all

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be helpful to engineers. Although a considerable fund of information bearing on the part taken by the resistance of longitudinal reinforcement, and the compressive resistance of concrete has accumulated, the data of web stresses are less definite and less complete. This monograph is therefore timely, and it ought to take rank as an important contribution to the literature of reinforced concrete.

Copies may be obtained gratis upon application to the Director, Mr. L. P. Breckenridge, Engineering Experiment Station, Urbana, Illinois.

The following are brief notes of the tests of beams with the reinforcing bars bent up. The location of the cracks is shown in diagrams. The heavy lines indicate cracks along which failure took place:—



No. 511.1. At 13,000 lb. the first noticeable crack appeared at 2 feet to right of centre and extended from the bottom vertically 3 inches to the level of the reinforcement and then diagonally toward the load point 5 inches. At 14,000 lb. a vertical crack appeared 2 feet 5 inches to left of centre and extended to the reinforcing bars. From this point it finally ran diagonally almost to the load point. The beam failed at 18,000 lb., the crack following the reinforcing bars to the end of the beam. The load then dropped quickly to 6,000 lb., where it remained constant for some time.

No. 511.2. At 13,000 lb. a crack appeared 1 foot 10 inches to left of centre and extended to the reinforcing bars. At 15,000 lb. this crack had extended diagonally almost to the top of the beam, 4 inches to the left of the load point. The load of 15,000 lb. was held for 15 minutes, due to a break in the machine. The beam failed at 20,000 lb., the load then dropped slowly to 4,000 lb., and the crack on the left extended along the reinforcement almost to the end of the beam. An examination of the beam made afterward showed that the bars had slipped $\frac{1}{4}$ inch in the left end.

No. 512.1. At 15,000 lb. two cracks were noted, one 2 feet 5 inches to the right and the other 2 feet 1 inch to the left of centre, extending upward to the reinforcing bars. At 18,000 lb. a crack appeared 2 feet 6 inches to the left of centre and extended to the reinforcing bars, branching off diagonally to the right toward the load point and to the left along the reinforcing bars. The maximum load was 19,000 lb. and the load gradually dropped to 2,000 lb. An examination of the beam showed that the rods at the left end had slipped slightly. The crack had followed the reinforcing bars to the end.

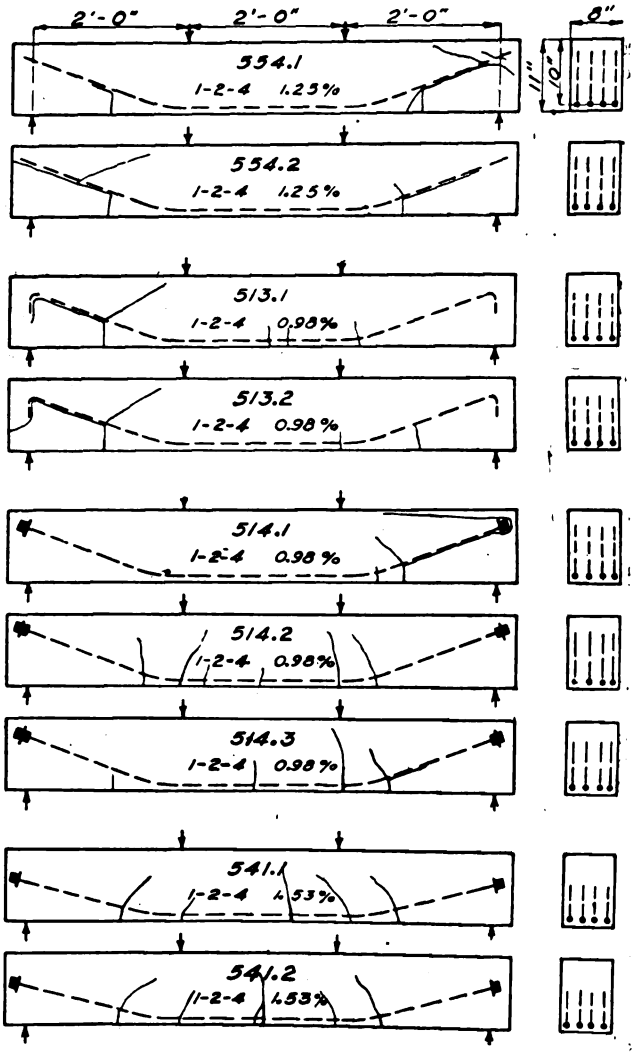
No. 512.2. At 14,000 lb. a crack appeared 1 foot 5 inches to left of centre and extended toward the load point. At 16,000 lb. a crack was observed 2 feet 2 inches to left of centre, which extended vertically to the reinforcing bars and from here started toward the load point. The beam failed quite suddenly at a load of 17,350 lb., and the crack followed the reinforcing bars to the end of the beam. An examination of the beam showed that the bars had slipped $\frac{1}{8}$ inch.

No. 531.1. This beam failed in a manner similar to No. 512.1 and at a load but 500 lb. greater. The crack at 1 foot 10 inches to right of centre appeared at 14,000 lb. and the beam failed at 19,500 lb., the crack following the reinforcing bars to the end of the beam.

No. 531.2. At 12,000 lb. a crack appeared 2 feet to left of centre and extended vertically to the reinforcing bars. At 18,000 lb. this crack was 5 inches above the bottom and was extending toward the left load point. At 14,000 lb. a similar crack appeared 2 feet to right of centre and extended in the same way. At 22,000 lb. a slight hair crack was noted following the line of the reinforcement. The beam failed by the opening of the crack at 24,000 lb.

No. 532.1. At 18,000 lb. a diagonal crack appeared at 2 feet 5 inches to right of centre and the beam finally failed along this crack. The maximum load was 20,000 lb.

No. 532.2. At the maximum load of 18,000 lb. a diagonal crack extended from the right end toward the load point. The bars slipped after the diagonal tension failure occurred.



No. 554.1. At 13,600 lb. a vertical crack appeared 1 foot 10 inches to left of centre and one 2 feet to the right of centre, which extended 4 inches high to another crack. At 17,900 lb. the beam failed as shown in the sketch in Fig. 14.

No. 554.2. At 10,800 lb. a vertical crack appeared 2 feet to the left of centre, extending up to the reinforcement, thence along the reinforcement to the end of the beam. A similar crack appeared 1 foot 9 inches to the right of centre. At a maximum load of 17,500 lb. the beam failed along the crack to the left of centre.

No. 513.1. At 9,000 lb. a crack appeared 2 feet to left of centre and extended vertically to the reinforcing bars. The

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beam failed suddenly at 16,700 lb. The crack followed the reinforcement to its end.

No. 512.2. At 10,000 lb. a crack appeared 2 feet to left of centre, extending vertically to the reinforcing bars. As the load increased this crack extended diagonally toward the load point. The beam failed at 16,400 lb.; this crack following the reinforcing bars to the end.

No. 514.1. At 10,000 lb. a crack appeared at 1 foot 10 inches to right of centre and extended to the reinforcement. The beam failed suddenly at 21,100 lb. by this crack running along the reinforcement to the nuts. At failure a crack appeared at the nut, running back toward the load point. The diagonal crack shown closed up. This is a peculiar failure and differs from others of its set. As noted elsewhere the washers were not locked to the end nuts in this beam.

No. 514.2. This beam is noteworthy because it failed through tension in the steel, although a crack was visible along the reinforcing bars. At 14,000 lb. a crack appeared to the right of the right load point and finally extended some distance toward the load point. At 19,000 lb. slight cracks were seen following the reinforcement from this crack. At 16,000 lb. a vertical crack 3 inches long appeared at the centre and also a crack below the left load point which extended upward 4 inches. At the maximum load of 22,200 lb. this crack was 8 inches high, and opening considerably, showing failure by tension in the steel. At 18,000 lb. a vertical crack 6 inches long was noted 1 foot 6 inches to left of centre and at the maximum load it was 8 inches long. The deflection of the beam at the maximum load was 0.2 inches, and the load remained within 1,000 lb. of the maximum until the deflection was 0.43 inches. Crushing of the concrete at the top of the beam occurred under the increased deflection.

No. 514.3. At 12,000 lb. a crack appeared 1 foot 8 inches to right of centre and extended vertically 4 inches. At 18,000 lb. a crack had branched off from the first crack and followed the reinforcement for a short distance. At 22,000 lb. a crack appeared under the right load. At the maximum load of 23,500 lb. this crack was 8 inches high, and as the deflection of the beam was increased the crack opened up almost to the top of the beam, and finally the concrete began to crush at the top. The beam failed by tension in the steel. The effect of the anchorage is shown in that the inclined crack did not extend to the end of the bar.

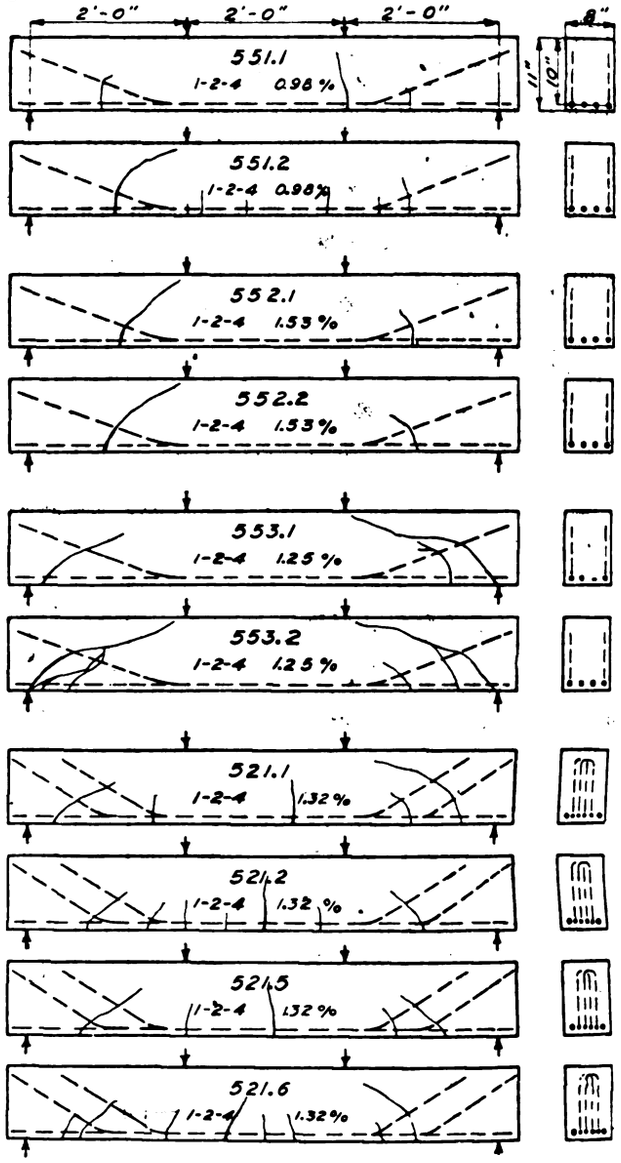
No. 541.1. At 16,000 lb. the first crack appeared at 1 foot 10 inches to left of centre and was 2½ inches long. At 18,000 lb. it had extended toward the load point until it was 5 inches from the bottom of the beam and at 28,000 lb. it was 7 inches. A similar crack appeared at 1 foot 10 inches to right of centre at 18,000 lb., and at 26,000 lb. this crack was visible 7 inches above the bottom of the beam. At 18,000 lb. cracks were noted under the two load points. At 22,000 lb. a crack 5 inches to right of centre was 2 inches high. At the maximum load of 29,600 lb. this crack was 6 inches long. This load was held almost constant for some time and the beam failed by tension in the steel, followed by crushing of the concrete at the top of the beam.

No. 541.2. This beam failed in a manner similar to No. 541.1. At 12,000 lb. the first crack appeared 1 foot 7 inches to right of centre and extended 4 inches toward the load point. At 14,000 lb. a similar crack appeared 1 foot 10 inches to left of centre. At 16,000 lb. this crack was 8 inches above the bottom of the beam. At 16,000 lb. a small vertical crack was observed near the centre. The maximum load was 28,450 lb. The beam failed by tension in the steel.

No. 551.1. At 14,000 lb. a crack appeared 1 foot 10 inches to right of centre, extending vertically 3 inches. At 16,000 lb. a similar crack appeared 2 feet 1 inch to left of centre. At 22,000 lb. a slight vertical crack was noted under the right load point. This gradually extended upward until the maximum load of 24,700 lb. was reached. The beam failed by tension in the steel and an examination showed that the rods had scaled. The cracks in the other one-third did not develop to any extent.

No. 551.2. At 14,000 lb. two cracks appeared; one 2 inches long at the right one-third point and one 4 inches long near the left one-third point. At 16,000 lb. a vertical crack 6 inches long was noted 1 foot 11 inches to left of centre. At 18,000 lb. three more vertical cracks were noted in the middle third. The beam failed at a load of 22,000 lb. by the crack in the left third of the beam extending to the load point, and at the same time following the line of horizontal reinforcement. This diagonal tension failure was at a load which nearly developed the elastic limit of the steel.

No. 552.1. At 22,000 lb. a crack appeared 10 inches to left of left load point 5 inches high and at 23,000 lb. one 14 inches to right of right load point 4 inches high. Failure at 25,000 lb. by the extension of the first crack to the load point.



No. 552.2. At 24,000 lb. a crack appeared 10 inches to right of right load point 5 inches high, and at 25,000 lb. one 17 inches to right of right load point 5 inches high. At 28,000 lb. these cracks were opening and lengthening. At 30,000 lb. the cracks were extended well toward the load point. Final failure came at the left end, the crack reaching from support to load point.

No. 553.1. At 24,000 lb. a diagonal crack appeared 2 feet 4 inches to right of centre and at 24,700 lb. one at 2 feet 10 inches to left of centre. These cracks gradually lengthened, and at 28,800 lb. the beam failed by diagonal tension. It will be noted that the failure crack extended to the support.

No. 553.2. At 24,000 lb. a diagonal crack appeared 1 foot 10 inches to right of centre, at 25,000 lb. another at 2 feet 5 inches to right of centre, and at 26,000 lb. one at 2 feet 6 inches to left of centre. These cracks gradually opened and lengthened, and at 31,000 lb. the maximum load was reached. The crack at the right end extended almost to the load point, and the final failure came at the crack at the left end, which reached from support to load point.

No. 521.1. This is the Cummings' unit frame reinforcement. It should be noted that the cracks outside the load points were small and did not extend far, and that failure was by tension in the steel at a high vertical shearing stress. At 20,000 lb. the first crack appeared at 4 inches to right of centre and extended upward 4 inches. At 22,000 lb. a crack appeared 2 feet 6 inches to right of centre, extending upward 6 inches. Another crack 4 inches long was noted 1 foot 5 inches to the left of centre, inclined toward the load point. At 28,000 lb. slight vertical cracks were noted 1 foot 10 inches to right of centre and 2 feet 8 inches to left of centre. The beam failed by tension in the steel at the crack near the centre, the maximum load being 31,100 lb. The load ran near the maximum for some time, as the deflection was increased, and finally the concrete crushed slowly at the top.

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No. 521.2. Another Cummings' reinforcement. The first noticeable crack was at the centre of the beam at 16,000 lb., extending upward 3 inches. At 18,000 lb. a slight crack appeared at the left one-third point. At 20,000 lb. two cracks appeared both inclined toward the load points, one 2 feet 3 inches to left of centre and the other 2 feet to right of centre. At 22,000 lb. a vertical crack appeared at 8 inches to right of centre and at 24,000 lb. at 6 inches to left. At 26,000 lb. a crack 6 inches long appeared 1 foot 6 inches to left of centre and inclined toward the load point. At the maximum load of 35,000 lb. the crack at the centre had gradually extended, opening up, and the beam failed by tension in the steel. The load remained near the maximum until further deflection and crushing of the concrete at the top of the beam finally occurred. The beam held 34,000 lb. until a deflection of nearly 0.5 inch had been reached. The outer cracks had not developed particularly, and there was no appearance of cracks in the direction of the reinforcement.

No. 521.5. Another Cummings' reinforcement. At 20,000 lb. a crack appeared 2 feet 3 inches to right of centre, inclined slightly toward the left. At 24,000 lb. slight vertical cracks were noted at the left one-third point. At 26,000 lb. a crack appeared 2 feet 4 inches to left of centre and inclined toward the load point. At this load a vertical crack 2 inches long was observed 1½ inches to right of centre. At 32,500 lb. this crack had opened almost to the top of the beam, and the beam failed by tension in the steel. The load carried dropped, and crushing of the concrete finally occurred.

No. 521.6. Another Cummings' reinforcement. At 16,000 lb. an inclined crack 6 inches long was visible 2 feet 4 inches to left of centre. At 18,000 lb. an inclined crack 1 foot 11 inches to right of centre appeared, which at 26,000 lb. had extended 8 inches from the bottom of the beam. It finally reached almost to the load point. At 18,000 lb. a vertical crack 2 inches long appeared 6 inches to left of centre. At 20,000 lb. a vertical crack 2 inches long was noted at the centre of the beam. The beam carried a maximum load of 26,200 lb. The deflection diagram is somewhat different from the other beams. The method of failure was evidently by tension in the steel aided by a yielding of the concrete which decreased the moment arm. The stress in the steel is therefore greater than the calculations make it. There was evidence that the concrete in this beam was not so good as in the other beams.

(To be continued.)

ART EXHIBITIONS.

THE many admirers of Mr. George Clausen's art have now a splendid opportunity for penetrating below the surface of his work and gaining an insight into his methods. For in the Hogarth Room of the Leicester Galleries there is an exhibition of sixty paintings and drawings by Mr. G. Clausen, R.A., R.W.S., which have never before been shown. It is not improbable that the first sensation of many of the enthusiasts will be something akin to disappointment, for there is little that can add to the artist's reputation. "The Visit" is certainly an altogether charming and very clever picture; but the painting of two figures in a window, with the consequent light effects on the interior of the room, has been ably done by others also. The ruggedness of the veteran's head in "An Old Villager" is most captivating, and the same attraction belongs to the head of "Kitty." Another conspicuous work is "The Rickyard: a Sunny Day," which is in his best manner. Of his slighter works mention may be made of "The Village at Night," "Winter Morning" and "Evening after Rain." There are several flower pieces and studies of still life; these prompt a doubt whether Mr. Clausen might not devote his time and talent to more personal work.

Messrs. Dowdeswell have organised in their New Bond Street Galleries a loan collection of pictures by Jan Steen, in aid of the National Hospital for the Paralysed and Epileptic. The great Dutch artist is represented by thirty-nine of his works, and these, with one exception, come from English collections. It has been said that "of all the Dutch painters of familiar life Jan Steen is acknowledged to be the greatest genius. The humour and whim in his compositions disclose to us a mind quite distinct from the rest, and the love of childhood displayed in his works shows that with all his eccentricities there is something good in his nature." A striking instance is in No. 21, *Grace Before Meat*, which is touching in its devotional simplicity; but Jan Steen was apparently ashamed of so much innocence, so he introduced a scamp of a boy who, despite the frowns of his father, is mockingly laughing while his little sister is being taught to say Grace. It mght well be the product of the merry rogue shown in No. 35, which is a whole-length portrait of the artist singing while he plays a mandoline. The majority of the pictures, however, seem to revel in the sordid details of tavern and peasant life. This same spirit inspired the *Marriage at Cana*, in which the performance of the miracle becomes of quite secondary importance. His axiom must certainly have been "Eat, drink, and be merry, for to-morrow we die"; and it was in painting wedding feasts, village fêtes, and acts of dissipation that Jan Steen seems to have felt most at home. The excellence of his colouring was warmly praised by Reynolds, and it is claimed that he painted dirt without it looking dirty. It is certainly true that the colouring of his pictures is fresh and bright. But we think the visitor to the galleries will wish the artist had felt an attraction for cleaner subjects.

NOTES ON BOOKS.

"The Building Foreman's Pocket Book and Ready Reference." By H. G. Richey. (New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 21s. net.)

WRITTEN from an American standpoint, this book is of necessity of less value on this side of the Atlantic than in the States; for example, in treating of Portland cement the standard sieve and standard sand used for testing in America convey no meaning to an English reader. The names of things and methods used on the other side do not always correspond to those with which we are familiar here. Notwithstanding these inherent disadvantages, this pocket-book is a very useful collection of information on all sorts of subjects for those who have to superintend building operations. From the orders and ornaments of Classic architecture to first aid to the injured there are few things that a foreman can learn from books that are not touched by this, and when work is done there are a few amusing puzzles "for the noon hour."

Perhaps to an English reader the most useful portions of the book are those dealing with the operative part of concrete construction, the methods of preparing moulds and centering, and various dodges and tips which the more extensive use of concrete in the States has naturally added to the stock of knowledge of the American workman. The laying out of work is well explained with practical methods of full size geometrical drawing, including curves of various kinds, conic sections and others, an essential part of a foreman's mental equipment. Similarly useful is what the author calls "Short cuts and useful problems," under which heading he deals with the use of ropes and their knots and a variety of miscellaneous information both curious and useful. The book, in short, is what it professes to be—a handy book of reference for the pocket of the building foreman. For the architect who has sometimes to tell a foreman what to do it provides just the sort of information that would impress the workman with a respect for the architect's practical knowledge.

OUR CONTEMPORARIES FROM OVER-SEAS.

THE *American Architect* devotes its illustrations to moderate-sized country houses, in which shingles, tiles, rubble, stone and plaster are the materials employed, and reproduces the R.I.B.A. recently issued list of books for students.

La Construction Moderne has an interesting review, with illustrations, of M. de Dartein's volume on "Ponts Français du XVIII. Siècle (Bourgogne)," the purport of which is to show the artistic character of the stone bridges of Burgundy during the eighteenth century. Illustrations are given of the monument to J. Lalande at Bourg and to Ch. Floquet at Paris, M. T. Ferret being the architect and M. Muscat the sculptor of the former, and M. Viet and M. Descombs respectively the architect and sculptor of the latter.

The *Engineering Record* (New York) gives an account of the use of built-up concrete slab piles as employed for the repair of old timber piers and piles at Southampton, Cowes, Ryde, and Portsmouth. The description of the central heating and lighting plant at the United States Military Academy is continued.

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Correspondence

[The Editor will not be responsible for the opinions expressed by Correspondents.]

The Conference on Taxation of Land Values.

Sir,—The land tax proposals in the Budget will, if adopted, so seriously affect all classes of property owners that it is incumbent upon all to make their opinions known without delay.

Anticipating the proposals of the Budget, the Council and committee of the British Constitution Association passed the following resolution on April 23 last:—

"That this meeting is strongly opposed to the suggested taxation of land values for the following reasons (among others):—(*a*) It would single out for taxation a class of property owners who already bear more than their fair share of imperial and local burdens; (*b*) it would impair the security of all mortgagees of land and owners of ground rents, among whom are the great friendly societies and other provident institutions; (*c*) it would unnecessarily disturb and dislocate land business throughout the country, and impose increased expense and possible loss on the large class of persons who have borrowed on the security of their landed property."

The resolution unanimously passed by the largely attended Conference of Representatives of Organisations connected with Land on Friday last was in the following terms:—

"That this Conference hereby resolves in regard to the land taxation proposals of the Budget:—(1) That they are unjust, because they would penalise certain sections of the community for the supposed benefit of others. (2) That they are impolitic, because they are calculated to provoke resentment on the part of those thus imposed upon, in the same way as did the levy of ship money in the reign of Charles I. (3) That they are economically unsound and calculated to impair the security of all property, and, through property, of every trade and industry in the country. (4) That a committee be appointed to prepare and present to His Majesty's Government a memorial urging the Government to withdraw the land taxation proposals. (5) That the committee consist of one representative from the Surveyors' Institution, the Society of Architects, the Estate Agents' Institute, the Central Land Association, the Central Chamber of Agriculture, the Metropolitan Public Gardens Association, the Auctioneers' Institute, the Incorporated Association for the Protection of Property Owners, and the executive officers of the British Constitution Association, with power to add to their number. (6) That the Conference at its rising stand adjourned to a time to be fixed by the committee to consider the reply of the Government."

We shall be glad if you will allow us, on behalf of the British Constitution Association, to inform your readers that all professional, trade or other organisations are invited to appoint four representatives to attend the adjourned meeting of the Conference, which will be held to consider the reply of the Government to the memorial and at which Lord Balfour of Burleigh will preside. Organisations agreeing with the resolution passed by the Conference are requested to so inform the hon. secretary of the Conference, in order that such agreement may be embodied in the memorial.—We are, &c.,

Avebury.
William Chance.
Percy Wyndham.
J. St. Loe Strachey.
C. F. Ryder.
S. Hutchinson Harris.
Wilbraham V. Cooper.
Mark H. Judge, Hon. Sec. to the Conference.

23 Charing Cross, London, S.W.: May 21, 1909.

Bishopstone Church, Wilts.

Sir,—The following notes on this church, of which you recently published a sketch, may interest your readers. They are based on information for which I am indebted to the courtesy of the Rector, the Rev. Archdeacon Lear.

The church, which is one of the most interesting village churches in the South of England, is dedicated to St. John Baptist, and is cruciform with a square tower at the crossing. The south transept shown in the sketch is vaulted, as is the choir, and the tracery is of unusual type, occurring as it does below the arch springing, and being quite Flamboyant in type. The small building against the gable wall is not as might be imagined a porch, having no entry into the transept, and its use has been much discussed by archæologists without finality. The Rector thinks, after much search, that it was erected simply to get decorative effect, and if this be so it seems to me to deserve to be called unique. It is beautifully groined, and is covered with a stone roof. The building was measured and described by Owen Carter, and the result published in Weale's "Quarterly Papers on Architecture," vol. 4.

All the work shown in the sketch is of the date of Edward III., and is of great beauty of workmanship. It was in the gift of the see of Winchester, and William of Wykeham presented the living in 1379 to John of Wykeham.—Yours faithfully,

E. Godfrey Page.

2 Old Serjeants' Inn, Chancery Lane.

Norfolk Reeds as Roofing.

Sir,—I have applied to the Welwyn Rural Council to ask if I can cover a house with Norfolk reeds, such as used in Norfolk, and they answer by saying that at the present moment they cannot see their way clear to grant my request.

In the neighbouring counties, Bedfordshire has no objection to the reeds being used, or Cambridgeshire; they are also allowed at the Garden City, Letchworth. I am afraid the Welwyn Rural Council are not of an artistic mind. They have some cottages in their own district covered with straw thatch.—Yours faithfully,

F. Newton.

94 Tilehouse Street, Hitchin.

[The Welwyn Rural Council appear to be unaware that Norfolk reeds are less inflammable and more sanitary than straw thatch, besides being preferable from an artistic point of view.—Ed.]

GENERAL.

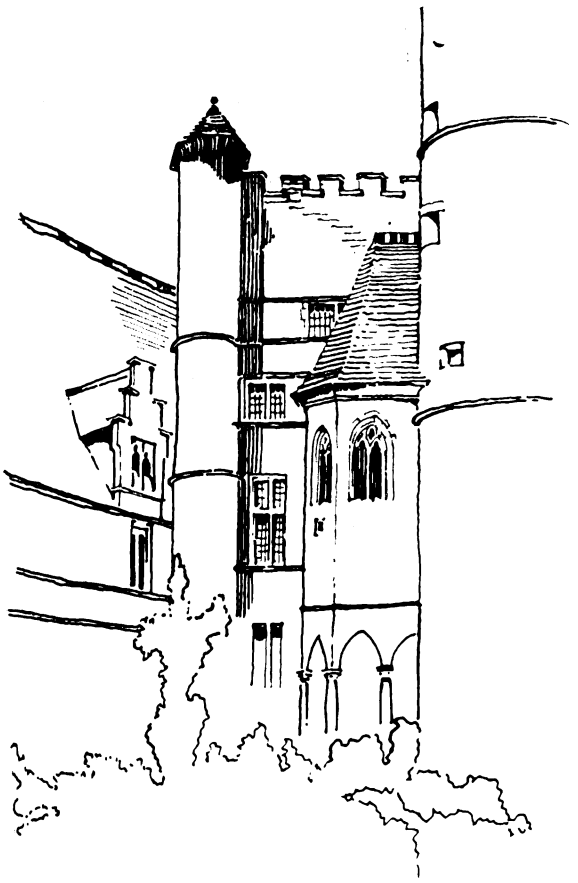
Mr. R. G. Thomas, architect, died last week at his residence, Victoria Hotel, Menai Bridge. Mr. Thomas, who was sixty-two years of age, nearly a fortnight previous went up a ladder to the roof of the hotel to examine some repairs, and, the ladder being too short, he overreached himself and fell a distance of 30 feet, sustaining injuries from the effects of which he died.

The Newcastle Board of Guardians have received a letter from the Local Government Board with reference to the plans of the proposed extensions to the hospital. A few alterations were suggested by the letter. The estimated cost of the alterations was 18,000*l*. It was agreed that the plans be forwarded to the Local Government Board for approval.

The Royal Geographical Society at their anniversary meeting on Monday passed the following resolution:—"That in the opinion of this meeting it is desirable to build or purchase a house or site elsewhere, or to rebuild, enlarge, or remodel the existing house; that, if the funds admit, a hall, to be called the Explorers' Hall, designed both to commemorate explorers and to serve as a meeting place for the Society, should form a prominent feature in the new or rebuilt house; and that, even if no other step be taken, a building fund should be created for accumulating capital for these purposes."

The Secretary to the Treasury, as representing the Commissioners of Woods and Forests, was asked last week whether his attention had been called to the fact that while royalties on slate quarries on Crown property in North Wales are between 2*s.* 10*d.* and 3*s.* 5*d.* per ton, the average royalty on quarries on private property is between 2*s.* and 2*s.* 6*d.*, and whether he would have an inquiry made into the scale of royalties on Crown property. Mr. Hobhouse, in a printed reply, said the Crown royalties on slates are in nearly all cases charged in the form of a percentage on the sums realised by the sale of the slates. Consequently they rise and fall with the fluctuations of the market, and when prices are low leases get the benefit of an automatic reduction. The whole question of royalties on the principal Crown quarries in Carnarvonshire was very carefully and thoroughly gone into by the Commissioners of Woods five years ago. The case of each quarry was considered and dealt with on its own merits. Considerable concessions were made, and the lessees united in expressing their appreciation of the fair spirit in which their applications had been met.

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RUE DU SÉMINAIRE, GHENT.
From a Sketch by BANISTER FLETCHER.

THE WEEK.

THE important memorandum by the Council of the Surveyors' Institution on the Budget proposals for the taxation of land, and the deputation from the Institution, received by Mr. C. E. H. HOBHOUSE, Financial Secretary, in the absence of the Chancellor of the Exchequer, ought to enlighten the minds of the Government, and particularly that of Mr. LLOYD GEORGE, as to the effect upon landed property of the proposed taxes. No society in the kingdom is better qualified than the Surveyors' Institution to estimate the effect of the Budget proposals upon landed property, whether developed or undeveloped, upon ground rents and leaseholds, upon mining royalties, actual and prospective. We give elsewhere the text of the memorandum which formed the subject of the representations made by Mr. A. R. STENNING, F.R.I.B.A. (President of the Surveyors' Institution), Mr. HOWARD MARTIN (Past President), Mr. J. K. SABIN, Mr. HERBERT SMITH, and the Secretary (Mr. ALEXANDER GODDARD), who formed the deputation.

THE Dean and Chapter of Chichester Cathedral are appealing for funds for the further repair of their church, and accompany with their appeal a report on the progress that has been made during the last four years and on the work that remains to be done. The repointing of the exterior, which was commenced in 1902, has been in progress ever since, and has been completed from the south transept eastward and round to the north-west tower, thus leaving the west front, the south-west tower—which needs more repair than merely repointing—and the south side of the nave and chapter house. Since the Executive Committee last reported, four years ago, the detached campanile or bell-tower has been thoroughly repaired at a cost of 2,300*l*.

TROUBLE has occurred in the vaulting, the penultimate bay of the nave at the west end having developed serious signs from an old crack. This local fault has been dealt with, the loose, disintegrated, and cracked chalk ashlar has been pinned up, and the rib stones properly secured. The outbreak of this trouble has caused the architect to advise an immediate careful examination of the whole of the vaulting of the nave and choir, so that any defects may be remedied before they become serious. This is the proper course for custodians of our ancient cathedrals to adopt, careful and frequent examination and prompt repair of small defects before they become great. Compared with this, the completion of the pointing and the repair of the west front, though urgent, are less immediately so. The renewal of the lead roof is another matter that should be attended to at an early date, and for which funds may well be specially contributed by lovers of Chichester Cathedral, although the work is, in the opinion of the architect, not pressingly urgent at the moment. It should not, however, in our opinion, be too long delayed, as a leaking roof over chalk vaulting is clearly a condition that invites serious disaster. The requirements of the Dean and Chapter of Chichester are so moderate, compared with those of some other cathedrals, that we hope all cause for anxiety will speedily be removed by an ample and prompt response to their appeal.

THE Council of the Cardiff, South Wales, and Monmouthshire Architects' Society has done well to protest against the resolution of the City Council of Cardiff to entrust the design of a new school to the city engineer. The small amount apparently—and only apparently—saved, in architect's fees by the carrying out of such specialised work as school planning in an official department is quite unworthy of consideration in a matter of so much importance to the health of the children and the efficiency of their education as the provision of the absolutely best and most up-to-date school buildings. It is ludicrous to suppose that an engineer's assistants, working overtime, and therefore presumably overtaxed, can produce plans for schools that can in any way compare favourably with those of architects who have given years of study and gained large experience in this by no means simple branch of architectural practice. It may appear to an ordinary councillor that it is an easy matter to design a school, and so it is, of sorts, but it is far from easy to design the best possible school for any particular case.

THE case of BROWN *v.* Llandovery Terra Cotta, &c., Company, Ltd., is important for those who may be called upon to act as arbitrators. In a dispute between JOHNSON, Ltd., and the defendants, Mr. BROWN was appointed arbitrator on behalf of or by JOHNSON, Ltd., and Mr. NORMAN on behalf of or by the defendants. These two arbitrators, having failed to agree, referred the dispute to Mr. SMART, as umpire, and he, in his award, ordered the defendants, the successful party in the arbitration, to pay the charges of Mr. BROWN, but left Mr. BROWN to recover those charges from the defendants. The arbitration was subject to the Arbitration Act, 1889. Mr. Justice SUTTON, who tried the action, in his judgment said:—"Whether or not the plaintiff is entitled to recover depends upon the question whether there is an implied promise by the parties to the submission jointly to pay the arbitrators and umpire for their services. I think this question must be answered in the affirmative on the authority of 'CRAMPTON and HOLT *v.* RIDLEY & Co.'" The learned judge therefore gave judgment for Mr. BROWN, the plaintiff.

THE value of a "holy well" as an asset of a mediæval church is strikingly illustrated by the instance of the discovery in 1872 of what are generally believed to have been the remains of the church of S. Cesario in Palatio, a small fifth-century building, which the famous Italian archæologist, Commendatore BONI, is now exploring. A well, of evidently Republican date, has connected to it a staircase of the same date as the church. Holy wells of high reputation existed in Greek lands, in Rome, and in other parts of Europe, even as far west as Ireland, in pagan times, which were afterwards adopted by the astute churchmen of the middle ages as suitable adjuncts to the site of a Christian church and as a good attraction for pilgrims.

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ARCHITECTURE AT THE ROYAL ACADEMY.—III.

COMING now to the section of the Architectural Room devoted to drawings of buildings for scholastic or other educational purposes, we find that there is not comparatively so large a proportion of noticeable designs as in other sections. The requirements of modern schools necessitate a considerable number of rooms of nearly, if not quite, the same size and more or less of the same pattern; hence it is difficult without forcing for an architect to design a school building in which repetition of treatment is not conspicuous.

The first drawing numbered in the catalogue is a "Hostel for Women Students at the Birmingham University," by Messrs. H. T. BUCKLAND & E. H. FARMER, which is a large house on an H plan, in which a domestic character is maintained without too much idea of an institution. "Wantage Hall, University College, Reading: Interior, Great Hall," by Mr. C. STEWARD SMITH, as shown in the perspective, appears principally to consist of a hammer-beam roof too large for the height of the walls on which it is supported. Mr. ARNOLD MITCHELL'S "Agricultural Buildings for the University of Cambridge," though lacking any feeling of the local spirit of our older Universities, is dignified and restrained, and, as shown in the coloured pencil elevation, is of stone and purple brick. We hope the colourist has taken artistic license in his delineation of the colour of the bricks. Mr. W. D. CARÖE'S design for "The Library, University of South Wales and Monmouthshire," like most of that architect's work, is overdone with detail, though far less so than has been the case in the past. In fact, the buildings here shown are quite dignified by comparison with some of Mr. CARÖE'S previous efforts, and would be still more so if the meaningless pilasters carrying nothing but inverted trusses were omitted.

The buildings designed for the "Village in the Elan Valley, Wales," by Messrs. H. T. BUCKLAND & E. H. FARMER, are very picturesque in grouping and unaffected treatment of stone and slate. Mr. AYLWIN O. CAVE'S "Secondary School for Boys, Maidenhead," is an unsuccessful competition design, of which it is difficult to appraise the merits without a plan. As far as the perspective shows, the chief feature of this is the placing of class-room blocks at right angles to each other, with other buildings—possibly the central hall—between, a disposition that makes for picturesqueness even if not leading to good planning.

Mr. HENRY T. HARE'S "University College of North Wales, Bangor," shows in an excellent water-colour drawing a stone building of Tudor domestic or college type, picturesque and yet dignified. Although not scholastic, "A Georgian Dining Hall," by Mr. H. DAVIS RICHTER, is hung in the educational section. It is rather too gorgeous for anyone but a South African or Chicago millionaire, who might be expected to appreciate a dining-room called "Georgian" and costing a lot of money. "The Coopers' Company's Schools, Bow," by Messrs. T. P. FIGGIS & A. E. MUNBY, is a good design, gaining much in its impressiveness by the circular colonnade in front of the quad, around which the school buildings are disposed.

Mr. PAUL WATERHOUSE'S beautiful drawing of "A Design submitted for the Eton Memorial" shows the detail of a part only of a beautiful and scholarly design. "A Design for Ruskin College, Oxford," by Mr. C. STEWARD SMITH, is a bird's-eye view of an interesting and well-grouped block of buildings. Messrs. SPALDING & SPALDING and E. G. THEAKSTON have contrived in their "High School for Girls, Stockport," to combine picturesqueness with formality in a manner that seems to us the most suitable line of effort for the designer of a school. "Newlands, Congleton," by Mr. REGINALD T. LONGTON, is out of its place in this section, being a simple and refined picturesque house, but it just happened to fill a gap in the hanging space, though being a small drawing it must, of course, be hung on the skirting, as near the floor as possible.

Professor F. M. SIMPSON'S "Physiology Institute, University College, University of London," is a scholarly and refined detail drawing, shown in a tinted elevation. Mr. BURKE DOWNING'S "Bromley Boys' Secondary School" is a beautiful drawing of a well-grouped symmetrical design of the formal picturesque type that we have already commended as the most appropriate treatment for a school. Mr. EUSTACE C. FRERE'S "Additions to All Saints' School, Leyton," is an example of the way in which a skilful draughtsman can make a pretty water-colour drawing of a quite uninteresting building.

We now come to the section of the exhibition in which domestic work is collected, and first notice Mr. L. ROME GUTHRIE'S "Gardens at Chetwood-Vetchery," a well-drawn bird's-eye view of a good scheme of formal garden design. Mr. EDWIN L. LUTYENS, in his "New West Wing, Temple Dingley, Herts," and his "Garden View of a House at Ilkley," gives us examples of the way in which he is always trying for new effects, but is not always successful. "Lytes Cary: Restoration," by Mr. CHARLES E. PONTING, is so good a restoration that one cannot tell what is new and what is old, so well has the character of an old west-country manor-house been preserved. Mr. EDWARD J. MAY'S "House on the Hindhead, Surrey," is like Mr. MAY'S work in general—quiet and excellent, with its tile-hung first floor and tile roofs. "Great Roke, Witley, Surrey," by Messrs. H. T. BUCKLAND & E. H. FARMER, is a big house and a good example of the manor-house type of mansion.

"The Hall, Putteridge Bury, Herts," by Messrs. ERNEST GEORGE & YEATES, is an interior of the character with which the President of the Institute has made us familiar. "The Knoll, Leicester," by Mr. WILLIAM H. BIDLAKE, is twice shown and is a good red brick and stone house of Tudor type, thoroughly typical. "A Country House," by Mr. J. E. DIXON SPAIN, is a quite modern twentieth-century design, completely an antithesis to Mr. BIDLAKE'S work, symmetrical and quaint in its use of rough-cast and brick. Mr. DUDLEY NEWMAN'S "Design for the Restoration of Fulbourn Manor, Cambs.," is a coloured perspective of a quite remarkable house, interesting both in plan, in grouping, and in detail. "Tuesly Court, Surrey," by Mr. E. GUY DAWBER, is an example of a building of local stone with tile roofs, brick dressings and chimneys that is quite refreshing.

Mr. REGINALD T. BLOMFIELD'S "Whittington, near Great Marlow," is a stately red-brick house with a central composition in stone of pediment and pilasters in typical English Renaissance manner, the central note being carried into the red brick portion of the building by stone quoins &c. Messrs. SILCOCK & REAY'S "Churchill Cottage Homes, Somerset," is a charming group of almshouses round three sides of a quad. "Worplesdon Golf Club-House," by Mr. ARTHUR A. MESSER, is a one-storey group of buildings with a picturesque roof treatment, eminently suitable for its purpose.

Mr. JOHN BELCHER'S "Lew House, Bampton, Oxon," and "Tatmore Place, Herts," are pictures of a prevailing greenish tone of which the buildings are almost too unimportant a part. Architects' illustrations of their designs are usually too much building and too little else to be pictorial. In attempting to avoid this fault Mr. BELCHER'S draughtsman has rather gone to the opposite extreme. "Ardenbrun Place, Surrey: the Entrance Porch," by Mr. ERNEST NEWTON, is a good piece of richly-treated detail in stone, the central feature apparently of a red brick building. "Headlands, Limpsfield," by Mr. ARTHUR KEEN, is at first sight a house without windows, but on a second glance one realises that it is the northern aspect. The use of gables without windows in them is, though not strictly defensible, a picturesque treatment of roofing that would otherwise have been rather awkward to plan without a considerable expanse of flat. "Twelve Cottages, Erskine Hill," by Mr. W. HENRY WARD, is a group of small houses at Hampstead for the Co-partnership Tenants, Ltd., and an interesting example of what can be done to infuse artistic design into what otherwise is but a piece of speculating builder's work.

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ARCHITECTURE: ITS TRUE PRINCIPLES.—XI.

By R. OWEN ALLSOP.

THE POWER OF SIMPLICITY.

THIS is putting us right in domestic architecture. The sense to perceive that all that is affected, assumed—all that is not *perfectly natural*—has been the notable advance made in modern work. The works of our most respected present-day architects are characterised by the disappearance of sham—sham purpose or material, or method. Simplicity insists that no style should be followed for the sake of its characteristics.

Simplicity cannot lessen the need for brainwork. It rather makes this more urgent. The spirit of simplicity may be likened to order in its origination out of disorder. The disorderly heap is complicated, work is required to produce a simple state of things. To be simple is to be natural, and once this great truth is lost sight of, a world of difficulty has to be faced in recovering the true way.

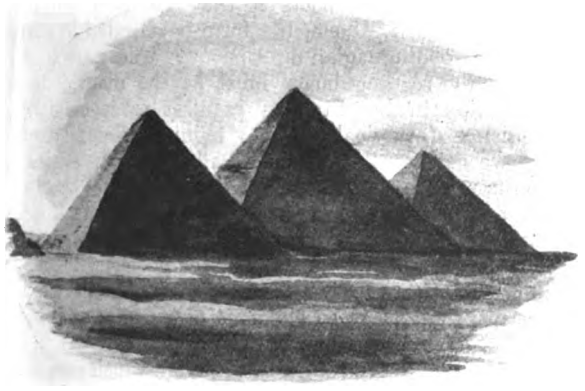


FIG. 25.—THE PYRAMIDS.

Simplicity is always effective, for the reason that the main theme, motive, or idea is kept clear. The greater the thing the greater the simplicity—the plain spherical (practically) world, the broad ocean, the round moon, the sun, the star points, the impressiveness of the trackless desert.

The demands of simplicity require that, of two ways choose the most straightforward. It is not, as we have endeavoured to show, that simplicity does away with or in any way is a substitute for brain work. It is rather its outcome. The way of simplicity is lighted by the lamp of truth, so that RUSKIN does well to treat rather simplicity as an effect than a root cause or principle. Nevertheless, one may be complex and complicated without dishonesty or sham, so that it is just as well that the nature of simplicity in architectural design and composition should be a little investigated on the lines assumed—that it may be designated a root principle or law.

Simplicity in massing and grouping is always pleasing, and it is so because it conveys a sense of straightforward honesty. The reverse impression attends greatly varied and complicated massing. The highly involved parts of many Eastern compositions are suggestive often of weirdness. Simplicity of plan suggests a clear head, arising doubtless from an impression of the presence of a high sense of order. It requires the exercise of much thought, if practical service is to be satisfied as well as æsthetic effect. Patching on "anyhow" is not simplicity—unless it be the simplicity of imbecility. The quality of simplicity is as pleasing in the building as in the man—to know the purpose and intention clearly, instead of being mystified and rendered suspicious by concealment, suggestive of underhand motives and ulterior unrevealed designs. Simplicity is correlative of, and leads to, unity, supposing a single eye and pureness of intention.

There is nothing about this principle, or attribute, of simplicity that induces tameness and insipidity, neither is it opposed to novelty and originality. Quite the reverse; if any practical service requires a novel arrangement not in accord with conventional treatment, let the opportunity be made the most of whether or no it seems orthodox. It is depressing to think of the many wasted opportunities attending compositions that would have secured novel and striking effects had the designer followed the suggestion thus thrown in his way. Yet he generally wipes out this chance because, forsooth, it is not in accordance with what others have done under similar circumstances and conditions. The law of simplicity says, "Be natural"—that is, take your opportunity—do what is required and do it boldly. Accept the course of events; follow up the chain link by link. It is only as this is done that perfect natural method is secured; and to be natural is to be simple.

We know what the simple roof mass has done for recent architecture. In the lines of main and secondary roofs lies the cause of much architectural effect. The mole-heap principle of packing on roofs here and there is the outcome of an ill-considered rambling plan, is not simplicity; it is rather barren nakedness of thought and idea and lack of trouble to simplify main outlines or plan, and of general mass arrangement. It is good to simplify roofs both for constructive reasons and for artistic effect. In all cases the demands of simplicity are that four parts shall not be arranged where all purposes are supplied by three—that is to say, that there be no needless multiplication of parts. This is in accordance with the requirements of good practical planning—that the various rooms and apartments required may be formed into the minimum number of masses, each mass as compactly arranged as possible. A plan must be compact, as distinct from rambling, and masses of building must be compact as distinct from the "happy-go-lucky" in their general relation the one to the other.

The motto of the Architectural Association is good so far as it goes, but it suggests PILATE'S question, and, further, "What is beauty?" In matters of architecture, perhaps, we need not greatly puzzle over the nature of truth. The ways of deception are so very apparent that all the main elements of building truly are, generally speaking, self-evident, and he must be very dead indeed to all sense of fitness who cannot nowadays avoid designing and construct that which is essentially false. The essence of deception is the intention to deceive. Therefore one must go very far indeed out of one's way to

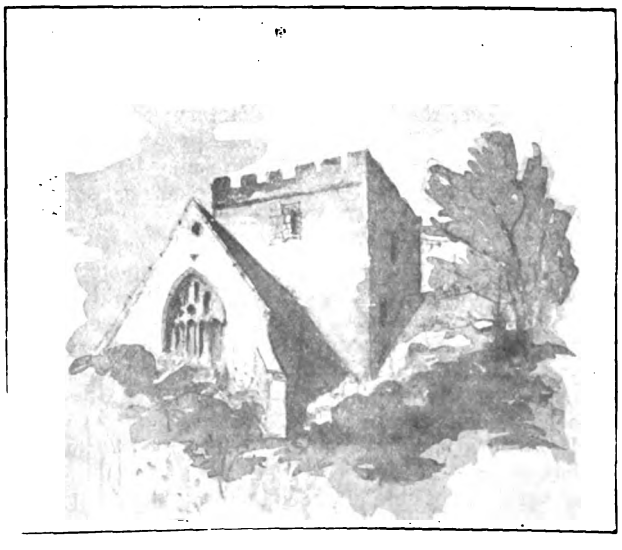


FIG 26.—POYNINGS.

create in a building the truly false. The simple design can never deceive. Truth is the first essential of simplicity—for simplicity is rather a compound of other attributes or quantities.

There is always this one satisfactory attribute to a natural design—it cannot offend; offence comes from affectation. The affected design cannot but displease equally with the affected person. Neither appear what they really are.

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The advertisement artist knows—better than the architect apparently—that that which most powerfully attracts the eye is not elaboration of design, but the simple object—circle, square, or diamond. The cube is ever old, but always new. From the same fundamental cause the Pyramids hold the eye. The simplicity of mass of an old village church, such as Poynings, Sussex,

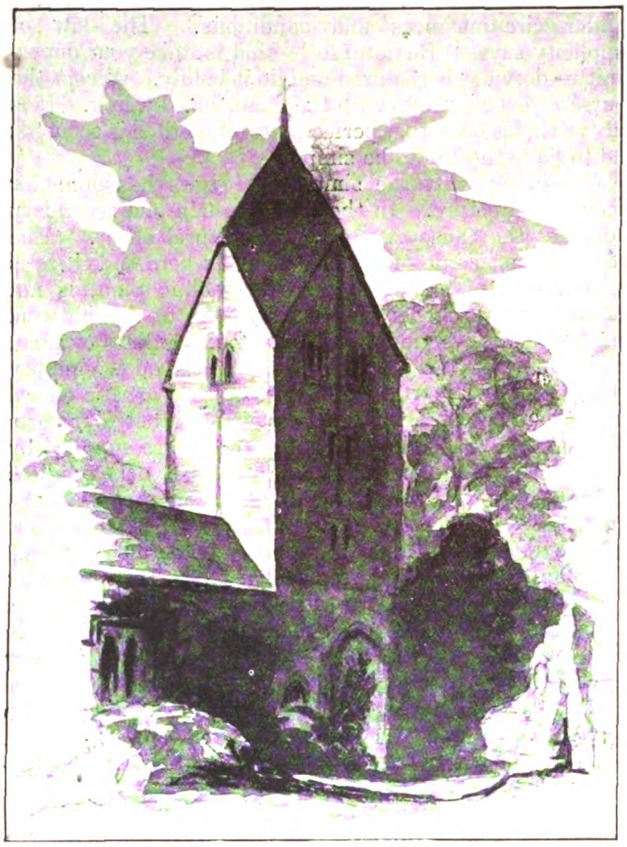


FIG. 27.—SOMPTING.

ensures dignity of effect. The tower of Sompting Church commands our respectful attention, where, often, elaborate form may repel. Against the north transept of St. Nicholas, Caen, is reared an object that powerfully arrests attention, because capped with a simple, elemental form of geometry—the cone.

It might reasonably be argued, in view of the stress laid on the necessity for geometrical simplicity of mass, that, therefore, the bald, square factory, the plain brick mill, barn, or skyscraper, must constitute the most excellent in architecture. In all these may be found that which may, in one view, be termed geometrical simplicity of main mass.

The suggestion, however, is not that the bald, naked cube, or other rectangular figure of solid geometry, should necessarily appear as such, but that they should form the basis or framework, so to speak. We may feel assured that, in one sense, it is this geometrical simplicity of the factory and like building that is the main source of their offensiveness and the prime cause of what we usually term hard, engineer's architecture.

If it were literally true that what we require is to exhibit a plain geometrical solid form, there would be little variety possible in architecture, since all would produce simple rectilinear and rectangular or other elemental forms of geometry, giving plain, hard outlines. Our view is that the geometrical basis should be to more elaborate architectural form, that which the frame is to the picture; to the end—for one thing—that the variety and play of form, in minor parts, should be enhanced by the simplicity of the skeleton mass; for, whatever Eastern taste may indicate, we here full well understand that highly varied curvilinear form in main masses vulgarises like forms employed in subordinate parts. That is to say, onion and bulbous domes and curved complexity of outline in main masses detracts from the value —as contrasted enrichment—of curvilinear outline in details. This is sufficiently self-evident, and it is not necessary to journey East to find multitudinous examples of congealed discord of this nature.

The severe rectangularity of a picture-frame enhances the value of varied and broken lines and surfaces in the picture. It might possibly be argued by the uninformed that what we require as frame for a picture of broken light and shade and line would be something to "harmonise," and least of all severe rectangularity and squareness. The truth, we know, is the other way about. Similarly, our view holds that the basic form of a building being square and rectangular, or otherwise geometrically regular and simple, this, in three-dimension matters, sets off as contrast and relieves more ornamentally varied form. The comparison—contrast—between picture and frame concerns matters of two dimensions; hence, in solids, the contrast—comparison—must be between forms of three dimensions. If we carve a small shamrock form on a similarly shaped solid trefoil mass, the smaller is killed by the larger; whereas by cutting the form on a plain cube we have the full value of relief and contrast. What boots it that we have delicately voluted capitals if, above, the form is repeated in coarse scrolls of Brobdingnagian dimensions? There are several reasons why rectangularity must be the main form of mass architectural. Stability requires perpendicularity. Convenience (practical service) requires rectangularity. Hence we get parallel, vertical walls and right angles at the commencement from (1) the necessities of practical service and utility, and (2) from the requirements of well-building—the scientific side of architecture. Again, it may be laid down that the simpler the geometry the more sublime the effect; for we may truly consider the simple figures of geometry to be elements of eternity, or at least to have been predestined from the beginning.

That principle of architectural design which rules that effect should be obtained by decorating construction, as distinct from constructing ornament, we all at this time admit as sound and far-reaching; but there is possibly a further rule—that we should enhance and render inter-

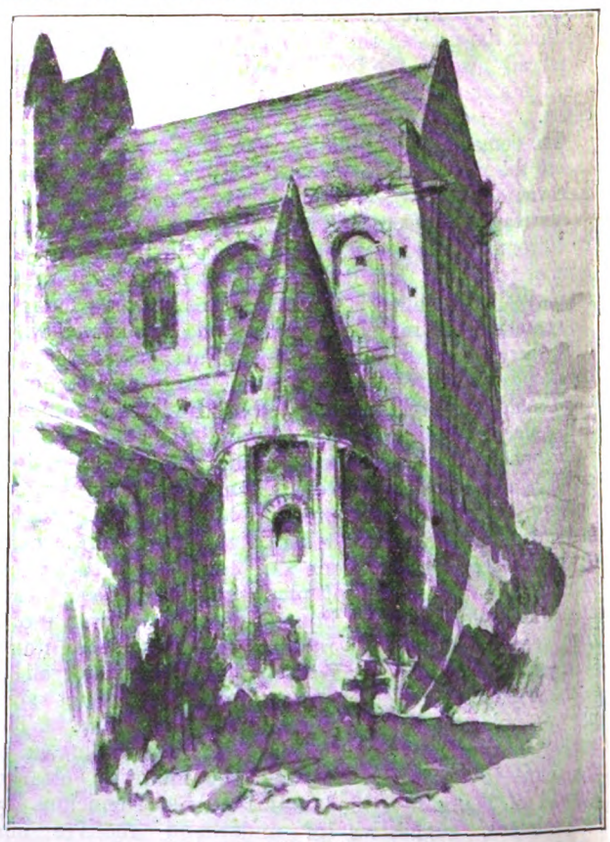


FIG. 28.—ST. NICHOLAS, CAEN.

esting and marked the geometrical basis. Crudely, this principle is exemplified in the practice of illuminating buildings, as where rows of lights run along cornices and round pediments, and in practical architectural design by putting piers at angles and cornices along upper edges. It is the idea that seems to impress us in the simplicity of a city lying "four-square," yet aglow with emerald,

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sardius, and topaz. If a façade were primarily broken into varied masses, the row of buttresses could be vulgarised, whereas, breaking out of a regular superficies—the straight wall surface—they are enhanced by contrast. The simplicity of the geometrical basis here stands, in a sense, as the plain frame to the varied picture. The main idea seems to be to preserve the geometrically regular mass form. It may be broken into, as by a great recess, or added to, as by a portico, but the great lines—whether or no such lines are actually presented to the eye—should be preserved. Buttresses at angles may hide the cubical or other rectangular mass, and divisions break up great *surfaces* and small, so that the original geometrical framework practically disappears. The idea, roughly here expressed, seems to suggest that which is the essence of the principle: to break up the geometrical harshness and baldness, not by destroying the fundamental basis, but by subordinate additions and subtractions. In the beautiful campanile of St. Paul's Cathedral we are impressed by the simplicity of the geometrical basis and the regularity of main masses. The elemental forms are simple—the square and circle primarily; and there is a bell at the summit. Yet they do not appear in their baldness, being softened and toned by subordinate parts. One cannot look up at the belfry stages without observing the elegance that arises from contrasting (by position) and emphasising—as by bold cornices and the like—varied geometrical forms themselves quite simple. For all regular, rectangular, and cylindrical forms, however proportioned, must be considered simple and elemental, the simplicity varying only in degree.

Stable construction is necessarily based on mathematical considerations. Geometry is based on mathematics. Hence, decorating construction and decorating geometrical form, in architecture, are ideas having much in common.

(To be continued.)

THE CONCRETE INSTITUTE.

THE fifth general meeting of the Concrete Institute was held at the Royal United Service Institution, Whitehall, on May 27. Mr. F. E. Wentworth Shields, M.I.C.E., the chairman, in opening the proceedings, said that he had to announce that Mr. Hatch was unable through illness to preside. The membership of the Society had now reached the satisfactory number of 740. The continued growth was an indication that the good work accomplished by the Institute was becoming more and more recognised by the various professions. Mr. H. K. C. Bamber, F.C.S., then read a paper entitled:—

Some Notes Relating to the Setting of Portland Cement, with Description of Methods Adopted for Regulating the same.

The author began by stating that his object in writing the paper was to give to the members of the Concrete Institute a short *résumé* of some of the results of research work in this direction done by manufacturers and others, more especially as applied to the more modern methods of manufacture.

He purposely gave the practical side of the question the pride of place, as the interests of the members of the Concrete Institute, and, in fact, all users of cement, were more concerned with this branch of the investigation than with the other. It mattered little to them what the exact formula might be representing the composition of the ingredients and their combination in the finished product so long as they had at their command a material which could be used under all conditions of their work, and positive information from the practical results of competent investigators in this field of inquiry as to the best methods to be adopted by the engineer and other users to insure successful work in the sometimes difficult conditions under which this work had to be carried out.

He did not propose to express any new theories, but in order that it might be seen how indefinite the present real scientific knowledge of this difficult subject was, and what insufficient and contradictory data the cement manufacturer had at his command when embarking on any practical experiment based on scientific theories, Mr. Bamber shortly referred to those which existed, and were most accepted at the present time.

It was well known that for the best cement the total percentage of lime (CaO) present, as found by analysis after decomposition of the various silicates and aluminates by solution and subsequent separation, was confined to very narrow limits—*i.e.*, 63.5 to 65 per cent. The amount of silica (SiO_2) varied from 21 to 22.5 per cent., and alumina (Al_2O_3) from 5 to 6 per cent., so that whether the ratio of lime to silica was calculated on a percentage basis or in accordance with chemical equivalents, it approximated 2.8 parts lime to 1 part silica, the formula for which, without assuming any definite combination, might therefore well be written as $3CaO \cdot SiO_2$, leaving approximately the lime required in combination with alumina to form dicalcic aluminate, and any attempt to vary this ratio to any extent resulted in a material which had not the good properties of, and could not be designated as, a true Portland cement.

The percentage figures he had mentioned of 63.5 to 65 per cent. of lime might appear to many who were accustomed to the old specifications for cement, placing a maximum of 61.5 per cent. for lime, to be high, but many analyses of pure clinker taken from such kilns as were used for the old methods of manufacture, and which were presumably producing cement within that apparently low limit, showed that for years the higher figure had been the percentage in all good cement clinkers, the actual fact of its presence in such quantities in the ground cement in part being cloaked by the accidental introduction of extraneous foreign matter derived as an uncombined residue from the fuel used for calcination.

These facts were mentioned, as they had an important bearing on the setting properties of cement.

Like the constitution of Portland cement, the theories as to the setting were also somewhat vague and uncertain; but it was generally assumed that the action was brought about firstly by the hydration upon the addition of water and subsequent crystallisation of the calcium aluminates present, which occurred with great rapidity, constituting what was known technically as the "initial set," causing cohesion of the mass of cement and the intermingled aggregate. This was followed by the hydrolysis of the calcium silicates, the latter being slowly decomposed and broken down into the more simple form of mono-calcium silicate, with the consequent liberation of calcium hydrate ($Ca(OH)_2$), which being in excess of that required to form a saturated solution partially crystallised out—this cycle of operations continuing over long periods during the hardening of cements.

These, then, were the hypotheses, correct or incorrect, which guided the cement manufacturer embarked on a field of investigation, or with which he endeavoured to explain the various phenomena which presented themselves from time to time during the course of manufacture.

The time allowed for consideration of these matters would not permit of a complete exposition of the many problems that confront the manufacturer, and it was proposed, therefore, on this occasion, to deal only with some of the points that arise in connection with the retardation of the setting time in order that the latter might be brought within reasonably controllable limits, and to endeavour to explain the irregularities that were sometimes found when testing the setting time and the soundness of present-day Portland cements.

A thoroughly well-made Portland cement clinker, ground to normal fineness, was always very quick-setting, almost equal to that of plaster of Paris, but this property of rapid-setting could be somewhat delayed by mixture of other foreign substances, as was done accidentally until recent years, and in fact yet continued, with cement manufactured on the intermittent kiln system, now being rapidly superseded. By this method dry material of uniform and correct composition was calcined by mixture with from 40 to 45 per cent., or even more, of its weight of coke and coal, the ash from the fuel—about 12 to 15 per cent. of the weight of the fuel used—remaining mixed up with the calcined clinker. In most cases this foreign matter alone had the effect of prolonging the setting time some few minutes, but portions of the clinker removed separately and free from the fuel ash when ground to powder set almost instantaneously upon the addition of water, with disengagement of considerable heat due to the rapid chemical action.

It was difficult to satisfactorily explain why the admixture of the fuel ash should have the effect of retarding the setting time somewhat, unless it was that it contained an amount of sulphates derived from the oxidised sulphur compounds originally present in the fuel used, and these sulphates having a similar effect on the cement as the addition of a similar amount of gypsum—or it might be that owing to the less perfect burning of cement in the

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past cement always contained free lime in the amorphous, as distinct from the crystalline condition—this lime was quickly dissolved in the water used for gauging, which, becoming saturated, prevented the solution of the calcium aluminates, and thus somewhat retarded the set.

During recent years, and upon the introduction of new methods, more particularly that of the rotary kiln, none but this pure character of clinker was produced, containing practically no free lime in the amorphous condition—the system being such that the ash from the fuel, the latter in quantity being in itself at least 33 per cent. less, to a very large extent passed away with the effluent gases from the kiln. This also applies largely to the sulphur compounds in the raw material and coal, which, being decomposed, passed out of the kiln as sulphurous acid with the other gases. The clinker thus produced was practically pure, and resembled those portions of picked uncontaminated clinker from the intermittent kiln previously referred to, and, like that, had, when finely ground, an almost instantaneous set, and with a lime content on analysis in both cases ranging between 64 and 65 per cent. It was thought that cement manufactured by the rotary process had a quicker initial set when untreated with any addition for the purpose of retardation than had the cement made by the older process; but this had been found to be an entire fallacy, since it was found that the pure uncontaminated clinker from an intermittent kiln was equally as quick setting as the pure clinker from the rotary kiln, the similarity being cloaked by the presence of the foreign matter from the fuel in the older process cement.

The realisation of these facts was not apparent in the early days of the more modern methods, and the manufacturer was faced with what appeared to him at first to be a new difficulty, whereas in reality it was the obvious result of the more careful production of a pure material, which he had been accustomed formerly to manufacture accidentally in a more or less contaminated condition. In ignorance of the above facts it was thought that perhaps the rapidity of the modern manufacturing process—more particularly the cooling down from the higher ranges of temperature of the calcined clinker, which was accomplished in a few minutes after reaching the maximum temperature—might be the cause of the apparently more chemically active condition of clinker manufactured by the rotary process; and very elaborate and costly experiments were carried out, extending over a long period, in which the calcined clinker after passing the clinkering temperature was kept at a red heat for a considerable time before final cooling, imitating, it was thought, the slower action of the old intermittent kiln process.

Unfortunately—like many others—this experiment, although carried out on a practical and commercial scale, either through the difficulty in regulating the supplies of clinker to insure a steady temperature of cooling, or through mechanical difficulties which the operation presented, was of a negative character.

Previous laboratory experiments in this direction had given great promise that more useful results might have been obtained, and undoubtedly indicated that during the calcination of cement clinker there are critical points of temperature of great importance, and well worthy of the careful study of the scientific specialist.

Experiments were also carried out to test the concentrated action of carbonic anhydride upon these various aluminates, this being the principal ingredient in the atmosphere which, together with water, brought about the natural process of aeration of cement. It was found that the aluminates containing the higher proportion of lime were less affected by this treatment with CO_2 than the lower aluminates, which it was thought might be the explanation why rotary cement was less affected by exposure to the atmosphere than cement made in intermittent kilns.

A very considerable amount of research work was done under the author's supervision in connection with the properties of the various calcium aluminates, to which the quick setting property of Portland cement was attributed. As already explained, it was thought that the more rapid cooling of the clinker probably had some chemical or physical effect on the aluminates present, and in order to test this theory the dicalcic, tricalcic, and tetracalcic aluminates were synthetically prepared in order if possible to test their setting properties individually when rapidly or slowly cooled from the state of fusion.

Unfortunately, such investigations were replete with difficulties, and it must not be forgotten that in examining these isolated components of cement their assumed properties when in a pure state might be entirely altered by the presence of other ingredients in cement reacting one upon the other. On the whole, the results in this line of research were of a negative character, but the author mentioned this series as one of many such experiments carried out to indicate the highly scientific class of investigation the cement manufacturer was prepared to undertake to obtain a further knowledge of the properties of the material the manufacture of which was under his control.

Attempts had also been made to reduce the quantities of aluminates present by adjusting the composition of the raw materials, by increasing the silica content at the expense of alumina; but here again only partial success was met with, as it would appear that even small proportions of calcium aluminate present were sufficient to cause a very rapid initial set of the whole mass—in fact, as far as the author was aware in no case, even where the raw materials were such that the calcined clinker contained a high percentage of silicates and a low percentage of aluminates, was the initial set of such cement, untreated with retarders, other than very rapid—in fact, almost instantaneous.

In order to avoid the necessity for the addition of gypsum to the calcined clinker, which until water was added to the cement was present only as a mechanical mixture, it was thought that this addition might be made to the raw material previous to calcination, during which operation it might become evenly incorporated with the whole mass of clinker, but in practice this was found to be quite inoperative as at the maximum temperature of the kiln in the presence of silicates, &c., gypsum incorporated with the raw materials was decomposed, the sulphuric anhydride (SO_3) being evolved and passing out of the kiln with the other gases, the remaining life (CaO) combining with the silicates (clay); the added calcium sulphate in this case only having the same function as the calcium carbonate present, which gave up its carbonic anhydride (CO_2), which escaped from the kiln, leaving the remaining calcium oxide (CaO) to combine with silica and alumina (clay).

Various other suggested methods of prolonging the setting time of cement without having recourse to the mechanical addition of retarders to the finished cement had been attempted, such as the injection of solutions of the alkalies and alkaline earths, and such like, upon the hot clinker during its passage through the cooler, but all these had met with only limited success, the results obtained being in many cases evanescent, and in others creating further mechanical difficulties in the grinding of the clinker, which rendered such processes physically and commercially undesirable.

At the end of the nineteenth century practically all the cement manufactured in the United Kingdom and in Europe was produced by the old method of calcination in intermittent or somewhat similar kilns, the product being a clinker having various degrees of hardness, ranging between the material thoroughly calcined at a temperature above 2,800 deg. Fahr. (at which temperature a thorough chemical combination has taken place), and the material technically known as "half-burn," which latter was practically the raw material from which only the carbonic anhydride of the chalk or limestone and the water of hydration and organic matter of the clay had been expelled. Now it was quite easy to realise, seeing the very complex character of the chemical combinations which were thought to take place at the true temperature of calcination, how difficult, and, in fact, almost impossible, it must be to determine a formula which will correctly represent the chemical composition of even a uniform raw material calcined under such a wide range of temperatures as that represented by 2,800-900 deg. Fahr., at which latter temperature the volatile matters from the raw materials were expelled.

It was equally easy to realise that the physical conditions, and therefore the setting properties of the atoms forming this heterogeneous mixture, must be of a very varying character, depending largely upon the relative proportions of the heavy or more lightly burned clinker, or that of an intermediate character, present in the mass as removed from the kiln; the more heavily burned portions were considered the most valuable, more especially those portions of clinker which had not been contaminated with or fused by contact with the siliceous matter contained in the ash of the fuel; and the product of the present-day rotary kiln, calcined in small particles at a uniform temperature, and in the absence of fuel ash, consisted, as one would expect, almost entirely of this pure clinker. The only methods known to the ancients of retarding the setting time of this heterogeneous mixture of silicates and aluminates was by exposing such cement after grinding to long

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periods of aeration, or by the addition of gypsum in one form or other.

The first process was only successfully applicable in the absence of added gypsum, and the effect of prolonged aeration of such cement was the absorption by the uncombined lime and the loosely combined silicates and aluminates, &c., of water derived from the moisture in the atmosphere, and subsequently carbonic anhydride from the same source. In this manner a considerable quantity of the material became carbonated and inert, depriving the cement of a not inconsiderable portion of its former chemical activity and thus causing a prolongation of the setting time.

It would be seen that such method must be most imperfect in its action and required a considerable length of time to enable the moisture and the carbonic anhydride in the atmosphere to find its way into the interior portions of the heap, by which time the outer portions would be considerably over-aerated and become practically inert.

It would seem that the action of the atmosphere was confined to the loosely combined or lightly burned particles of the cement and that the thoroughly calcined particles were little affected by exposure to the atmosphere at normal temperatures, and this experience seemed to be confirmed from the fact that cement manufactured by the rotary process, producing the pure clinker, when ground without treatment or additions to retard the setting time, would retain its original quick-setting property unimpaired for long periods when stored in bulk. Instances of this had occurred where cement having an almost instantaneous set at the time of manufacture had retained this property when kept in bulk, but otherwise exposed to the atmosphere, for a period of two years.

It would be seen from this that the old method of simple aeration in bulk to retard the setting time could not be applied with any degree of the former success to the product from the rotary kiln, and this would also seem to be evidence that the cement manufactured by the more modern process was of a more stable and reliable character than that formerly put upon the market. A cursory examination of the clinker produced by the two methods would, even to the uninitiated, be sufficiently convincing on this point.

In view of the fact that this simple method of aeration in bulk could not be successfully applied to cement manufactured on the new system, many attempts were made to accomplish the most important part of natural aeration, i.e., the absorption of water, by artificial means, such as passing the ground cement through a moist atmosphere, or by blowing moist air through the cement in bulk. These methods, however, were not found to be wholly successful, firstly, from the physical and mechanical difficulties which presented themselves by reason of the partial setting of the finest portions of the cement, with the consequent blocking of any apparatus used for the purpose, such as revolving drums, distributing discs, conveyor screws, and scrapers, and the like; and secondly, in the author's opinion, for the much more important reason that, in order to accomplish the desired result in a short space of time, it was necessary to submit the cement manufactured by the rotary process (all of which consisted of finely reduced particles of the pure calcined clinker) to a moist atmosphere at a comparatively high temperature, as distinct from the normal temperatures under which all the previous attempts at artificial aeration had been carried out.

In order that this might be accomplished, and the cement submitted to a moist atmosphere at a high temperature, in which the action of the water vapour upon the particles of clinker might be rapid and effective, a process was introduced in which advantage was taken of the peculiar construction of the mills chiefly used for completing the reduction of the cement to a fine powder in enclosed revolving cylinders, known in the trade as "tube mills," which contained as their grinding media a heavy charge of steel balls or flint pebbles.

(To be continued.)

THE NATIONAL GALLERY.

THE report of the Director of the National Gallery for the year 1908 was issued last week.

The most important purchase was "A Family Group," by Frans Hals. This was bought from Mr. A. H. Buttery, acting on behalf of Lord Talbot de Malahide, for 25,000*l*. The vendor was willing to accept half the purchase money in instalments spread over three years, and H.M. Treasury agreed to recommend a supplementary vote of 12,500*l*. towards the purchase on condition that the normal annual grant-in-aid of 5,000*l*. should be suspended for the year 1909-10, and that the needed balance of 2,500*l*. should be raised by private aid. Subscriptions to the close of 1908 amounting to 2,621*l*. have been received, and it is hoped that in view of the forestalment of the next two years' grant-in-aid further help towards this important purchase will be forthcoming.

Two portraits by Alfred Stevens were purchased from Mr. Gamble for 250*l*. each. The "Portrait of Jacqueline de Bourgoyne," by Jan Gossart (1470-1541), Flemish School, was purchased from Messrs. Agnew, who bought it at the Gauchez sale in Paris and ceded it to the Trustees without profit for 2,300*l*.

Since the issue of the last report the Trustees have received a further sum of 5,103*l*. 17*s*. on account of capital under the terms of Colonel Temple West's bequest, making a total amount of 99,909*l*. 6*s*. 1*d*.

In 1906 a bequest to the National Gallery of a certain sum of money by the late Mr. C. E. G. Mackerell was announced, but, as the will was disputed by the next of kin, the case was referred to H.M. Treasury. During the past year a satisfactory settlement was made by the Solicitor to H.M. Treasury, and the Trustees received the sum of 2,859*l*. 9*s*. 11*d*. and were informed that there were further funds which would, on the determination of certain life interests, pass to the Trustees of the National Gallery. The interest only of this sum is available for the purchase of pictures.

Four works were bequeathed by Mr. Martin H. Colnaghi—viz. "Madonna, Child and Saints," by Lorenzo Lotto; "The Bohemians," by Philip Wouwerman; "Dawn," by Aart van der Neer; "The Bridge," by T. Gainsborough, R.A. In addition to the above, under the will of the late Mr. Martin H. Colnaghi, the Trustees of the National Gallery were made his residuary legatees, subject to the life interest of Mrs. Colnaghi, and subject to certain conditions as to the disposal of the testator's property. A portrait of this donor by J. C. Horsley, R.A., has been presented by Mrs. Colnaghi.

The nine following works of art were purchased for the nation by the President and Council of the Royal Academy of Arts under the terms of the Chantrey Bequest:—"The Gleaners Returning," by George Clausen, R.A.; "The Fountain," by Charles Sims; "A Pasturage among the Dunes. Pas de Calais," by H. Hughes-Stanton; "Old December's bareness everywhere," by J. Buxton Knight; "Marie Antoinette," by Miss Mary Gow; "Gold Lace has a Charm for the Fair," by Frank Dadd; "Ariadne" (sculpture), by Harold Parker; "Diana" (sculpture), by Bertram Mackennal; "A Foul in the Giants' Race" (sculpture), by Charles L. Hartwell.

Four of these pictures from the Chantrey Collection have, with the sanction of H.M. Treasury, been temporarily lent to the following institutions, in pursuance of a custom initiated by the Royal Academy, and in response to a general desire that they might be seen in the provinces before being finally housed in the National Gallery, British Art:—"The Fountain" to the Liverpool Walker Art Gallery; "A Pasturage among the Dunes" to the Royal Society of Artists, Birmingham; "The Gleaners Returning" to the Royal Museum and Libraries, Salford; "Gold Lace has a Charm for the Fair" to the Corporation Museum and Art Gallery, Leicester.

The two following pictures, purchased under the terms of the Chantrey Bequest in 1907, which were lent to the Liverpool Walker Art Gallery and the Royal Society of Artists, Birmingham, respectively, have now been returned and hung in the Gallery of British Art:—"The Rehearsal," by L. Campbell Taylor; "Runswick Bay," by Arthur Friedenson.

On the recommendation of the Trustees, the Lords Commissioners of H.M. Treasury have sanctioned the opening of both Galleries free to the public on all Sunday afternoons throughout the year from 2 P.M. until the hour at which the Galleries are closed on free weekdays in each month.

H.M.'s First Commissioner of Works announced last year that, by the gift of Sir Joseph Duveen, a new wing, comprising five rooms with other rooms below, would be added to the National Gallery, British Art, for the exhibition of the Turner Bequest. The National Gallery Board had been previously consulted, and had approved the removal of the whole of the Turner collection to this new building, with the exception of such pictures as should be needed sufficiently to exemplify this master in the representative British School at Trafalgar Square, including the two pictures which, in fulfilment of Turner's will, hang side by side with pictures by Claude Lorrain in the French School. The new rooms are

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at the north-west corner of the existing building, and their construction is already well advanced. They are designed by Sir Joseph Duveen's architect in harmony with the architecture of the Tate Gallery.

In the course of the past year the removal of the temporary Vauxhall Bridge and the consequent levelling of the road in front of the Gallery made it possible to complete its approaches. The road now curves in to the foot of the steps; the garden has been enclosed with new railings and gates; and the part affected turfed, gravelled and supplied with seats.

The installation of electricity in the basement of the Gallery of British Art has been carried out, to the great convenience of the offices, refreshment room, &c., and for purposes of inspection.

The Gallery in Trafalgar Square was visited by 637,304 persons on the free days during the year, showing a daily average attendance on such days (209 in number) of 3,049. In addition to the above number, 58,156 persons visited the Gallery on the thirty-nine Sunday afternoons on which it was opened during 1908, showing a daily average attendance of 1,491.

On students' days (Thursdays and Fridays) 63,691 persons were admitted between January 1 and December 31, 1908; the admission fees (at 6*d.* each) amounting to 1,592*l.* 5*s.* 6*d.*, as compared with 1,448*l.* 10*s.* 6*d.* received in 1907.

The National Gallery, British Art, at Millbank, has been visited by 244,683 persons on the free days during the year, showing a daily average attendance on such days (206 in number) of 1,188. In addition to the above number, 47,107 persons visited the Gallery on the thirty-nine Sunday afternoons on which it was opened in 1908, showing a daily average attendance of 1,208.

The amount annually realised by admission fees at both establishments is devoted as an "Appropriation in Aid" of the Parliamentary Vote to the National Gallery.

On students' days (Tuesdays and Wednesdays) 40,123 persons were admitted between January 1 and December 31, 1908; the admission fees (at 6*d.* each) amounting to 1,003*l.* 1*s.* 6*d.*, as compared with 1,005*l.* 11*s.* in 1907.

The total number of students' attendances at the Gallery in Trafalgar Square on Thursdays and Fridays throughout the year was 17,630. Independently of partial studies, 654 oil-colour copies of the pictures have been made—viz. 357 from the works of fifty-eight old masters, and 297 from the works of twenty-three modern painters. Two hundred and twenty-two new students have been entered on the books during the year. The total number of students' attendances at the Gallery of British Art on Tuesdays and Wednesdays throughout the year was 7,301; and 392 completed copies of the pictures have been made in oil colours, eighty in water colours, and nine in pastel. One hundred and two new students have been entered on the books during the year.

ILLUSTRATIONS.

THE HAMBURG-AMERIKA LINIE OFFICES, COCKSPUR STREET, S.W.—DETAILS.

IN our issue of March 12 we published a perspective drawing of this building, together with a photograph showing the interior of the general office. The main portion of the ground-floor and basement is occupied by the Hamburg-Amerika Linie as offices; the remainder of the seven storeys is available for letting, being divided into suites according to tenant's requirements. The external bronze work, including the large panel with life-size figures over the entrance to the shipping office, was modelled by Mr. J. WENLOCK ROLLINS and cast by Mr. BURTON, of Thames Ditton. The sculpture in Portland stone on the façade (Bath Stone Firms) comprises two large figures in half pediments representing Germany and America, and a frieze of nine bas-relief panels across the curved lines of the bay windows, the subjects being the chief travel stories of antiquity. These were modelled and carved by Mr. W. B. FAGAN. The total cost of the work was about 50,000*l.* The contractors were the Waring-White Building Co., Ltd. The architects are Mr. ARTHUR T. BOLTON, A.R.I.B.A., and Messrs. STOCK, PAGE & STOCK, F.R.I.B.A., of Victoria Mansions, 28 Victoria Street, S.W.

COMPETITION DESIGN FOR CORNWALL COUNTY OFFICES.

WE publish to-day the perspective view and ground-floor plan of the design submitted in competition for the above building by Mr. EDWIN T. HALL, V.P.R.I.B.A., of 54 Bedford Square, W.C. The author interpreted the instructions to require an economical design, and therefore sought to obtain a dignified exterior without extravagance. It will be noted that the council chamber and all the committee and other members' rooms are on the ground floor, and so are all the offices of heads of departments. The committee and the members' dining rooms, &c., are placed in a quiet position away from the noise and bustle of general work, while they are close to the council chamber, and all could be used for conference rooms and for receptions. The future addition of the town clerk's department was arranged on the first floor, so that when erected the whole building would be a compact entity. The main staircase for public access to all the departments is arranged from a circular hall, while there are two staff staircases for intercommunication of departments and for ready access from all to the council chamber.

NEW CLUBHOUSE, JUNIOR SUDAN CLUB, KHARTOUM.

THIS building, which has recently been erected as a club house for junior Government officials, was formally opened on March 2, 1908, by the Governor-General, Sir REGINALD WINGATE, K.C.B., K.C.M.G., &c. The plan consists of a billiard room 27 feet by 18 feet, with reading room adjoining, and there is a wide verandah on the north side. The material is local red brick. The club occupies an excellent corner site on the Khedivial Avenue (close to the Gordon statue), and was designed by Mr. O. BEESTON HATCHARD, town architect, P.W.D., Khartoum.

DORMERS, BOVINGDON, HERTS.

THIS house, of which the illustration shows the entrance front, is now nearing completion on a charming site some ten acres in extent about 2½ miles from Boxmoor. The external walls are of 14-inch brickwork roughly rendered with cement stucco and whitened, the plinth, chimney stacks and dressings, and the forecourt walls being of red brick in varied tints; while the roofs are covered with sand-faced tiles. The accommodation consists, on the ground floor, of hall, dining and drawing room (all three opening on to the loggia), servants' sitting room, and the usual offices; on the first floor there are seven bed and dressing rooms, bath rooms, &c.; and on the top floor a large billiard or play room, with beautiful views therefrom of the surrounding country on all sides, also two bedrooms, bath room, box room, &c. An entrance lodge is also being constructed in connection with the house. Mr. WALTER E. HEWITT, A.R.I.B.A., of 22 Buckingham Street, Strand, W.C., is the architect, and Mr. A. TIMBERLAKE, of King's Langley, the builder. The perspective drawing was by Mr. SYDNEY W. DAVIS.

THE CIVIL HOSPITAL, KHARTOUM.

THIS building has recently been erected in Khartoum by the Sûdan Government—Captain M. RALSTON KENNEDY, R.E., D.S.O., Director of Public Works—at a cost of E25,000*l.* on a large open site on the Sirdar Avenue on the south side of the town. The material is hard white sandstone from the Gebel Auli quarries on the White Nile, with mouldings, string courses, &c., in cement. The arcade in the front elevation, and the verandahs roofed with Marseilles tiles at the back screen the main walls from the sun and render the large airy wards cool in summer. The operating theatre and sanitary blocks are lined with glazed bricks and tiles, and the building is fully equipped throughout with the most modern hospital fittings of English pattern. The fireproof floors of the wards, &c., are tiled, and the corridors and main staircase are in terrazzo mosaic. The hospital and accessory buildings are lit throughout by electric light, and the current is also utilised for fans in every ward. The key plan shows the accommodation provided. The hospital was built to the designs of Mr. O. BEESTON HATCHARD, town architect, Khartoum.

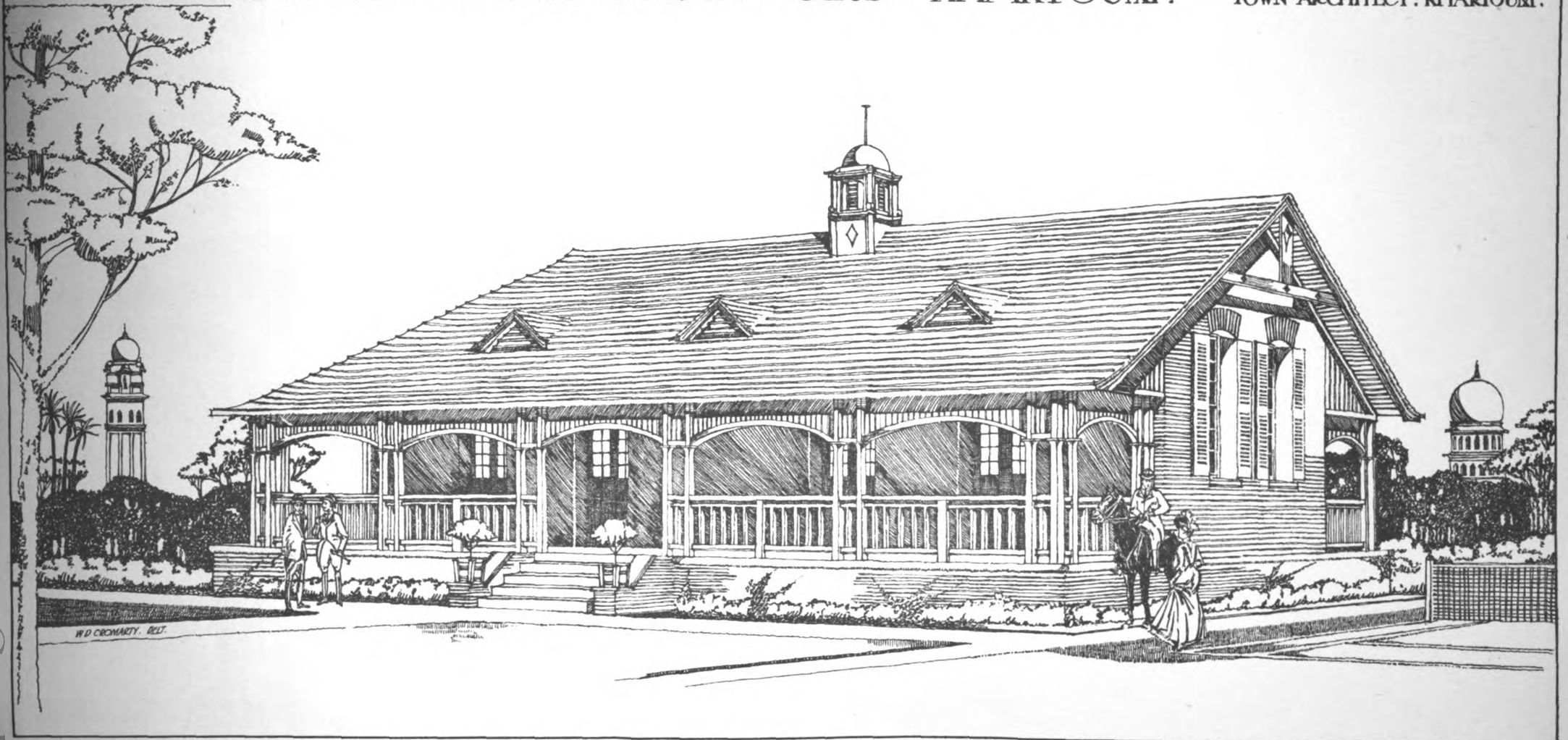
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NEW · CLUBHOUSE · JUNIOR · SUDAN · CLUB · KHARTOUM.

O. BEESTON. HATCHARD.
TOWN ARCHITECT. KHARTOUM.



The Architect, June 4th 1909.

PHOTO-LITHO. SPRAGUE & C°. L.D. 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

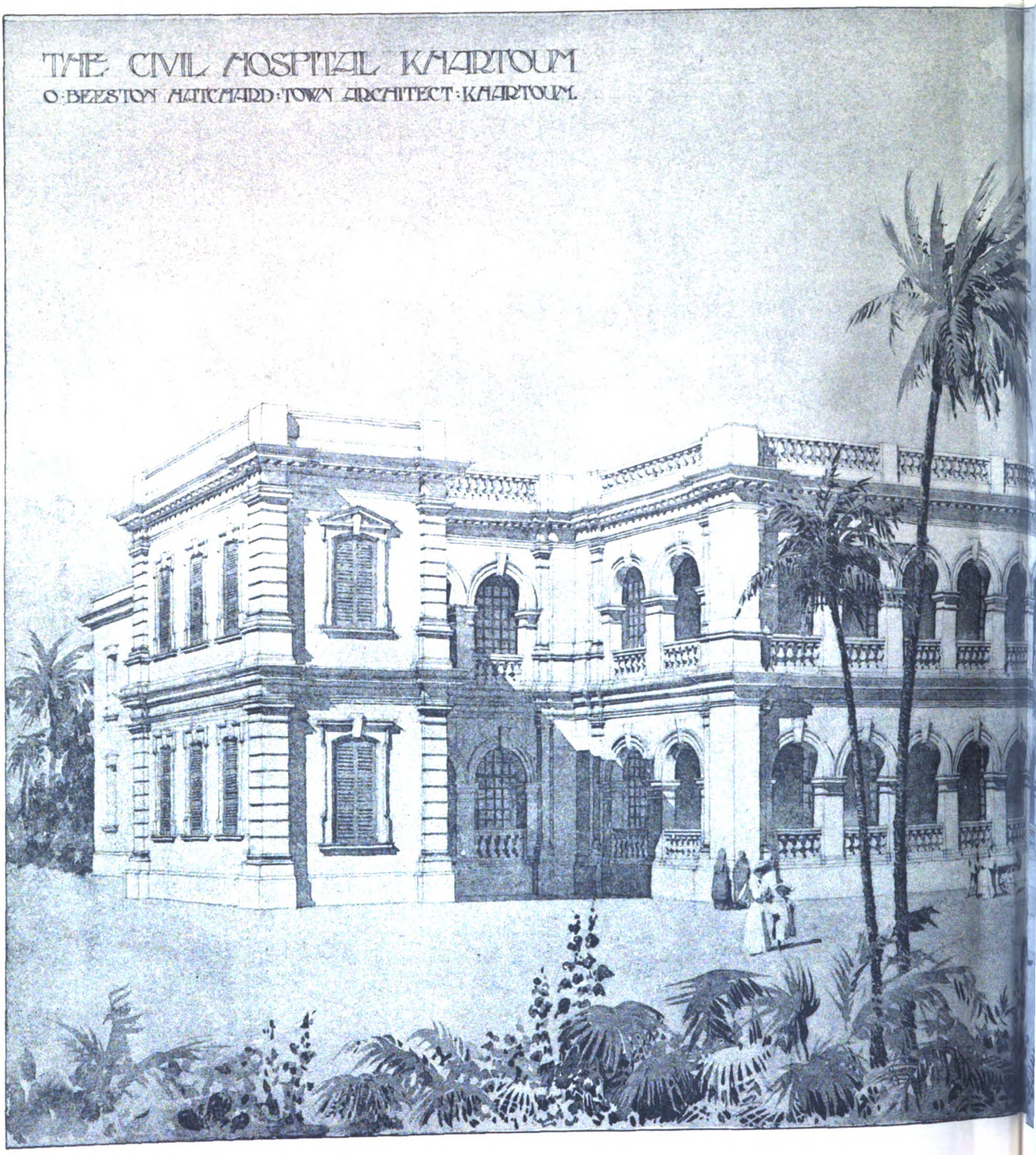
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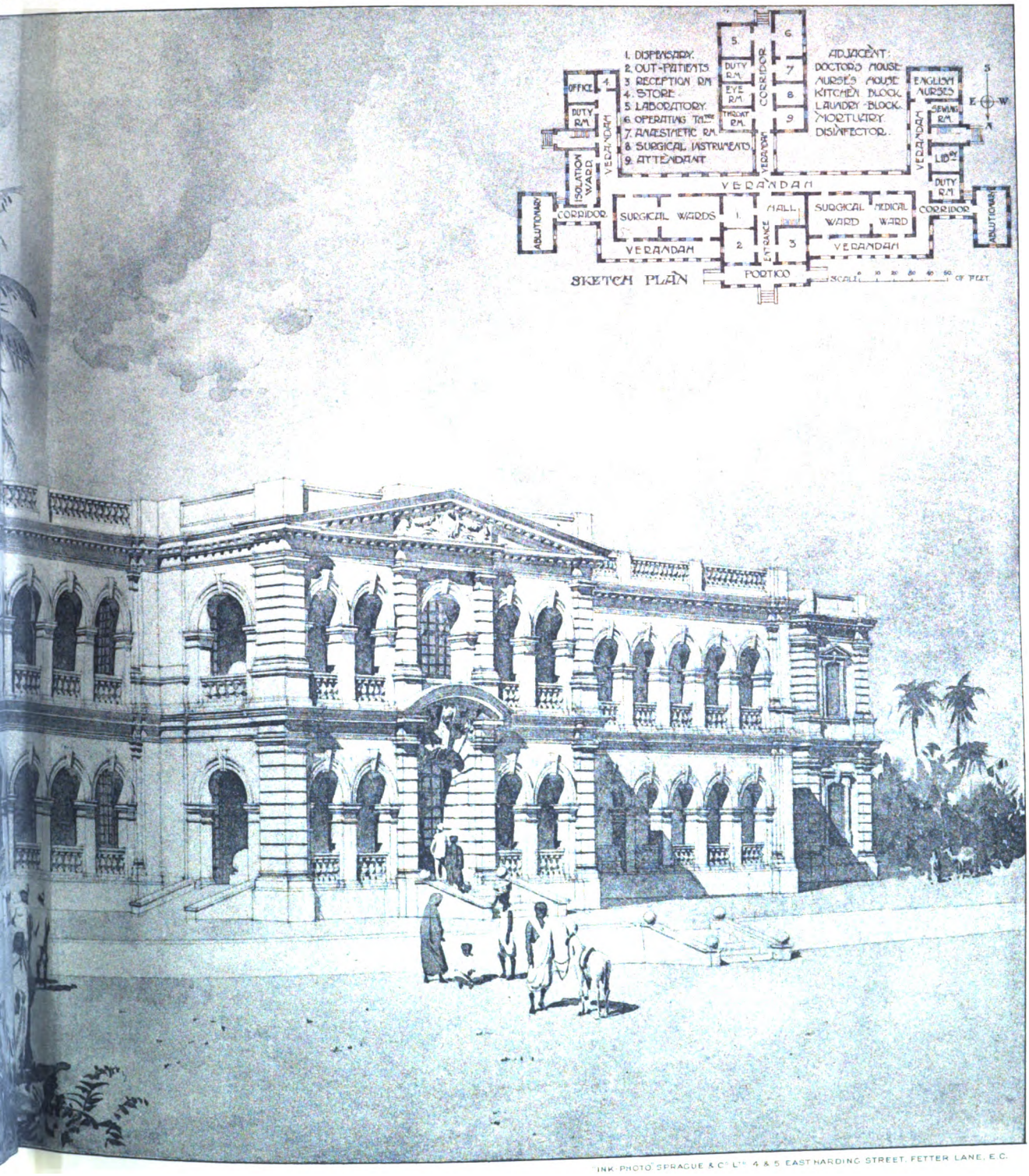
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THE CIVIL HOSPITAL KHARTOUM

O: BEESTON HATCHARD: TOWN ARCHITECT: KHARTOUM.



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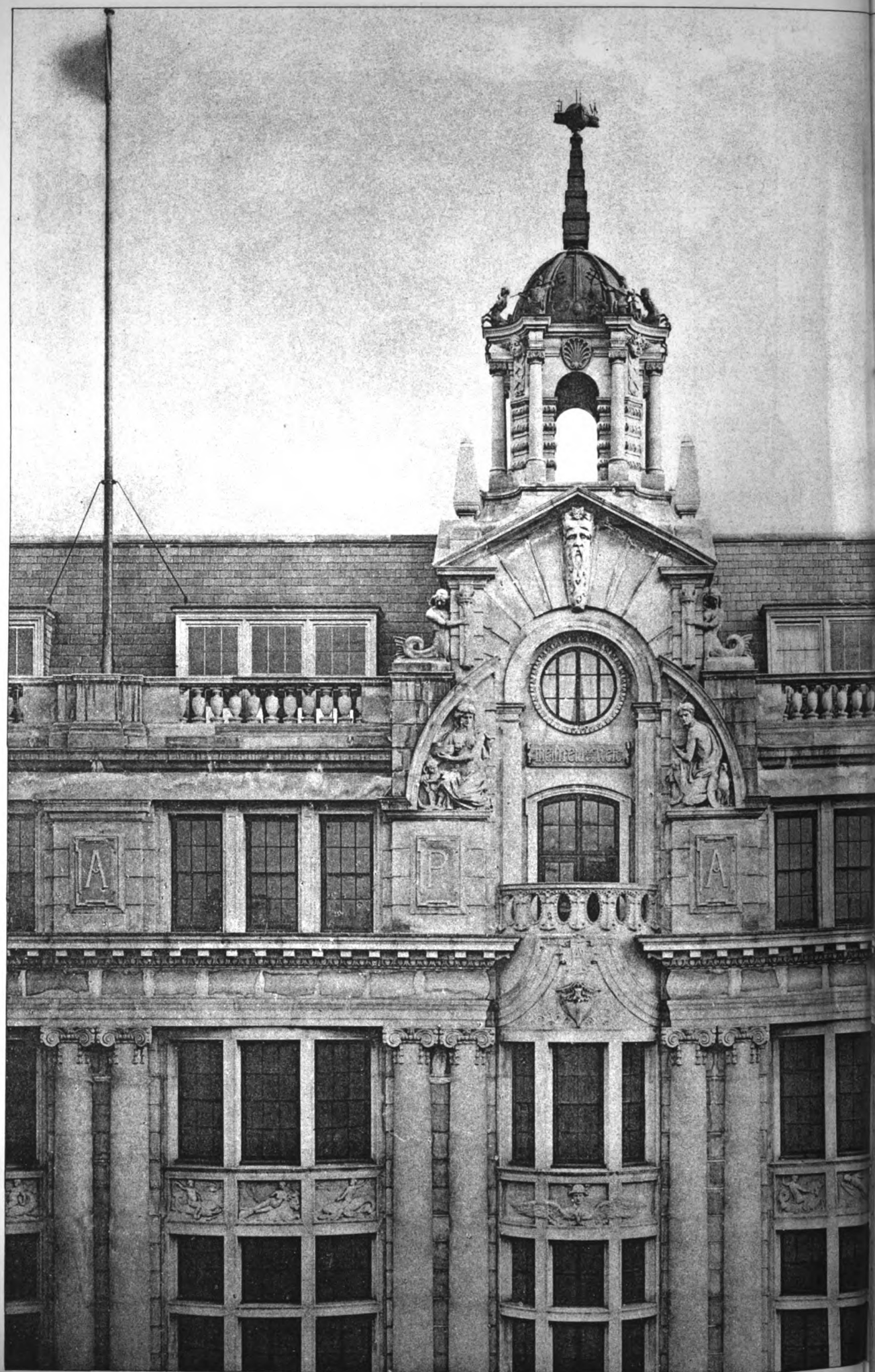
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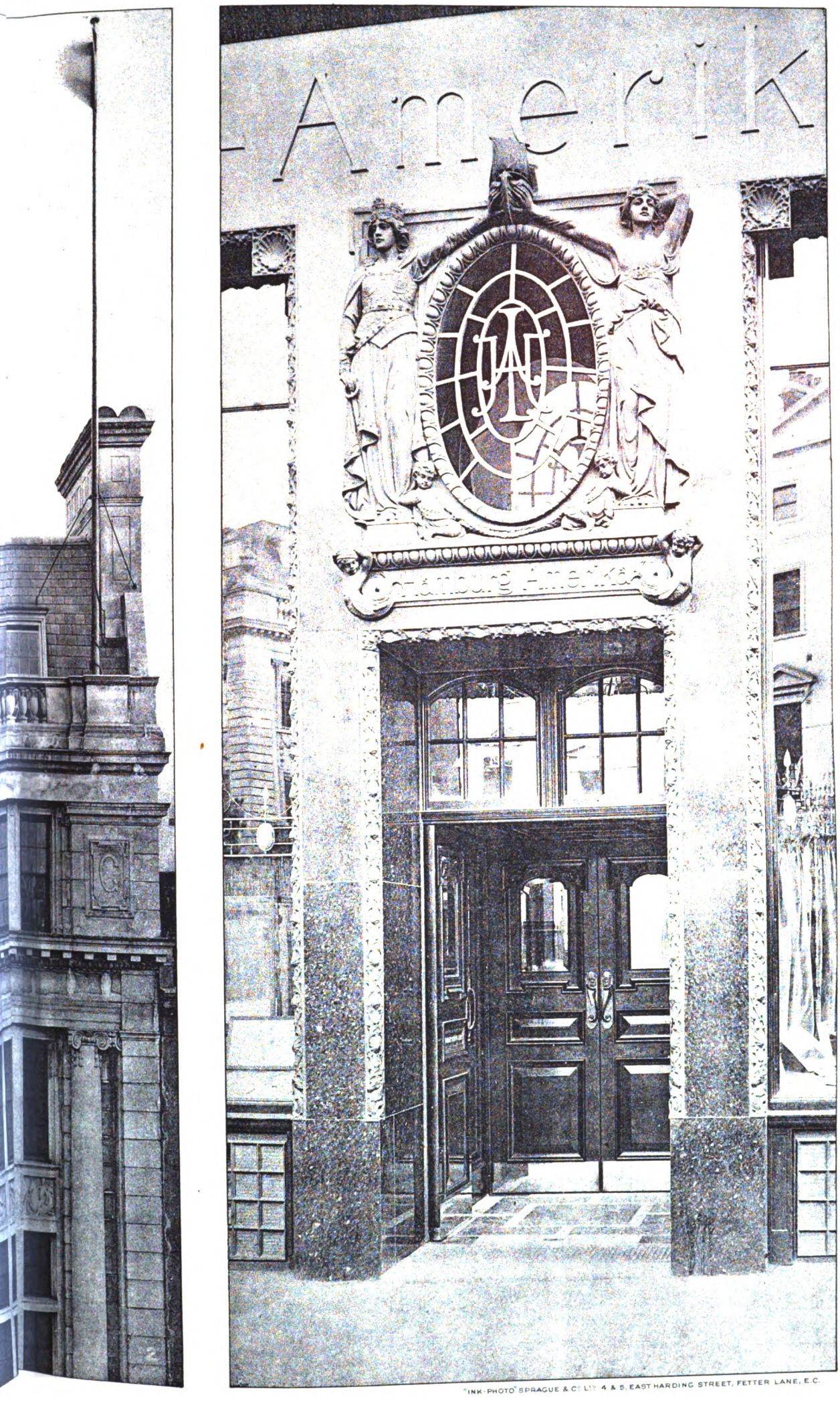


PHOTOGRAPHED BY BEDFORD LEMERE & Co 147, STRAND, W.C.

THE "HAMBURG-AMERIKA LINIE" OFFIC

ARTHUR T. BOLTON, A.R.I.B.A., and Messrs.

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COCKSPUR STREET, S.W.: DETAILS.

PAGE & STOCK, F.R.I.B.A., Architects.

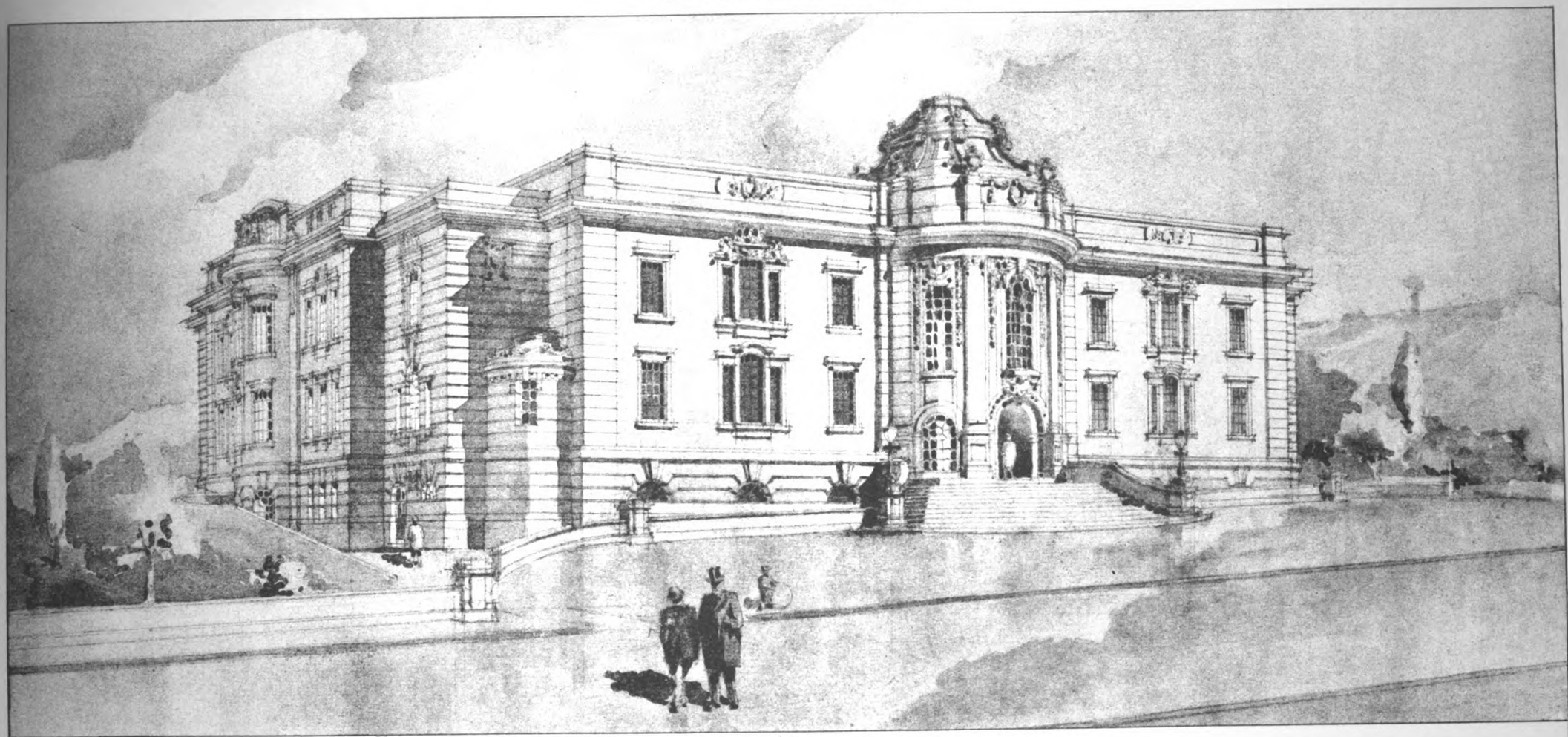
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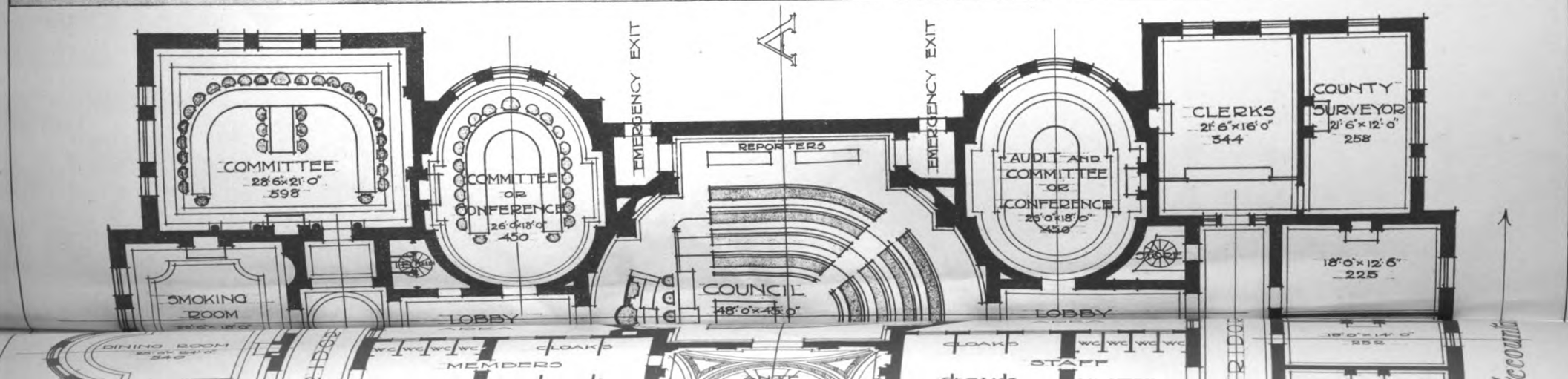
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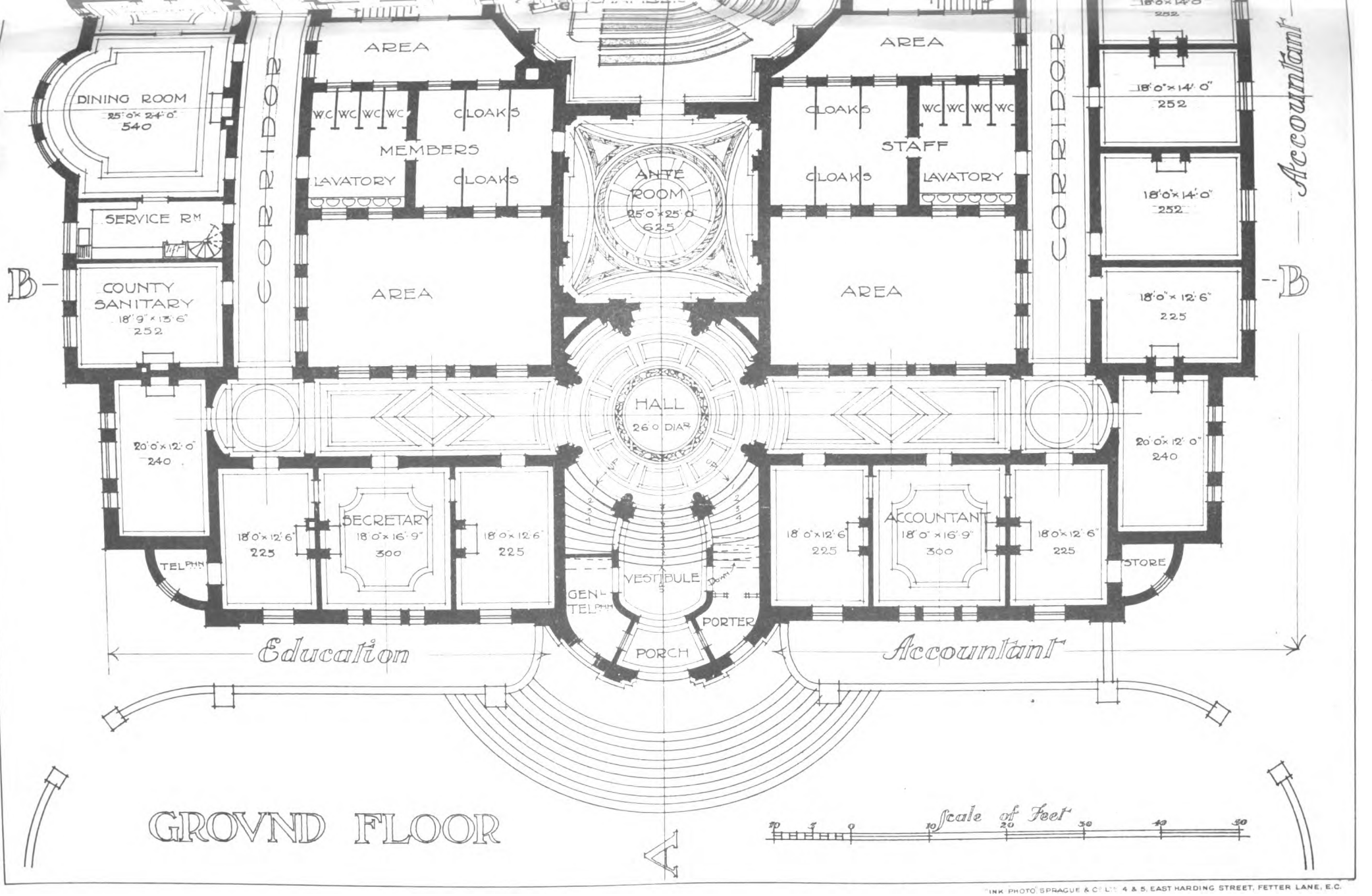
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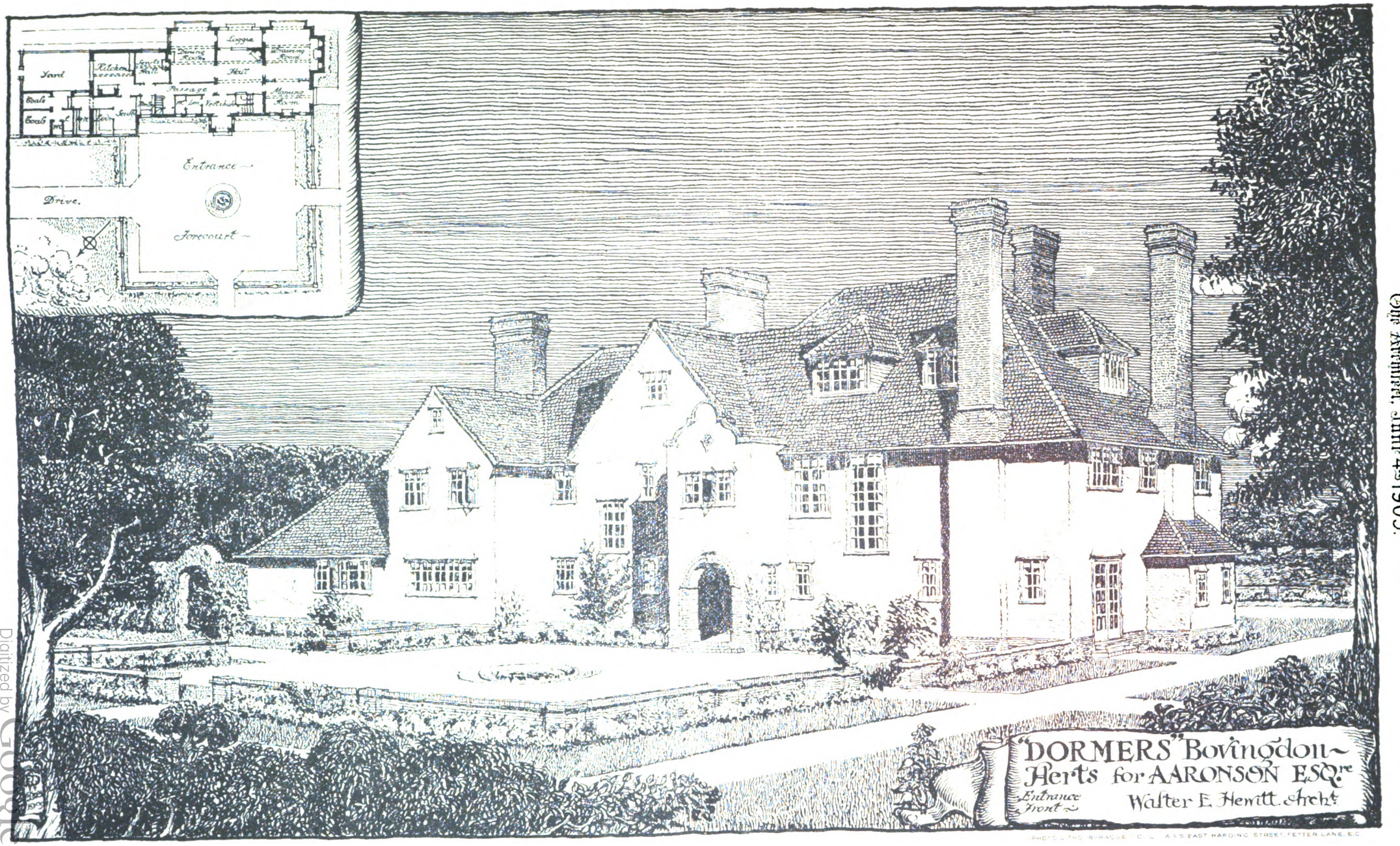
COMPETITION DESIGN FOR CORNWALL COUNTY OFFICES.

By EDWIN T. HALL, V.P.R.I.B.A.

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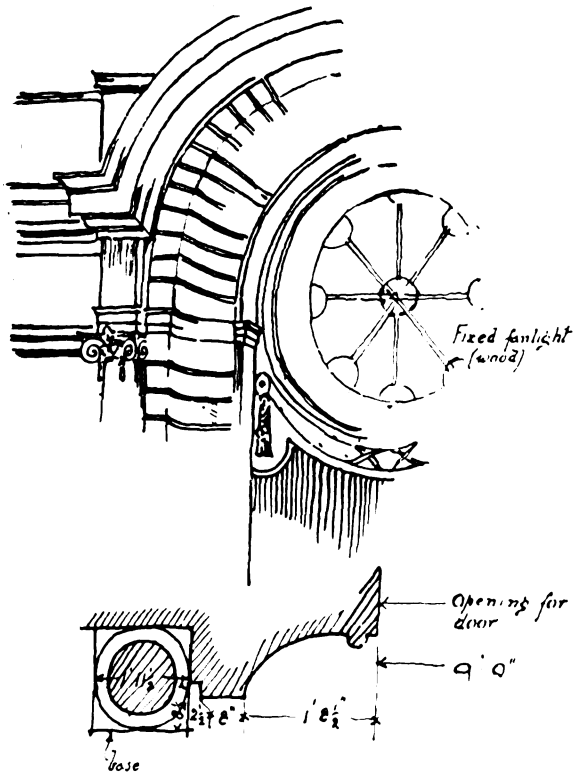
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The Architect, June 4th 1909.

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GATEWAY TO A STREET FRONT, GHENT.
From a Sketch by BANISTER FLETCHER.

TESTS OF REINFORCED CONCRETE BEAMS.

(Concluded from last week.)

THE following are notes of the tests of beams with stirrups:—

Beam No. 231.1.—At 25,000 lb. diagonal crack marked (1) was noted 10 inches to left of left load. At 26,000 lb. cracks appeared in middle third and diagonal crack (2) was noted, and at 28,000 lb. diagonal cracks (3) and (4). At 29,000 lb. and 30,000 lb. cracks marked (5) and (6) noted at left end of beam. At 32,000 lb. metallic noises were heard and diagonal cracks continued to open. Maximum load, 33,000 lb. Load dropped to 14,900 lb., as ultimate failure occurred at (3) and (4); stirrup marked (*a*) broke, and stirrup marked (*b*) slipped.

Beam No. 232.1.—At 26,000 lb. vertical crack marked (1) appeared. At 28,000 lb. diagonal crack (2) was noted at left end and diagonal cracks (3) and (4) at right end. At 30,000 lb. diagonal crack (6) appeared. At 32,000 lb. crack marked (7) was noted at left end and vertical cracks marked (8) and (9) in middle third, and at 34,000 lb. vertical crack (10). At 36,000 lb. tension cracks in middle third were opening, diagonal cracks not opening much. Maximum load, 38,000 lb. Load dropped to 32,600 lb. failure occurring by tension in steel.

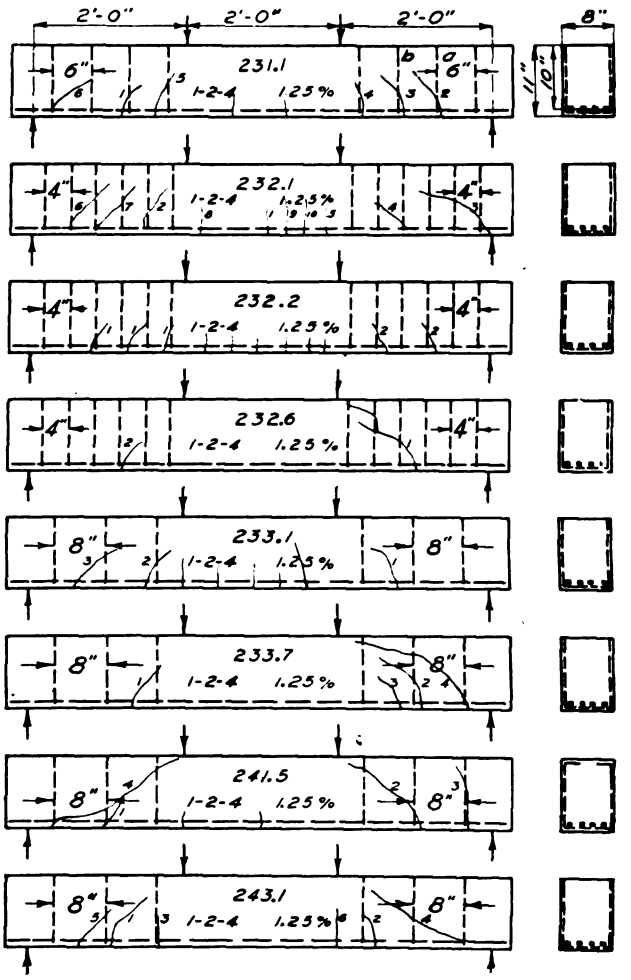
Beam No. 232.2. At 24,000 lb. numerous vertical cracks noted in middle third and diagonal cracks marked (1) at left end, but these did not open very wide. At 32,000 lb. diagonal cracks marked (2) were noted at right end. Maximum load, 40,300 lb. Failure occurred by tension in steel.

Beam No. 232.6. At 19,000 lb. a short diagonal crack marked (1) noted at right end at mid-depth of beam. At 20,000 lb. the above crack extended downward to bottom of beam and upward along fifth stirrup from end, a branch extending to load point. At 21,000 lb. crack marked (2) noted. Failure occurred by diagonal tension. Maximum load, 25,000 lb.

Beam No. 233.1. At 27,000 lb. a diagonal crack marked (1) was noted 21 inches to right of centre and extended vertically 6 inches. At 36,000 lb. a diagonal crack marked (2), 6 inches high, was noted 18 inches to left of centre of beam. At this load a vertical crack 5 inches long appeared under left load, tension cracks 4 inches long were noted 6½ and 1 inch to left of centre and a tension crack 3 inches high 3 inches to right of centre. At 41,000 lb. a diagonal crack marked (3) extended vertically 5 inches. At 43,200 lb. all cracks were opening. At maximum load, 43,300 lb. a tension crack 7 inches long noted 7 inches to right of centre. Failure occurred by tension in steel.

Beam No. 233.2. At 20,000 lb. a diagonal crack appeared 9 inches to left of left load and extended vertically 4 inches. At 28,000 lb. several vertical cracks were noted in middle third, and two diagonal cracks at right end. Diagonal crack noted at left end at load of 32,000 lb. Maximum load 34,700 lb. Failure occurred at right end by diagonal tension probably followed by slipping of bars. Middle stirrup at right end finally split out at near the maximum load on account of being too near the surface—about 1 inch centre to surface.

Beam No. 233.7. At 23,000 lb. a diagonal crack marked (1) noted which extended vertically 5 inches. At 24,000 lb. a diagonal crack marked (2), 7 inches high, noted. At 26.000 lb. diagonal cracks marked (3) and (4) appeared and extended vertically 4 inches. The other cracks were opening up at this load. At 27,000 lb. the cracks were lengthening. At 27,200 lb., the maximum load, diagonal crack marked (4) opened and extended to load point. Load dropped to 22,000 lb., failure occurring by diagonal tension with slipping of stirrups.



Beam No. 235.1. At the maximum load of 14,500 lb. a diagonal crack 6 inches high appeared 13 inches to left of left load. Load dropped gradually, and at 13,000 lb. the crack was opening up rapidly toward load point.

Beam No. 235.5. Mixture was lean and concrete seemed poorly rammed at bottom. Failure occurred by diagonal tension. On one side the diagonal crack was observed at third stirrup from load. This stirrup was afterward found to be broken. Maximum load 6,100 lb.

Beam No. 241.5. Stirrups bent in at top. At 18,000 lb. diagonal cracks marked (1) and (2) noted, (2) extending toward load point at 27,000 lb. At 22,000 lb. a crack 10 inches long marked (3) appeared. At 26,000 lb. a crack marked (4) was noted at left stirrup 2 inches above bottom of beam, extending to second stirrup from left end, and from there to load point. Maximum load 32,300 lb., failure occurring by diagonal tension.

Beam No. 243.1. At 26,000 lb. diagonal cracks marked (1) and (2) appeared. At 30,000 lb. a diagonal crack 6 inches high marked (4) noted at right end, 13 inches from load. At 32,000 lb. the cracks at left end were opening wider. At 34,000 lb. a diagonal crack marked (5) was noted 16 inches to left of left load and extended upward 6 inches. Maximum load 44,300 lb., failure occurring by diagonal tension.

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Tests of Beams with Stirrups. Series of 1907-8.

All beams failed by diagonal tension unless otherwise noted.

Beam No.	Age Days.	Load at First Diagonal Crack Pounds.	Maximum Applied Load Pounds.	Stress in Longitudinal Reinforcement Pounds per Square Inch.	Vertical Shearing Stress Pounds per Square Inch.	Bond in Longitudinal Reinforcement Pounds per Square Inch.	Tensile Stress in Stirrups Pounds per Square Inch.	Bond in Stirrups Pounds per Square Inch.
231·1	60	25,260	33,000	47,800	251	251	96,400	1,004
231·5	66	18,000	35,800	51,800	272	272	104,400	1,088
231·6	71	20,000	31,800	46,000	242	242	93,000	968
232·1*	60	28,000	38,000	55,000	281	281	72,000	750
232·2*	60	24,000	40,300	58,200	306	306	78,400	815
232·5	62	17,000	22,000	32,000	170	170	43,500	453
232·6	61	19,000	25,000	36,300	192	192	49,100	512
233·1*	61	27,000	43,300	62,500	328	328	82,000	874
233·2	61	20,000	34,700	50,200	264	264	33,800	705
233·5	63	14,000	34,000	49,300	259	259	33,100	690
233·6	61	14,000	29,300	42,500	224	224	36,500	714
233·7	63	23,000	27,200	39,500	208	208	21,600	563
235·1	63	14,500	14,500	21,900	116	116	29,800	310
235·2	61	17,000	17,800	26,700	141	141	36,100	376
235·5†	61	6,100	6,100	9,600	52	52	13,300	139
235·6	61	8,000	11,900	18,100	100	100	25,600	267
241·5	59	18,000	32,300	46,700	246	246	40,200	834
241·6	52	18,000	29,400	42,600	224	224	37,500	760
242·1*	60	21,300	22,500	41,300	171	218	27,900	580
242·2*	60	20,000	24,500	44,800	193	246	31,500	550
243·1	60	26,000	44,300	64,000	336	336	34,900	1,140
243·2*	60	24,000	26,000	47,600	197	251	32,400	668
244·1*	60	22,000	24,100	43,300	185	185	22,600	470
244·2	60	24,000	28,200	40,800	216	216	26,500	549
271·5	59	12,000	13,800	22,800	110	—	—	—
271·6	61	15,000	16,300	26,700	127	—	—	—
221·1	60	17,000	25,000	28,000	195	221	19,900	413
221·2	58	22,000	26,000	29,100	203	230	20,700	430
221·5	60	20,000	23,000	25,800	181	205	18,500	383
221·6	59	21,000	21,000	23,600	165	187	16,800	350
222·5	61	20,000	23,700	35,000	182	185	47,600	310
222·6	20	17,000	17,200	32,500	132	168	34,400	224
223·1	61	16,000	19,000	35,000	146	186	35,900	372
223·5	61	19,000	22,600	33,400	174	177	42,700	443
223·6	63	4,000	21,000	31,100	162	165	39,700	412
224·5	60	14,000	21,800	32,300	168	171	52,200	427
224·6*	60	18,000	21,200	38,900	164	209	51,000	417
225·5	59	22,000	22,000	34,700	173	196	15,800	411
225·7	59	20,000	21,700	39,800	165	210	15,000	392
226·5	60	19,000	20,100	36,900	154	196	15,700	326
226·6	61	16,000	21,000	38,600	160	204	16,300	339
227·5	63	18,000	20,000	22,500	158	179	16,100	335
227·6	60	15,000	16,400	18,500	130	147	13,300	275
228·5	59	16,000	17,500	19,700	138	156	33,800	351
228·6	60	19,000	21,400	24,000	168	190	41,400	428
221·3	57	24,000	31,100	34,600	242	274	24,700	512
221·4	70	20,000	21,170	23,800	166	188	16,900	351
223·2	57	22,000	24,600	36,300	189	192	46,400	481
223·3	70	20,000	26,150	38,500	201	205	48,300	511
229·1§	63	20,000	22,000	43,500	255	259	26,000	540
229·2*§	32	20,000	25,400	50,000	292	296	29,800	618
229·5	72	13,000	13,400	20,100	159	164	12,750	337
229·8	60	14,000	26,100	37,700	200	204	16,000	423
233·3‡	72	18,000	20,850	38,300	159	203	26,000	539
233·4	66	18,000	26,300	38,200	201	201	25,800	536
240·1*	64	26,000	34,800	38,800	270	306	27,500	572
243·3	64	20,000	34,200	49,500	260	260	42,400	880

* Tension failure.
† Appearance indicated poor concrete.
‡ Failure at the end not having stirrups.
§ Load applied at a single point 2 feet from one support.

Beam No. 244.1. At 18,000 lb. vertical cracks 4 inches long marked (1) noted 2½ inches to right of right load and 2½ inches to left of left load at stirrups. At 22,000 lb. a diagonal crack marked (2) appeared 11½ inches to left of left load and extended vertically 4½ inches. At 23,700 lb. the crack at north end was opening wide. At 24,000 lb. a vertical crack marked (3), 6 inches high, was noted 3 inches to the left of centre. Maximum load 24,100 lb. Tension crack marked (1) to left of load opened wide after the maximum was reached.

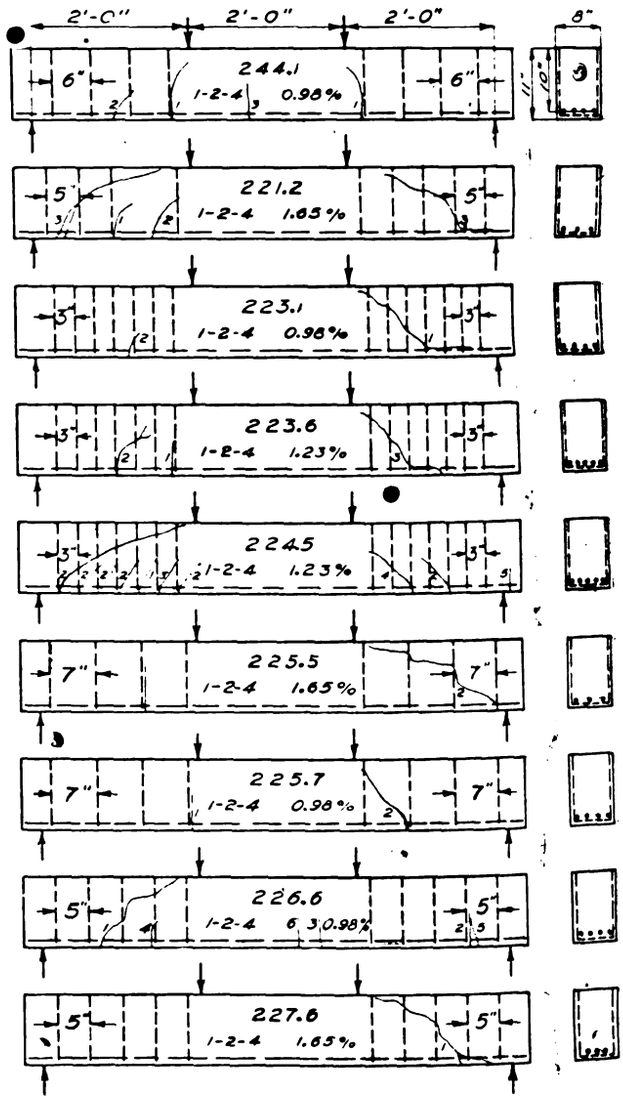
Beam No. 271.6. At 12,000 lb. vertical crack 5 inches long was noted 5 inches to right of right load. A short diagonal crack was also noted in lower third of beam on opposite side 7 inches to right of right load. At 13,800 lb. failure crack appeared suddenly, starting at right end 7 inches inside the support and extending to within 4 inches of load. The expanded metal web was not sufficient to give much resistance.

Beam No. 221.2. Three stirrups at right end were showing at surface. Concrete was poor. At 22,000 lb. a diagonal crack marked (1), 4 inches high, was noted 12 inches to right of left support. At 24,000 lb. diagonal crack 5 inches high marked (2), 6 inches to left of left load, was noted. At 26,000 lb. diagonal crack marked (3) appeared. Maximum load 26,000 lb., diagonal tension failure.

Beam No. 222.5. At 16,000 lb. vertical crack was noted 6 inches to left of left load. At 20,000 lb. one 5 inches to left of centre and at 22,000 lb. 3 inches to right of centre. At 20,000 lb. diagonal cracks were noted 10 inches to left of left load and 3½ inches to right of right load. Failure occurred by diagonal tension. Maximum load 23,700 lb. All the concrete broke away from bottom of second stirrup to left of left load. Reduced section could be plainly seen. Stirrup did not slip.

Beam No. 223.1. At 16,000 lb. diagonal crack 3 inches high marked (1) was noted. At 18,000 lb. this crack was 5 inches high and diagonal crack 4 inches high marked (2) was noted. Crack marked (1) opened wider at maximum load of 19,000 lb. and extended almost to load point. Failure by diagonal tension at right end.

Beam No. 223.5. At 19,000 lb. diagonal cracks were observed 8 inches to left of left load and 8 inches to right of right load. At 22,000 lb. a diagonal crack was noted 14 inches to right of right load. Maximum load 22,600 lb.



Failure occurred by diagonal tension and failure crack was more nearly vertical than usual. Failure crack was limited to space between last three stirrups nearest the load. A loose stirrup was noted 6 inches to left of left load.

Beam No. 223.6. Diagonal cracks were noted 12 inches to left of left load and 9 inches to right of right load. Crack at right end extended almost to load point. Failure by diagonal tension at load of 21,000 lb.

Beam No. 224.5. At 14,000 lb. diagonal crack marked (1) was noted, at 15,000 lb. (2), at 16,000 lb. (3), and at 17,000 lb. crack (4). The cracks which started from the bottom of the stirrups headed for the centre point of next stirrup toward load. Failure occurred by diagonal tension along diagonal crack at left end and several stirrups slipped at this end.

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Beam No. 225.5. At 18,000 lb. crack marked (1) appeared. Failure occurred by diagonal tension along crack marked (2). Second stirrup from right end bulged out and drew down. Maximum load 22,000 lb.

Beam No. 225.7. At 17,000 lb. vertical crack 4 inches high marked (1) was noted and at 20,000 lb. diagonal crack 4 inches high marked (2). At 26,900 lb., the maximum load, the crack marked (2) extended almost to load point. Load dropped to 16,000 lb. Failure occurred by diagonal tension. Concrete around second stirrup to right of right load was very lean. Lower part of the stirrup on each side was exposed and stirrup slipped a little.

Beam No. 226.5. At 18,000 lb. the vertical crack 5 inches high was noted at stirrup 7 inches to left of left load. At 19,000 lb. a diagonal crack 4 inches high was noted 15 inches to right of right load. At 20,000 lb. the cracks were enlarging and at maximum load of 20,100 lb. a diagonal crack 6 inches high was noted 8 inches to right of right load. Load dropped to 11,300 lb.

Beam No. 226.6. At 16,000 lb. diagonal crack 3 inches high marked (1) was noted, at 18,000 lb. vertical crack along stirrup 5 inches high marked (2) and at 19,000 lb. the cracks marked (3) and (4). At 20,000 lb. diagonal crack marked (5) appeared and other cracks were enlarging. At maximum load 21,000 lb., vertical crack marked (6) was noted; diagonal cracks were lengthening. Load dropped to 14,000 lb. and diagonal crack (1) was opening. Failure by diagonal tension at left end. The stirrups were quite close to sides of beam and were wrapped in paper for the lower 4 inches.

Beam No. 227.5. At 18,000 lb. small vertical cracks were noted 2 inches to right of right load, 4½ inches to left of left load, and at first stirrup 2 inches to left of left load on further side of beam. The latter crack was 4 inches long. Failure crack started at bottom of second stirrup 7 inches to right of right load, ran up stirrup 2½ inches, then to first stirrup at a point 3¼ inches from top, then upward along the stirrup. Maximum load 20,000 lb. Two stirrups were exposed at left end.

Beam No. 227.6. Cracks were noted on both sides of beam at 15,000 lb. No cracks noted at left end of beam. Failure was rather sudden and was due to diagonal tension. Third and fourth stirrups from right end were found to have slipped ⅛ or ¼ inch. The stirrups were not well embedded, especially at north end where failure occurred. Maximum load 16,400 lb.

Beam No. 228.5. At 16,000 lb. a diagonal crack 5¼ inches high was noted 3 inches to left of left load. At maximum load, 17,500 lb., a diagonal crack 5½ inches high was noted 6 inches to right of right load. Failure occurred along the diagonal crack noted at 16,000 lb. The crack ended at bottom of beam at a point near first stirrup to left of load. First two stirrups at left end on further side of beam were showing at bottom. This fact did not affect the results, however.

Beam No. 228.6. At 19,000 lb. diagonal crack was noted 8 inches to right of right load on further side of beam and extended upward 4 inches. At 20,000 lb. diagonal crack was noted 12 inches to left of left load and extended toward load point, starting at fourth stirrup from left end. One stirrup showed slightly at right end. Maximum load 21,400 lb., failure occurring by diagonal tension.

Beam No. 221.3. At 24,000 lb. crack marked (1) noted, at 27,000 lb. cracks marked (2) and (3), each being about 3 inches high. At 29,000 lb. cracks were lengthening. At 31,000 lb. the two stirrups marked (a) slipped as crack (2) opened. After the maximum load of 31,100 lb. the load fell off to 18,400 lb., and failure crack gradually opened.

Beam No. 221.4. At 20,000 lb. crack marked (1) noted. At 21,000 lb. stirrup marked (a) slipped. At maximum load, 21,170 lb., stirrup marked (b) slipped. Load fell off and crack gradually widened. Diagonal tension failure.

Beam No. 223.2. At 22,000 lb. crack marked (1) noted. At 24,000 lb. this crack was 7 inches high and crack marked (2) was noted. Maximum load 24,600 lb. Gradual failure by diagonal tension. The load was taken off and then applied again. It rose to 13,300 lb. then fell off to 12,200 lb. as failure crack opened and stirrups marked (a) slipped.

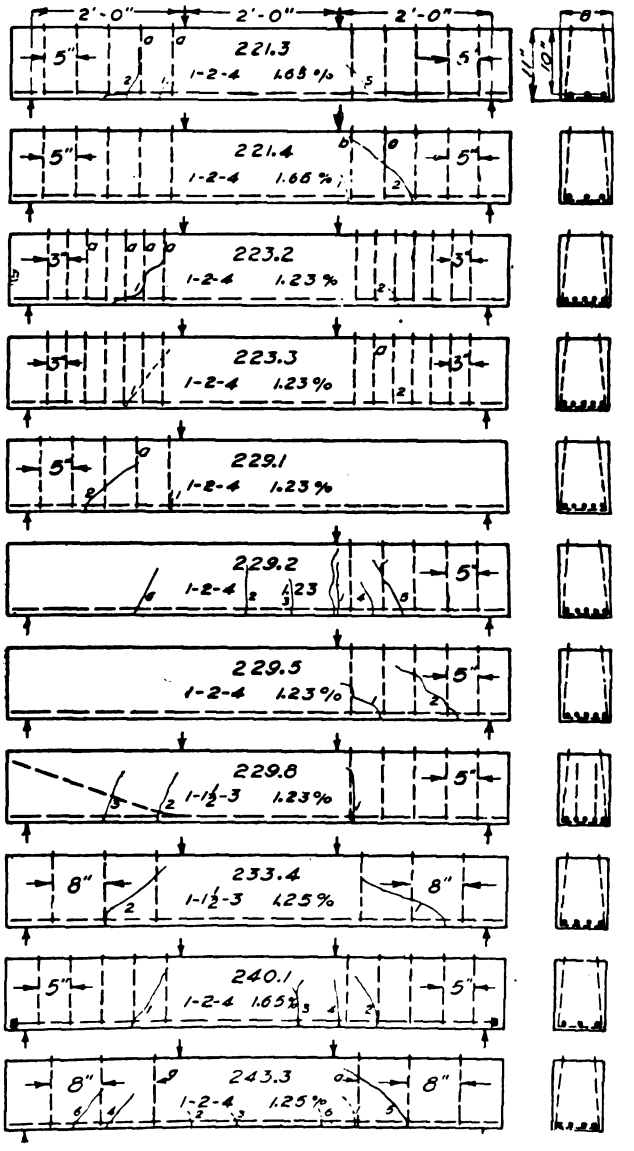
Beam No. 223.3. At 20,000 lb. crack marked (1) noted and at 23,000 lb. this crack was 7¼ inches high. Maximum load 26,150 lb. Failure was gradual and stirrup marked (a) slipped after beam started to fail.

Beam No. 229.1. Loaded at one point. At 20,000 lb. crack marked (1) noted 3 inches high. At 22,000 lb. diagonal failure crack marked (2) opened and stirrup marked (a) showed signs of slipping. Load dropped to 17,000 lb.

Beam No. 229.2. Also loaded at one point. At 14,800 lb. vertical crack marked (1) noted. At 18,000 lb. cracks marked (2), (3) and (4) noted. At 20,000 lb. crack marked (5) appeared and other cracks lengthened. At 24,200 lb. crack under load was 8 inches long and ⅛ inch wide. Maximum load 25,400 lb., failure occurring by tension in steel. This shows a high resistance for the portion of the beam without stirrups.

Beam No. 229.5. Also loaded at one point. At 13,000 lb. crack marked (1) noted. At 13,400 lb., the maximum load, crack marked (1) was 4 inches high, and crack marked (2) was noted. Load fell off to 12,000 lb., failure occurring by diagonal tension. No signs of stirrups slipping and stirrups were not exposed.

Beam No. 229.8. Stirrups at one end only; at other end two bars bent up. At 14,000 lb. crack marked (1) was noted. At 20,000 lb. cracks marked (2) and (3) were noted, the former being 4 inches high and the latter 8 inches. Cracks (1), (2) and (3) increased in length regularly as load was applied, and at 26,000 lb. cracks (2) and (3) were about 9 inches long and crack (1) 11 inches. Crack (1) then widened appreciably. Maximum load 26,100 lb. Failure occurred at the end having stirrups and took place slowly.



Whether slip of stirrup along longitudinal bar or slip of the latter occurred is not known. Concrete was rich mixture.

Beam No. 233.4. At 18,000 lb. cracks marked (1) and (2) were noted. Up to maximum load of 26,300 lb. the cracks gradually lengthened and failure occurred by diagonal tension.

Beam No. 240.1. This beam had nuts and washers at ends of longitudinal rods. At 26,000 lb. cracks marked (1) and (2) appeared. At 33,000 lb. cracks marked (3) and (4) were noted and other cracks were lengthening. Failure occurred by tension in steel at 34,800 lb. followed by crushing of concrete. Stirrups did not slip.

Beam No. 243.3. At 20,000 lb. crack marked (1), 3 inches high, appeared. At 21,000 lb. crack marked (2) noted near

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left load point. At 23,000 lb. crack marked (3), 3 inches high, appeared. At 26,000 lb. diagonal crack marked (4), 4½ inches high noted at left end of beam. Crack marked (1) was 7 inches high at this load. At 30,000 lb. crack marked (5) was noted. At 34,000 lb. cracks marked (6) and (7) were noted, the other cracks were lengthening and at this load stirrups marked (a) had slipped. Maximum load was 34,200 lb., failure occurring by diagonal tension.

LONDON MUNICIPAL HEAT SUPPLY.

By ALFRED E. WHEELER, C.E.

MUCH has been spoken and written in the past on the subject of Smoke Abatement, but it would appear that little practical good has resulted in spite of the deliberations of numerous Committees and Commissions which have sat to consider the question.

In a recent lecture on the subject the Vice-President of the Manchester Chemical Club stated that the first step to the solution of the smoke problem must come by attacking the domestic coal fire. Authorities have agreed that 70 per cent. of the smoke in the atmosphere proceeds from domestic chimneys, and no engineer of experience will see any reason to suspect exaggeration in this statement, since he knows very well that the construction of the old open grate is opposed to the conditions necessary to smokeless coal combustion.

Without entering into a long dissertation on the chemistry of the combustion of coal, the reason of the failure of most domestic fire grates may be made apparent in a few words. Combustion is the "combining" of the oxygen in the air with the carbon and hydrogen present in the coal producing a chemical change, which, like all other chemical changes, evolves heat in the process, but a necessary condition of perfect combustion provides that the air should pass *through* the hot fuel and not *over* it. There are comparatively few domestic fire grates which fulfil this condition, hence the trouble which it is sought to remedy. It is, however, a comparatively simple matter to burn coal smokelessly under carefully studied conditions of firing and draught in specially constructed furnaces, and even low grade fuel may be used to great advantage.

The smoky condition of the domestic grate is not more remarkable than its supreme wastefulness of heat. In some tests carried out for the Smoke Abatement Committee, Mr. D. K. Clark found that no less than 58 per cent. of the total heat of coal was lost by this imperfect combustion, and this again will be easily understood by architects who have experienced the loss of efficiency in boilers occasioned by leaky flues; hence it would appear that each household is wasting more than half the money spent upon its coal to the detriment of everyone and the good of nobody, and the moral is read each time an excess of atmospheric moisture carries these unconsumed products in suspension and gives us a real sample of City fog.

Sufficient has been said to show that the most effective solution of the problem would be to prohibit the use of domestic coal fires altogether, but what authority will be bold enough to take this step? Granted that coal may be burnt both smokelessly and, at the same time, more economically on a large scale, the problem of the distribution of the heat remains, and to carry out a scheme of heat distribution for London would necessarily be an undertaking of so gigantic a nature as to border on the impossible. The latter word, however, is generally an insignificant one in the vocabulary of the modern engineer, who is happily not appalled by magnitude. Our large gas, water, and electricity undertakings, although marvels of magnitude, have grown to their present proportions gradually, hence their conception strikes no one as remarkable; therefore with a due appreciation of the stupendous nature of the scheme. I propose to suggest, by means of a few figures, a method for carrying into effect a public heat supply for London, and thus make an effort to strike an effective blow at the smoke trouble.

The idea of central station heat generation for public supply is, of course, not new. Prof. J. D. Hoffman read a very interesting paper before the American Society of Heating and Ventilating Engineers at Chicago in 1905, in the course of which a plant of this nature was described, and the ensuing discussion also disclosed various other systems established for the purpose of supplying heat on a public supply basis. None of these systems, I must submit, or indeed any system which I have yet been able to trace, has quite fulfilled the object which forms the subject of this article, *i.e.*, the distribution of *heat* distinct from heat associated with water or its vaporised condition, steam. Either of these forms introduces complications involving in the one case working charges due to the formation of chemical deposit in the mains, and in either case a considerable outlay for water.

One of the members of the American Society in the debate already referred to stated that he proposed taking the attitude of believing that heat will be successfully and cheaply distributed by wire as power and light are now, and that he deemed it wise to "go slow" on pipe systems, and do as much heating as possible by wire. I propose to take more than mere passing notice of this opinion, because it would seem surprising that it should be seriously entertained by a responsible heating engineer. Heating by means of electric radiators, although doubtless having a very attractive sound, has been found to cost rather more than fourteen times that of heating by steam or hot water (Prof. R. C. Carpenter in the latest edition of his work on heating buildings quotes even a higher figure than this), yet its facilities for regulating the heat given off are not comparable with those available by the latter methods. A brief comparison of figures may assist in demonstrating this point. The equivalent of an electrical Board of Trade unit is 3,440 British thermal units, and this quantity of electricity at the cheapest rate it is at present retailed at costs one penny. Coke such as is commonly burned in a low pressure steam or hot water heating boiler at, say, 20*s.* a ton, has an average calorific value of 13,000 B.T.U. per lb. A large proportion of this heat, however, never finds its way into the heating medium at all, and at a very conservative estimate not more than 8,000 B.T.U. per lb. are utilised. A large experience of heating apparatus shows that an average of 33⅓ per cent. is radiated from supply mains and pipes, therefore the total heat available for actual heating becomes about 5,333 B.T.U. per lb., and costs 0.107*d.* This, it will be seen, is considerably more than the heat value of an electrical Board of Trade unit, the equivalent cost of heat by coke in an ordinary way running out at 0.069*d.*, or rather less than *one-fourteenth* that of electricity.

A comparison of the cost of electric heating with heating by steam taken from a steam boiler puts the relative costs at

Electricity	3,440 B.T.U.	=	1*d.*
Steam	3,440 do.	=	0.061*d.*

The latter cost, deducting the allowance—of 33⅓ per cent. as before—for the radiation from the pipes shows electricity for heating to be 16.3 times more costly than a steam-heated system. In fairness, however, it should be pointed out that some part of the general working costs of the steam plant should be debited to the account of the heating apparatus, although, on the other hand, the cost of 1*d.* for the electrical equivalent of 3,440 B.T.U. on the electrical side includes nothing for upkeep of lamps, rent of meter, &c.

Neither is it surprising that there should exist so great a disparity between the relative costs of heating by electric means and by direct application of heat, if we consider the multifarious stages by which the former is accomplished as compared with the latter.

All the electric corporations or companies in London generate their electric power by means of steam engines. Indeed, such a method is almost universal with a few notable exceptions, in this country at any rate. True, in some parts of America, especially at Niagara, on the Continent, and even in our own country, there exist supplies of natural water power, which have been turned to good account for the purpose of generating electrical energy, but the great bulk of the power used in the generation of electric current is obtained from heat engines, and it is in respect of these latter that these remarks are particularly addressed. Let us then for a moment review the stages through which heat must pass on its electrical progress to the consumer by way of the steam engine.

Assuming as a representative case that the dynamo is direct coupled to a very efficient high speed compound condensing engine, consuming 15 lb. of steam per i.h.p. per hour, at an initial pressure of 120 lb. per square inch. The coal is fed into the boiler furnaces to generate the steam, which in turn passes from the boiler to the cylinders of the engine to do its work of transmitting the heat supply. The heat account per h.p. up to the point when it reaches the dynamo is as follows:—

Heat value of coal fed to boilers	21,750	B.T.U.
Do. work at dynamo ...	2,545	do.
Total loss per cent....	88.5	

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Allowing that the dynamo gives off from its terminals as much as 95 per cent. of the power supplied to it, the heat value given off will be nearly equal to 1,584 B.T.U. per 1 lb. of coal. The further loss accruing in transmission we will ignore. Thus the heating value of the 14,500 B.T.U. per lb. of coal has, by the time it has reached the consumer, dwindled to 1,584 B.T.U. *or equal to a loss of 89.08 per cent.*

As we have already seen when coke is used as fuel in a direct heating apparatus, the net heat utilised per lb. for heating purposes is about 5,333 B.T.U., therefore if we find that by the electrical-cum-steam-engine method we are only able to utilise 1,584 B.T.U. per lb. of coal, the natural inference is, that in order to transmit the same heat electrically as by the direct method, we must do so at the extraordinary expenditure of about 236 per cent. *more* fuel! Nor may we anticipate a much greater efficiency in the steam engine of the future, any further developments in the direction of economy being improbable. There may possibly be some hope in the steam turbine, but a recent test of a modern type of Curtis turbo-generator, with a steam pressure of 153 lb. per sq. inch and working with a vacuum of 27 inches, showed a resulting thermal efficiency of only 14 per cent.

Although the heat engine works with such prodigality of heat, it is nevertheless practically the universal prime mover employed in the work of generating electric energy on anything approaching an extensive scale, therefore if electricity is to be the medium for distributing heat in the future to London the heat engine must necessarily be the means employed for generating the current. It is thus patent that in adopting the principle of electrical distribution we are pledging ourselves to a waste of money, and what is more important—that which money cannot replace—viz., our stores of coal.

There is another form of heat engine, however, which merits more than a mere casual mention, and I need hardly say I refer to the various forms of internal combustion engine, in which the heat for obtaining the power is produced within the engine itself by gas or oil.

One of the highest forms of this type of heat engine is the Diesel principle of internal combustion, in which oil is injected into highly compressed air in the cylinder, the heat due to compression igniting the charge; but perfect though this application is, the thermal efficiency of the Diesel engine is but 40 per cent. at the fly wheel of the engine, and (allowing the same efficiency for the dynamo as before) only 38 per cent. at the terminals of the generator.

It may be thought that I have gone into detail somewhat unnecessarily in the matter of the heat engine, but I have done so for two reasons—first, to correct once for all the erroneous impression that electricity may be made to play a profitable part in any scheme of heat distribution on a large scale, however efficient an agent it may be for the transmission of power or for lighting. A system which requires the expenditure of from 50 to 250 per cent. more fuel to do a given duty is the system which must be avoided unless it is desired to run the finances of London on the most approved lines of harebrained philanthropy.

Secondly.—In any scheme which we may formulate for the prevention of smoke we are bound to consider the claims of the extensive user of power. It would be a burdensome and unjust imposition to compel the manufacturer to demolish his steam plant—which may be in excellent condition—in pursuance of a policy of prohibition of the smoke-producing use of coal unless he can be shown some alternative, and not necessarily more costly, source of power to take its place.

An efficient type of industrial steam-engine may be constructed to run on 25 lb. of steam per i.h.p. hour, with a thermal efficiency of 5.28 per cent., and an expenditure of coal per i.h.p. of 3.34 lb. If it is pointed out to the owner of this coal-eating monster that a suction gas plant will run on an expenditure of 0.8 lb. of coal per i.h.p. hour, and *save 75 per cent. of his coal bill*, he would doubtless cheerfully scrap his steam plant, if only in the interests of his own pocket. The alteration is also more advantageous to him than is at first apparent, as it obviates the necessity of all feed pumps and such like incidental plant, lowers considerably his water bill, and reduces skilled oversight to a minimum. To some, on the other hand, the facilities offered by the local electricity supply companies may appeal.

We have thus far progressed in two directions:—

(*a*) We have seen how NOT to supply heat to London.

(*b*) We have supplied the method of replacing the existing smoky and wasteful steam plants with the smokeless and economical gas plant.

Before proceeding to a more or less detailed description of the method which will be suggested for the supply of heat to London, I would like to emphasise a point already referred to, and which does not seem to have been aimed at in similar attempts which have been made in various parts of the world. Any scheme designed to supply heat should do so as distinct from water or any other medium. It was pointed out in an earlier passage that if a supply of water accompanies the supplies of heat complications are introduced, not the least of which being a large water bill incurred at the generating station, and doubtless past failures might largely be traced to this cause, making as it does directly against economy in working. Among other contributory causes, which will be discussed later in their proper places, are the following:—

1. First cost of water a continual charge.
2. Heating each fresh supply of water from its initial temperature.
3. Extra working cost due to chemical deposit in mains and boilers.

From these points it will be gathered that an efficient scheme should embody the following requirements:—

1. No cost for anything above and beyond the actual heat.
2. To commence with a stock-in-trade of heat (as it were), and merely replace heat sold and that lost by depreciation.
3. Keep all mains and boilers free from chemical deposit, so that a heavy working charge may be avoided.

It must also be remembered, in connection with the last-named reservation, that any system which involves the periodical cleaning or replacement of mains in London streets is foredoomed to failure. It should also be noted that scale formation inside boiler plates or tubes results in a serious loss of heat efficiency, however thin the deposit.

(To be continued.)

YORK BEFORE THE CONQUEST.

A LECTURE entitled "The Earlier Forms and Reminiscences of York Minster" was delivered recently before the Yorkshire Philosophical Society by Mr. G. Benson, A.R.I.B.A. He commenced his lecture by saying that a wedding introduced the Church into York. Edwin, King of Pagan Northumbria, which stretched from the Forth to the Humber, had extended his rule to the channel by compelling the other Anglo-Saxon kings to acknowledge him as their over-lord. King Edwin in the year 625 married the Christian Ethelberga, sister to the King of Kent. The Queen brought to York her chaplain, Bishop Paulinus. Efforts were made to induce the King to embrace Christianity. Pope Boniface sent him a letter and presents. Subsequently King Edwin summoned his Witan before the idol temple at Goodmanham to discuss the new religion. The King, the council and the pagan high priest were converted by Paulinus. Out of the fire which consumed the idol temple at Goodmanham arose, phœnix-like, the minster at York. The King came to York to his palace, the old Praetorium, within the Roman fortress. In the adjoining wide main street which lay from north-east to south-west, the King built a church. The King selected York as the archiepiscopal see and induced Pope Honorius to bestow the pallium on Paulinus. York, besides being the political capital, now became an ecclesiastical capital or metropolis. The minster became the metropolitan church of the Province and the bishop the metropolitan. So that York was both capital and metropolis at once, a dignity to which London never attained, for it has always in Church matters been subject to the See of Canterbury. A conjectural view of the stone minster of King Edwin was shown on the screen. It was seen standing amidst the ruins of the old Roman fortress. The Roman walls, tower and gateway, and some of the buildings in the interior of the camp were depicted.

In York Museum is a jewelled silver cup decorated with birds, animals, and interlaced patterns. Some authorities consider it may have been made by one of the artificers from Rome, brought over by Wilfrid. If so, Mr. Benson suggested it might have adorned the altar at York Minster until looted by the Danes, who carried it over Stainmoor to Ormside, from whence it has been restored to York. After speaking of the events which led to the deposition and restoration of Wilfrid, Mr. Benson said many of the nobles sent their sons to be brought up in his household. This was the

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beginning of St. Peter's School, of course not on the present site. Roger of Howden records that on Sunday, April 23, 741, a monastery in York was burnt. Moreover the A.S. Chronicle states this year (741) York was burnt. This fire appears to have destroyed the minster monuments, for there was an absence of such fine crosses of the period as are to be seen in part at Northallerton and Easby. The minster was restored. Archbishop Egbert, accompanied by Alcuin, a youth of twenty, and a scholar in the York school, in 755 travelled through France and Italy, and after a short stay in Rome returned to York, bringing many manuscripts to add to the library. Egbert was succeeded as Archbishop by the schoolmaster, Albert. Alcuin then became master of the school, which was carried on with great zeal. The library was the most famous in Europe. After an episcopate of ten years or so Bishop Albert considered a new cathedral was necessary. It was designed by Eanbald, who was assisted by Alcuin. The plan was similar to that of the churches of Rome. The axis of the old minster appears to have been north-east to south-west, and parallel to the streets in the Roman fortress; that of the new edifice was changed to east and west. The concrete foundation of the latter was revealed in 1829, and a plan made of it by John Browne. The new minster appears to have consisted of a nave 87 feet long and 23 feet 4 inches wide, with aisles and a tower chancel, and having porch chapels or transepts on either side. At the west end was a roofed-in narthex or porch. Alcuin described it as supported by solid columns under curved arches. It had a great number of apartments with separate roofs, and it contained thirty altars. The new minster was consecrated in October 780, to the Alma Sophia by the Archbishop ten days before his death. In the course of further remarks Mr. Benson said it was possible that some day or other York might come to appreciate Alcuin sufficiently to erect near the minster a cross of the Northumbrian type to the lasting memory of this illustrious schoolmaster even as Whitby had done for Caedmon. During the Norman invasion the city was fired and the minster destroyed. The whole of the buildings he had been describing have vanished except Roger's choir, and given place to the present magnificent structure.

THE PRESERVATION OF IRON AND STEEL.*

Introduction.

IT is significant of the present age that the tendency of thought amongst all nations is toward the conservation of natural resources. Increasing consumption of the world's supplies and constant decay of materials menace the future of the human race. It is evident that carbon, from which we derive energy, and iron, which provides the principal means of applying energy, are the materials which should particularly engage the attention of those who are studying the problems of conservation. The annual production of pig iron in the United States alone grew from 13,789,242 tons in 1900 to 25,307,191 tons in 1906; and while for the year 1908, owing to industrial conditions, it decreased to about 16,000,000 tons, it seems sure to again show an increase in the near future. How much of this enormous and constantly increasing world's production of iron and steel is wasted for lack of adequate preservation? Where will the growth of demand stop, and how many years will the world's ore supply stand the drain upon it? These are questions of vast importance, the answers to which can only be vaguely guessed. One thing seems certain: civilisation must learn to conserve more efficiently its stores of iron and steel already manufactured, and seek methods to prevent the almost resistless tendency of iron to return to its lethargic union with oxygen, from which it was won only by the consumption of vast quantities of the ever dwindling coal supply. It is not generally realised that about four tons of coal, or its equivalent, is used in preparing one ton of finished steel from the ore. The world's store of gold is not subject to loss by corrosion, but suffers to some extent from attrition, owing to the softness of the metal. If steel could by any means whatsoever be ennobled, and thus protected from the inevitable decay due to corrosion, future conditions for all possible years to come could be viewed with complacency. It is said † that there exists at Delhi an iron monument that, since the dim beginning of history, has been exposed to the weather without rust or decay, and yet this column has been provided with no protective coating other than that which the atmosphere has itself formed upon it. Could we to-day, with all our boasted knowledge and our great pneumatic processes, build its like? It is probable that we could not, and yet an art is not necessarily lost for ever. It is simply a question of whether or not it is worth our while to rediscover it.

The Corrosion of Iron.

It is the object of this paper to examine into the controlling factors that influence the causes and the cure of the corrosion of iron, and to inquire into the possible practical bearing of the results of recent research.

The author has in previous investigations *referred to the fact that the problem of the preservation of iron has three distinct phases. The first phase is concerned with the manufacture of a metal highly resistant to corrosion, such as is represented by the iron column of Delhi, or the splendid examples of hand-forged metal that have come down to us from past centuries, with which may be contrasted the pitted, lace-like condition of specimens of modern steel after only a few years' exposure to the atmosphere. The second phase concerns the general subject of protective coatings, which may consist of other metals, such as zinc, tin, copper, and lead, or of oil paints, varnishes, lacquers, and bituminous materials, or, finally, the production of a higher oxide on the surface, as in the Bower-Barf, Wells and Speller processes. The third phase includes the interesting study of the passive condition which iron is capable of assuming, and the possibility of maintaining the surface in such an ennobled condition.

Many discussions† have arisen in regard to the several rival theories of corrosion, but the evidence which has been collected in numerous recent researches appears to the author to prove beyond all argument that the corrosion of iron, like that of other metals, is an electro-chemical phenomenon.

In considering the corrosion of iron it is important to remember that, with possibly one or two exceptions, there are no elements that do not either dissolve in or combine readily with iron. It is also unique in the fact that the presence of very small quantities of impurities suffice to change its physical characteristics entirely. On account of this fact metallurgists scrutinise the hundredth of a per cent. of some of the principal impurities that are generally associated with this metal. This is particularly true, for instance, of the element phosphorus. It is so important to modern metallurgy that the amount of phosphorus should be controlled in certain forms of steel, that an animated discussion is going on at the present time between certain interests as to the maximum amount of phosphorus that a steel shall be allowed to contain, and the question at issue amounts to no more than a few hundredths of 1 per cent.

Manganese also is an element which is nearly always associated in modern metallurgy with iron and steel. Manganese decreases the electrical conductivity of iron, and as the percentage of manganese, starting from zero, rises, the electrical resistance increases up to a certain specific maximum. It will be seen that if the presence of manganese in iron raises the electrical resistance, any variation in the distribution of the manganese means that there will not be a constant electrical conductivity throughout its mass, or on any given surface. There is abundant evidence to show that manganese associates itself to a considerable extent with sulphur when both these impurities are present in steel.‡ That manganese sulphide shows a difference of electrical potential against steel is also well known. One who is familiar with the methods of modern metallurgy knows that the manganese is added for certain specific purposes, not as a rule quantitatively, but in accordance with the views of the ironmaster who has control of the mill or furnace. Moreover, the manganese is usually added by throwing lumps of ferro-manganese into the molten metal, either in the furnace itself, or in the ladle into which it

* A paper by Allerton S. Cushman, Assistant Director, Office of Public Roads, United States Department of Agriculture, presented to the Iron and Steel Institute.

† M. P. Wood, *Rustless Coatings*, 1905, p. 170.

* United States Department Agriculture, Office of Public Roads. Bulletin No. 30, 1907; *Transactions of the American Society for Testing Materials*, 1907, vol. vii. p. 209; *Transactions of the American Electro-Chemical Society*, 1907, vol. xii. p. 403.

† *Transactions of the American Society of Mechanical Engineers*, 1894, vol. xv. p. 998; *ibid.*, 1895, vol. xvi., pp. 350, 663; *Zeitschrift für Elektrochemie*, 1903, vol. ix. p. 442; Treadwell and Hall, *Analytical Chemistry*, 1907, p. 92; *Manchester Lit. Phil. Mem.*, 1871, vol. v. p. 104; *Journal of the Iron and Steel Institute*, 1888, No. II., pp. 132–6; *Proceedings of the Chemical Society* (London), 1906, vol. xxii. p. 101; *Journal of the Chemical Society* (London), 1905, vol. lxxxvii., part ii. p. 1548; *Journal of the American Chemical Society*, 1903, vol. xxv. p. 394; *The Analyst*, 1905, vol. xxx. p. 232; *Transactions of the Chemical Society* (London), 1906, vol. xcviii. p. 1356.

‡ *Transactions of the American Society for Testing Materials*, 1908, vol. viii. p. 74.

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has been poured. Chemists know the extreme care that has to be taken in order to get uniform mixtures of substances in the course of chemical operations. In the large scale in which metallurgical processes are carried on, even if it were possible to take great care in the mixing, it still happens that when iron is cooled from the molten state segregation takes place; that is to say, the impurities, although they may have been thoroughly mixed in the molten mass, do not remain homogeneously distributed after the metal is cooled.

For these reasons we must remember that in studying iron and steel from the standpoint of their stability, under the conditions of service, we are not dealing with homogeneous pure metal. It is not difficult for an electro-chemist to believe that when such material is immersed in, or even brought into contact with, an electrolyte, electrolysis will take place upon the surface and thereby induce rapid corrosion. It is probable that the corrosion of all metals is more or less due to electro-chemical action. Before metals can be attacked at ordinary temperatures in the presence of water they must first pass into solution, and in passing into solution become ionised. This is true of copper, zinc, lead and other metals that suffer corrosion.

In accordance with the conceptions of Nernst * and the modern theory of solutions, all metals have a certain solution pressure which will operate until counterbalanced by the osmotic pressure. Iron, however, appears to differ from the other metals in one important respect. The corrosion of iron does not take place evenly and uniformly over the surface. On the contrary, it is a matter of common observation that iron corrodes rapidly at certain weak points, the effect produced being known as pitting. That this effect is produced by local electrolysis would hardly be doubted, even if it were not possible to demonstrate it by the use of the ferroxyl indicator.

Early in his investigations the author † observed that whenever certain specimens of iron or steel are immersed in water or in a dilute neutral solution of an electrolyte to which a sufficient quantity of phenolphthalein indicator has been added, a pink colour is developed. If the solution is allowed to stand perfectly quiet, it will be noticed that the pink colour is confined to certain spots or nodes on the surface. The pink colour of the indicator is a proof of the presence of hydroxyl ions, and thus indicates the negative poles. It may be added that some specimens of steel exhibit this phenomena much more quickly and distinctly than others.

Since phenolphthalein shows only the nodes where solution of iron and subsequent oxidation does not take place, Walker ‡ suggested the addition of a trace of potassium ferricyanide to the reacting solution, in order to furnish an indicator for the ferrous ions whose appearance marks the positive poles. If iron goes into solution, ferrous ions must appear, which, with ferricyanide, form the well-known Turnbull's blue compound. If the reagent is stiffened with gelatin or agar-agar, diffusion is prevented and the effects produced are preserved. For this combined reagent, which indicates at one and the same time the appearance of hydroxyl and ferrous ions at opposite poles, the author has suggested for the sake of brevity the name "ferroxyl." If the reagent has been properly prepared the colour effects are strong and beautiful. In the course of a few days the maximum degree of beauty in the colours is obtained, after which a gradual deterioration sets in.

In the pink zones, as would naturally be expected, the iron remains quite bright as long as the pink colour persists. In the blue zones the iron passes into solution and continually oxidises, with a resulting formation of rust. Even the purest iron develops the nodes in the ferroxyl indicator, but impure and badly segregated metal develops the colours with greater rapidity and with bolder outlines. This result would of course be expected, as in pure iron the formation of poles would be conditioned by a much more delicate equilibrium than in impure iron, where variations in concentration of the dissolved impurities would stimulate the electrolytic effects.

The ferroxyl mounts are prepared as follows:—A 1½ per cent. solution of agar-agar is first made by dissolving a weighed quantity of powdered agar in the requisite amount of water. This solution is boiled for one hour, fresh water being added to replace that lost by evaporation. It is then filtered while hot, and 2 cubic centimetres of standard phenolphthalein indicator added to every 100 cubic centimetres solution, after which it is brought to a perfectly neutral condition by titration with a tenth normal solution of potassium hydroxide (KOH) or hydrochloric acid (HCl), as the case may be. The addition of 7 cubic centimetres of a 1 per cent. solution of potassium ferricyanide to every 100 cubic centimetres of solution is then made, and the ferroxyl reagent while still hot is ready to use. Enough of the reagent should be poured into a Petri dish just to cover the bottom and the dish floated in cold water until the agar has jellied. A clean sample of iron is then placed on this bed of jelly and covered with the hot solution. After the final addition of agar the dish should not be moved until thoroughly cool. While the colours sometimes show up immediately, they usually require from twelve to twenty-four hours to attain their most perfect development. The mounts may be preserved for many months by keeping the surface of the agar covered with alcohol.

In the author's opinion these effects which are produced in the ferroxyl indicator constitute a visible demonstration of electrolytic action taking place on the surface of iron and causing rapid corrosion at the positive nodes. This electrolytic action, which is shown to take place whenever iron rusts, should not, however, be confused with the rapid destruction of steel in the neighbourhood of vagabond currents from high potential circuits used for electric lighting or tramways. In order to avoid such confusion of terms and ideas, it has been proposed to speak of the underlying electro-chemical cause of corrosion as autogenous * electrolysis, or more briefly, auto-electrolysis.† It is not the author's intention at present to collect all the evidence which tends to prove that auto-electrolysis always takes place when iron rusts; this has already been done in numerous papers by several independent investigators.‡ The case may be allowed to rest on the evidence of the ferroxyl test, which at least is conclusive as to the fact that iron is going into solution and oxidising more rapidly at certain points than at others.

(To be continued.)

* H. C. Jones, *Elements of Physical Chemistry*, 1907, p. 449.

† United States Department Agriculture, Office of Public Roads, Bulletin No. 30, 1907.

‡ *Journal of the American Chemical Society*, 1907, vol. xxix. p. 1257.

* Proposed by G. W. Thompson.

† Proposed by R. H. Gaines, *Engineering News*, 1908, vol. lix. p. 583.

‡ Whitney, *Journal of the American Chemical Society*, 1903, vol. xxv. p. 394; Cushman, United States Department Agriculture, Office of Public Roads, Bulletin 30, 1907; Walker, *Journal of the American Chemical Society*, 1907, vol. xxix. p. 1251.

NOTES ON BOOKS.

"Greek Architecture." By Edith A. Browne. (London: Adam & Charles Black. *3s. 6d.* net.)

To concentrate the history and explanation of Greek architecture into the small compass of thirty-six pages of square demy octavo, in large type, so that a reader, knowing "nothing whatever about Greek architecture" and whose "knowledge of classical history is what an earnest student would dub elementary," may in a short hour or two be enlightened as to the sources from which Greek architecture sprung, the causes that actuated its development and the merit of the achievement it attained, is a remarkable performance, and we congratulate the authoress of this little volume on the perspicacity with which she has selected the essential and the lucidity with which she has expounded the material elements of Greek architecture. The Philistine who reads this book can scarcely fail to understand it, and, having understood, will be possessed of such a true comprehension of the salient features of Greek architecture that he will not need further instruction until he leaves the ranks of amateurs and joins that of the professional or earnest students. Commencing with an account of "The First Builders in Europe," the titles of Pelasgic, Primitive and Prehistoric are dismissed as misleading, and the positions of the Mycenæan, Ægean and Minoan civilisations in the history of ancient art are explained briefly but clearly. Then we have the character and methods of "the Greek builders" and the nature and form of "Greek buildings" concisely and yet adequately described, followed by a chapter on "Greek Means to Beautiful Ends," in which the root principles of Greek architecture are logically formulated and from which the amateur will learn that its excellences are founded on situation, proportion, form, line, ornament, sculpture and colour. A final chapter explains "The Influence of Greek Architecture," and having completed this the reader will understand the inwardness of Greek building and comprehend the "great artistic debt owing to the Greeks by the world in general and the European builders in particular." Not the least valuable part of the book is the series of forty-eight full-page illustrations from good photographs of Greek buildings as they appear to-day.

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"Steel Construction." The *Illustrated Carpenter and Builder* Technical Manuals. (London: John Dicks Press, Ltd. 6*d*. net.)

This manual is described as "an easy introduction to the science of designing and building in steel." Though it is offered to the student of constructional engineering as an introductory text book, it is suggested that many architects and builders in general practice will probably find that the work will meet all their requirements. This seems rather a reflection on the profession. It is, however, safe to say that anyone who masters this primer will be better qualified to deal with this form of construction than some architects who make an extensive use of steel. The chapters are clearly written, and as far as possible exclusively treat of one feature at a time; beams, columns, connections, roofs, grillages, floors, bracing and staircases, steel cage work and ferro concrete have each their separate chapters. The novice may be puzzled by the misprint on p. 15, where we are told that "beams" are usually subjected to what is termed *beading*" —instead of "bending." The subject is a difficult one, and no doubt it has been reduced to a surprising degree of simplicity; the book, however, has not yet made it quite so simple as the A B C.

"Reinforced Concrete Construction." (London: *The Local Government Officer*. 1*s*.) "Simplified Methods of Calculating Reinforced Concrete Beams." (London: Whittaker & Co. 6*d*.)

The above are two booklets in which Mr. W. Noble Twelvetrees deals with a subject of which he has long made a study. The first is based on articles which he recently supplied to the *Local Government Officer*, and is divided into four chapters. Chapter I. explains the theory of beams and columns, Chapters II. and III. give formulæ for each, and Chapter IV. deals with practical construction. Mr. Twelvetrees in his second pamphlet offers "a standard system of notation capable of meeting all requirements and harmonious with the notation employed more or less consistently by writers on construction." Under the existing conditions something like chaos exists, and anything that can be done to make order out of it must be welcome. The system should be considered by some of the engineering societies.

OUR CONTEMPORARIES FROM OVER-SEAS.

THE *American Architect* illustrates the Carnegie Library Building of the Georgia School of Technology, Atlanta, by Messrs. Morgan & Dillon; the College Building of the Atlanta College of Physicians and Surgeons, by the same architects; and the First Presbyterian Church at Chattanooga, for which Messrs. Bearden & Forman and Messrs. McKim, Mead & White are associated as architects.

The *Berliner Architekturwelt* occupies itself with some of the civic buildings of Rixdorf, which town has grown to a population of about 217,000 from the 90,000 that it contained in the year 1900. A Rathhaus on a large scale has been projected and partly erected, from the designs of Reinhold Kiehl, and two of the municipal schools are also illustrated. Herr Reinhold Kiehl is the architect of these also.

The *Engineering Record* (New York) completes the description of the central heating and lighting plant at the United States Military Academy, commenced in previous issues.

Correspondence

[The Editor will not be responsible for the opinions expressed by Correspondents.]

The Institute and Registration.

SIR,—My reason for having given notice to bring forward two resolutions at the general meeting on June 7 is to correct what appears to me to be a wrong impression which has been conveyed to the members of the Institute in the circular letter signed by the president, the four vice-presidents, and the hon. secretary, and posted to every member of the Institute in the envelope with the voting papers.

As a member of the Institute who has followed the registration movement for some years, I am anxious to see its fulfilment in due course. At two general meetings at the Institute, one held on April 3, 1906, the approval of an application to Parliament for a Bill was unanimously agreed. It was then felt that contentious matter should be dropped, as, unless the profession could approach Parliament with practical unanimity, there was little chance of getting the Bill passed. So contentious matters were dropped, and the committee recommended in their report that "the Institute should confine itself to attempting to obtain Parliamentary recognition for its membership, an attempt which it was believed would meet with very general support." That belief on the part of the committee was well founded, for their report was unanimously adopted at a general meeting, when it was "resolved, after a revised or supplemental charter had been obtained, that the Council should prepare and present a Bill to Parliament."

This view was held unanimously on April 3, 1906, and was adopted at a subsequent general meeting held at the Institute on March 4, 1907, as follows:—

"The Council have given careful consideration to all the principles above enumerated, and recommend that as a first step a revised or supplemental charter should be applied for, embodying as many of the principles set forth in Section 11 as possible, *and that when this has been done an Act of Parliament should be applied for as soon as practicable.*"

The circular says:—

"As soon as all architects are thus practically united within the Institute, an opportunity will be afforded of considering the possibility of submitting a Bill to Parliament."

To my mind, after the definite and unanimous expression of opinions at general meetings, the wording of the circular conveys an unauthorised change of policy.

Now, to prevent any misunderstanding occasioned by the circular letter, I am bringing forward the following resolution:—

"That in the opinion of this meeting the circular letter enclosed in the envelope accompanying the voting papers for election of candidates to the Council and standing committees does not correctly represent the policy of the members of the Institute as embodied in an adopted report at a general meeting held at the Institute on March 4, 1907."

My second resolution is:—

"That this meeting desires that in future no circular letter be posted in the envelope containing the ballot papers which has not first received the approval of the Council."

I feel that this resolution requires no argument to commend itself. I would, in fact, prefer having the resolution simply put to the meeting without comments. I fear if this form of circularising the members is taken as a precedent an objectionable custom would become established.

Believe me, yours faithfully,

GEORGE HUBBARD.

May 27, 1909.

GENERAL.

West Stanley Council, Durham, have awarded the premiums of 30*l*., 20*l*. and 10*l*. offered for three best plans of new Council offices to the following architects out of sixty-six who competed:—1st, Mr. J. W. Wilson, Sutton Coldfield, Warwickshire; 2nd, Mr. John J. Eltringham, Blackhill; 3rd, Mr. Edwin Bowman, Westgate Road, Newcastle; reserve, Charles Edeson, Scarborough. The estimated cost of the building is 3,000*l*.

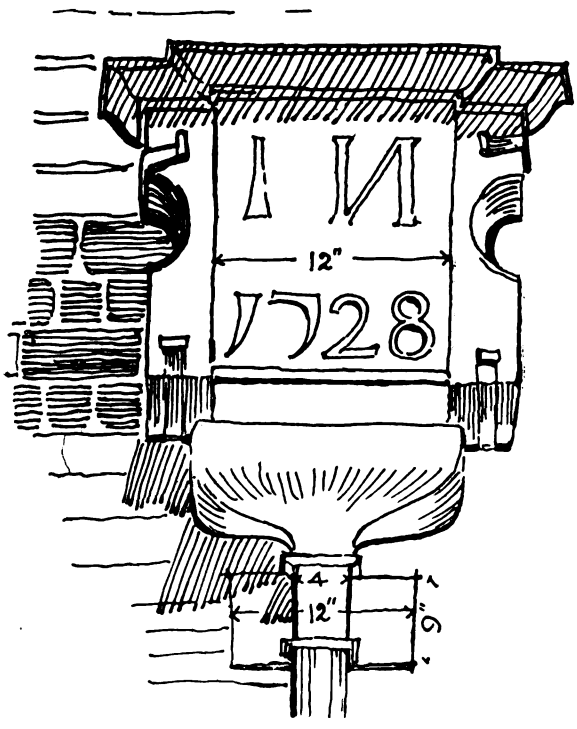
The Council of the Royal Institute of Architects of Ireland held a special meeting at 31 South Frederick Street, Dublin, last week. Mr. F. Batchelor occupied the chair. The President stated that the National University had decided to provide a school of architecture in the University, together with a lectureship carrying a salary of 200*l*. per annum. The report of the professional practice committee was read and adopted. Mr. Batchelor stated that it would be necessary for a representative of the Institute to go to London and interview the officials of the Board of Trade with reference to the Articles of Association. The President was appointed to attend.

At a Meeting of the Canterbury education committee on Tuesday the Surveyor brought up amended plans for the school of art. By curtailing the basement accommodation he had reduced the estimated cost by 800*l*., which would bring the amount of the lowest tender down to 2,400*l*., exclusive of furniture. The plans were referred to committee.

At a Special General Meeting of the Incorporated Association of Municipal and County Engineers, at Malvern, last Saturday, under the presidency of Mr. E. Purnell Hooley (county surveyor of Nottinghamshire), it was resolved, with two dissentients, to change the name of the Association to the "Institution of County and Municipal Engineers."

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RAIN-WATER HEAD AT COMPTON WYNYATES.
From a Sketch by BANISTER FLETCHER.

THE WEEK.

LOYALTY and affection for the present occupant of the Presidential chair saved the vote of censure at the Royal Institute last Monday night, and Sir ASTON WEBB rightly gauged the feeling of the members generally in the line that he took by appealing to their consideration for the personality of Mr. ERNEST GEORGE, of whom it was very generally expressed—in the lobby—that "he is a dear old boy, *but* a very poor chairman." It was widely felt, although Mr. HUBBARD's motion was defeated by a small majority, that the circular issued with the voting papers was a mistake, and it was also very generally believed that Mr. GEORGE had no hand in its initiation or its composition. Hence the sufficiency of the majority was due to the kindly feeling of those who at all costs were willing to help the President out of the mess.

IT would have been far otherwise if all the speeches by supporters of the signatories of the circular had been in the tone of that by Mr. BURNET. There will be grievous trouble in the Royal Institute if the position is maintained that the Council, when elected for the year, are the autocrats of the Institute, and may disregard or flout the wishes and resolutions of the members as expressed in general meetings. The members of the Council are the representatives and executive of the general body, not its pastors and masters. Granted that they have managed their own business so successfully as to become the most prominent men in the profession, it is not likely that the thousands of architects of whom they are the representatives will tamely acquiesce in the business of the Royal Institute being managed by the elect, regardless of the opinions, the knowledge and the experience of their constituents.

THERE is not much probability of the mistake being repeated if one may judge from the amusing eagerness with which the supporters of the signatories jumped at a suggestion by Mr. MIDDLETON that a by-law should be drafted forbidding such a thing in future, and promptly adopted it as an amendment to Mr. HUBBARD's second resolution. When Mr. HUBBARD's propositions were disposed of, nobody seemed to want the answers to Mr. CROSS's questions, which as a matter of procedure ought to have been put and answered first. If they could have been answered satisfactorily there would have been less disposition to discuss Mr. HUBBARD's resolutions, and these would have been negatived in very quick time. Then the meeting might have found an opportunity to proceed with the by-laws, which are now hung up till next Monday.

HOLBEIN's *Duchess of Milan* has been saved for the nation, and the picture will remain at the National Gallery—and the dealers will pocket their profit. Which only shows that if you scream loud enough you can find money in England ready to be contributed to any sentimental object. The Dean and Chapter of Winchester are still some thousands short of the 100,000*l.* that Mr. JACKSON says is needed to make it safe. We have no sympathy with the Dean and Chapter. They do not scream loud enough. But we should like to see Winchester and every other of our cathedrals safe. There are no dealers in cathedrals at present, and therefore no market prices to be engineered for the benefit of American millionaires.

NOW we want a few more patrons of modern art like M. ALFRED HIPPOLYTE CHAUCHARD, the great Parisian milliner, to collect the best of our modern paintings, sculptures, and other works of art, and present or bequeath them to the nation, so that we may have the British counterparts of the works of MILLET, COROT, TROYON, ROUSSEAU, DIAZ, DELACROIX, DECAMPS, and MEISSONIER that now become the property of the French nation. Only our benefactor should start without the dealers, if he is to carry into the acquisition of art treasures the business ability that he has exercised in his own trade.

THE value of the sites of our City churches is so great that we must be thankful for the preservation of the tower of St. Alphege, London Wall, which now seems to be assured. The Vestry have done well to awaken in time and to realise that the key of the situation is in their hands, so that, within reason, they can exact their own terms. Confronted as the diocese of London is with the difficulty of providing sufficient accommodation for the possible needs of growing districts in the outer ring, it is hardly to be expected that any Bishop of LONDON should hesitate to sacrifice an apparently unnecessary church within the City for the tempting price that it would fetch. It behoves the parishioners in vestry, therefore, in each case to see that all the ancient landmarks of art and worship are not cleared out of the square mile.

THE possibility of the winding-up of the Crystal Palace Company, and the consequent destruction of the building, is to be regretted, not only for the sentimental regard that one must feel for that destruction, but also for the loss of the valuable though little appreciated architectural courts and the excellent school of engineering that are now housed at Sydenham. This is another opportunity for a loud scream, but who is to do the shouting? We commend the job to the new Council of the Royal Institute, as they seem so proud of their business ability; and with their wonderful diplomacy no doubt they could induce the Civil Engineers to help.

FROM the *Exeter Diocesan Gazette* we learn that several of the churches in the Woodleigh Deanery have been the cause of anxiety to their custodians and parishioners in respect of the safety of the bells or their containing towers. At Aveton Gifford, Woodleigh, East Allington, Churchstow, Bigbury, Kingsbridge, and West Alvington the belfries and their contents have been examined and set right. Now other churches are supposed to require similar attention—South Milton, South Pool, East Portlemouth, Loddiswell, and Malborough are in terror. The whole movement through the district seems to be the result of a popular scare, which might easily have been avoided if the churchwardens had only fulfilled their duty and kept "ward" over the churches under their care. Bell frames, like arches, never sleep, and in course of time there must come a moment when the stress and strain of bell-ringing is too much for the tower or the frame.

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ARCHITECTURE AT THE ROYAL ACADEMY.—IV.

THE drawing of "Additions to Piper's Corner, High Wycombe, Bucks," by Mr. L. ROME GUTHRIE, leaves one in doubt as to which are the additions and which is the original building, but at least we have a picturesquely grouped result with stately detail incorporated. "Hollingden, Woldingham," by Mr. HAROLD TRIMNELL, is a good design in timber and plaster, novelty and piquancy being obtained by the very sensible use for a summer country residence of a pillared verandah supporting part of the first floor external wall. Messrs. READ & MCDONALD'S "House in Kensington Palace Gardens" breathes the spirit of the locality, the atmosphere of Kensington Palace, and is an able exposition of the character of the architecture of the eighteenth century Royal suburb. "The New Formal Garden, Ardross Castle," by Mr. EDWARD WHITE, shows us in a good pencil drawing an admirable treatment of an approach series of terrace gardens leading up to the house.

Messrs. ERNEST GEORGE & YEATES in "Additions to Maristow, Devon," give us an example of the skill of Mr GEORGE in treating a Classic type of house, no less able than what we have come to regard as his usual manner. A well-drawn piece of detail is shown by Messrs. HORACE FIELD & SIMMONS in "Bank Premises, Okehampton—Detail," but if this is a sample the design of the whole building should be worth seeing. "Part of a Group of Twelve Houses, Hampstead Garden Suburb," by Mr. GEOFFREY LUCAS, is a charming piece of design for elevating the work of the speculative builder to the level of architecture. It is a good augury for the future of middle-class house building in England when we find artistic design becoming recognised as valuable for the sale or letting of the size of house that has hitherto been left to the mercy of the jerry-builder, with his soft-stone carving, tile hearths and mahogany newels and handrails. Good and picturesque design has enabled Mr. W. RUPERT DAVISON to occupy quite a large space on the Academy walls with his series of drawings in one frame illustrating "Bronygarth, Woldingham."

Mr. CHARLES F. A. VOYSEY has completely departed from his usual well-known and now, by plagiarism of his admirers, somewhat hackneyed treatment of rough-cast and green slate in his "House at Coombe Down, Bath." We have here quite a fifteenth-century looking house, reminiscent in detail of the Bishop's Palace at Wells—a stone building with stone slate roof arranged round a quadrangular court, with a real old-time hall, and yet sufficiently modern in its planning to make a liveable house, a happy combination of the spirit of mediæval and modern life. The charm of simplicity, which is one of the features of our domestic architecture in the present day is well exemplified in Mr. HAROLD KENNARD'S design for "The Gables, Amersham, Bucks," in which a home-like character of expression is obtained by the use of a big roof, with long ridge and dormers, that comes down to the level of the ground-floor ceiling and contains all the upper part of the house. Professor STANLEY D. ADSHEAD in his "Albion Terrace, Worthing," shows how the ordinary seaside lodging-house can be raised from the ruck. A plastered building, which, after all that may be said against compo and stucco, makes for dryness at the seaside, is relieved from banality by a moderate use of "Adam" type of ornament, whilst green verandahs and shutters, with a touch of red in the brick rings of bull's-eye windows, give a quite pleasing colour scheme. We first admired these houses in being, without knowing who had designed them, and are glad to find them represented on the Academy walls.

Mr. ARNOLD MITCHELL'S "House at Avon Dassett, Warwickshire," is a mansion of which, though no plan is given, we are able to realise from the coloured perspective picture that symmetrical elevations on each front have interest given by projecting pavilions or blocks, on the cleverly conceived device of an H-plan with an L added at the end of each arm. Messrs. JOSEPH MORRIS & SON in their "Cottage and Stable, Yateley, Hants," give us another example of simple and pleasant treatment with the upper storey in a tile roof over a plastered wall with red brick plinth. "The Rectory, Dinnington," by Messrs. SUTTON & GREGORY, is a good pen and ink drawing of a picturesquely grouped house with mullioned windows, an entirely suitable treatment for a country rectory, sufficiently mediæval to be quasi-ecclesiastical, sufficiently modern to be a twentieth-century house. Messrs. H. R. & B. A. POULTER'S "House in York Road, Camberley," is a quite modern design in plaster walls with wood-framed windows and picturesquely grouped red tile roofs.

Mr. GUY DAWBER, in his "Rebuilding of Nether Swell Manor, Gloucestershire," has used well his opportunity to produce a distinctly seventeenth-century type of big manor-house, quite indicative of the home of a rich and powerful lord of the manor. "New Residence, Bolton," by Mr. ARTHUR J. HOPE, is another instance of a house with a ground storey and a roof, the latter being covered with yellowish-green slates as indicated in the coloured perspective. "A Memorial Fountain" by Mr. H. INIGO TRIGGS is a beautiful piece of detail, shown in a delicate pencil drawing. It is therefore skied. Mr. ALBERT E. BULLOCK'S "Residence at Stroud, Glos.," is a big house designed for Mrs. HALL, in general good, but spoilt by a Brobdingnagian projecting gable over an octagonal bay. Mr. WALTER H. BRIERLEY'S "Exterior View of Bishopsthorpe Garth, York," is shown in an excellent pen-and-ink drawing by Mr. F. L. GRIGGS, and is a picturesque brick building of farmhouse type with pantile roof. Mr. THOMAS L. WATSON'S "Doorway, Ashfield House, Glasgow," is a good piece of detail, sufficiently original to be interesting, sufficiently conventional to be scholarly. "House, Stables and Cottage, Week St. Mary, North Cornwall," by Mr. W. CURTIS GREEN, is chiefly remarkable for its scheme of delineation, a study on grey paper of blue slate and Chinese white plastered walls.

Mr. MAURICE E. WEBB'S "New Staircase, Brockhurst, East Grinstead," is a pleasant piece of original treatment in arcaded wood work. In his "Gorse's Farm, Sussex," Mr. JOHN CASH has taken advantage of varied levels to make quite an interesting building, treated in the simplest way with plain brick walling relieved with tile hung bays. A pretty effect of a house next a river is seen in Mr. CHARLES E. MALLOWS'S "Proposed House near Abingdon," only one corner of which is shown in an excellent pencil drawing. Messrs. NICHOLSON & CORLETTE'S "King's House, Kingston, Jamaica," is, of course, in reconstruction after the late disastrous earthquake, and is apparently a study of a suitable treatment for a reinforced concrete building. "A Façade in Kingsway," by Mr. EDWIN L. LUTYENS, is quite the most successful design exhibited by this versatile architect in the present Academy, an office building, admirably treated with somewhat of a domestic character, but stately, and withal picturesquely interesting. Professor BERESFORD PITE'S "Bank in Euston Road" appears to be an added shop front extension to an old house, adjoining the recently erected insurance office by the same architect, and is clearly a study, marked by originality, of the possibilities of the Pompeian form of Greek architecture.

STUDENTS' DRAWINGS AT THE SOCIETY OF ARCHITECTS.

THE Society of Architects cannot be congratulated on the quality as a whole of the twenty-five sets of designs, or, rather, sets of drawings that have been received and adjudicated upon in the annual competition for their Travelling Studentship. True that the value of this is nothing like that of the Royal Institute prizes, but 25*l.* and a silver medal ought to have brought out a better set of drawings than is now exhibited at the Society's rooms. We understand that a selection of the drawings will subsequently be exhibited at various provincial centres; but the selection will have to be very limited if the Society and its students

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are not to be a laughing stock in such centres as Manchester, Liverpool, Glasgow, and Edinburgh.

The subject set for the competition was "A secondary school, to be planned in conformity with the last building regulations of the Board of Education, and to accommodate 100 boys and 100 girls." The site was an easy one, with a frontage of 225 feet to the north-west, or rather west 30 degrees north, as shown, and we presume correctly, on the winner's plans, with side roads to the north-east and south-west of indeterminate length. The accommodation required was four class-rooms for each sex, headmaster's and headmistress's rooms, assembly hall, the usual cloak rooms and lavatories, chemistry and physics laboratories for elementary and advanced students, with balance room and preparation room, lecture theatre, manual instruction room, cookery room, two art rooms, and two music rooms.

Some students seemed to have but the most rudimentary notions of what a secondary school should be like, and we hope that all the competitors, without exception, will carefully study the paper on the subject read before the Society by Mr. G. TOPHAM FORREST. A criticism on all the drawings submitted has been printed by the Society, but we think they should go further and invite all the competitors to attend under their direction a class of design presided over by a competent instructor. A very large number of the competitors seem to possess but the faintest idea of what design in architecture really is, either as regards plan, composition, or detail.

Amongst the faults very generally to be found in the designs are the bad or improper lighting of the art rooms, the non-isolation of manual instruction-room, cookery room and music rooms, and right-hand light to class-rooms. These faults clearly do not always proceed from an ignorance of what is required, but from an insufficient skill in planning to attain the desired ends, as witness the performance of the *naïve* young gentleman who labels his windows on faces at right angles to each other "north light." He does not designate the aspect of the windows in his art room on the opposite wall to the supposititious "north light."

As the Society has, as we have already said, published a criticism on all the sets of drawings, we do not propose to follow them in this, or to repeat what they have already said. Our remarks on the individual designs are therefore supplementary to those of the Society.

The winning design, by Mr. C. H. HUDSON, has the art rooms on the west 30 degrees north aspect, and would therefore in summer time get a share of the late afternoon sun. Although in the main well drawn, the detail shows a lack of skill in draughtsmanship, the cartouch and amorini over the principal entrance being quite beyond the author's skill. There is a sad lack of knowledge of detail, the exaggerated frieze and diminutive architrave of the entablatures, for example, being variations from the orthodox that have no prescience of genius for their justification.

The design placed second, by Mr. G. LL. EVANS, like the winning one, has the art rooms with the almost western aspect, and moreover quite insufficiently lighted by small windows and skylight with a tunnel shaft that would make the lighting not only feeble, for an art room, but, what is worse, unequally disposed. The balance room is too far from the laboratory. The detail of No. 3 is one of the best bits of drawing in the room, but such faults in planning as a long lecture-room with a through traffic route across the middle, manual instruction and cookery rooms in the main corridor, are hopeless. The elevations of No. 6 with a little more knowledge and experience might have been made comparatively quite decent in the present company. The detail of No. 11 is good, but his design lacks strength and repose. No. 20's plan might easily be made very much better—that is, it has the elements of a good one.

The Royal Sanitary Institute and Parkes Museum will be removed to No. 90 Buckingham Palace Road, S.W., after June 24.

STEELWORK.—XI.

By C. V. CHILDS, A.M.I.C.E.

SHOP practice varies somewhat in its methods in England and America; in fact, the different means employed in cutting up the sections, especially the joists, alter the whole system of obtaining the steel from stock. In England the rolling mills, as soon as the material is rolled and whilst it is red hot, cut the joists into "stock" lengths by means of the hot saws; owing to the metal being sawn hot and the hot saws not being suitable for accurate work, exact lengths cannot be cut in this way. The long lengths of the joists as they come from the rolls are therefore cut up, either into lengths slightly longer than those on order for special work, or else into a certain quantity of approximately even foot lengths ranging between the minimum and maximum likely to be required for the various sections. These then pass into stock and replenish the stockyards of the constructional works. Probably in nine cases out of ten these lengths would have to be cut again on the cold or milling saws, either to dead or some intermediate lengths. The result of this system is that in many cases constructional firms will quote two separate prices, one for taking from stock and the other for delivery a certain time after the material is obtainable from the rolling mills. Taking from stock entails what is known as "cutting and waste"; perhaps a quantity of one section is required of, for instance, a length of 20 feet 6 inches; the works have in stock a few lengths each of 21, 22, 23 feet, &c. In order to supply what is necessary, the works have to cut up these lengths into the required 20 feet 6 inches, entailing a waste of from 6 inches to 2 feet 6 inches on each piece. Even then perhaps they may not have a sufficient number in their own yard and may be compelled to purchase either from the rolling mills or other constructional works' stock, or else wait until the date that that section is put down for being rolled on the rolling mills' programme, this being generally arranged according to the amount of that section there is on order at the mills. All this means delay in regard to delivery, and this delay is not always entirely the fault of the contractor, but should be put down to the system of the rolling mills cutting up their sections into stock or even foot lengths. Even for a large building the contract for the steelwork is not usually let more than a week or two before the steelwork for the ground floor is required; consequently the steelwork for this floor, and in nearly all cases for the first floor as well, has to be taken out of stock. If the steel contractor could be given more time in which to arrange for obtaining the plain material, there would not be so many complaints in regard to his being the cause of stopping the work of the other building trades; there is certainly some excuse for him until the ground and first floor steelwork is erected, but after that there should be none whatever. This system of cutting to lengths should really be taken into account by the quantity surveyor, there being two prices, one for cutting and waste which applies to material from stock, and the other for cutting to exact lengths at the rolling mills; the first should apply to the ground and first floors' steelwork and should appear in the quantities as so many cuts each on the various sections; the second should apply to the upper floors and appear in the quantities as a price per ton.

In America the whole system is different; the constructional shops' stockyard contains very little material but what is actually on order for special contracts. The small amount of material that is immediately wanted is obtainable from the rolling mills' stockyard, the remainder can wait until the rolls go in. As the material that is being rolled for stock comes from the rolls, one crop end only is cut off and the long length of probably nearly a hundred feet passes into the stockyard. This is then cut up to the lengths on order from the constructional works, by means of quick-cutting cold saws. The circular saws are about 4 feet in diameter, and run at about 4,000 revolutions a minute; the friction between the saw and the section that is being cut causes the saw to melt its way through the steel. Nearly all the joists in a steel frame building require to be cut to exact lengths; as these saws are not absolutely accurate, it is the usual practice to cut the joists about ¼ of an inch short; standard sizes of angle cleats are depended on for connecting the joists to the girders; the exact length is made up by allowing the cleats to extend about ⅛ inch beyond the ends of the web of the joist.

This does not make as neat workmanship as cutting the joists to exact lengths on the milling saws; but for building work, where the steelwork is to be buried out of sight, so

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long as the strength is there, a beautiful finish is hardly requisite.

If the English rolling mills would adopt some such system of keeping in their own stockyards the long lengths as they come from the rolls it would always be possible for the contractor to procure the exact lengths he requires by paying the small extra cost of about five shillings per ton direct from the rolling mills. The stock reserve would then be located at the mills, obtainable at short notice; it would save the contractor having to carry a large stock of sections at his own works, some of which may represent dead capital for even years; there would not be the everlasting problem of how to cut up material on order to the least amount of waste; cutting would be cutting only and not cutting and waste; the waste ends would not have to find their way back to the mills, but would be there ready to go back into the furnaces; and finally, the main cause of all the delay that now occurs in getting the steelwork delivered at the site would be eliminated and the cost of steelwork would be reduced.

After the material is cut to lengths the next operation is to punch or drill the holes. Here also there is a difference between English and American practice.

For the better class of work in England the specification calls for the holes to be drilled; as before pointed out, there is a much larger proportion of heavy compound girders in English than in American designs, consequently English shops are better equipped for dealing with this class of work. English constructional engineers find it is easier, and that there is less handling of the material, to drill the flange holes for the compound girders in one operation, by means of batteries of radial drills.

For all other work, such as holes in angles and plates for plate girders, &c., punching is undoubtedly cheaper, and punching does not distort these sections as much as it does the joists, which generally require to be straightened after the flanges have been punched. For the best American work it is usual to specify that the holes must be punched $\frac{1}{8}$ inch smaller than the required diameter, and rhymed out to its full size, which is done by means of pneumatic drills.

For connections this is better even than if the holes were drilled; the connecting members can be assembled and the rhymer passed through, thus ensuring perfect alignment of the connection holes.

Notching the flanges of the joists, or, as it is termed in America, "coping," is rather a troublesome operation; it is usually performed in England by making a cut with the cold saw through the flange and cutting out the web by hand with a cold chisel, another method is to mill out the metal by means of a special milling machine; this makes a beautiful finish, but is a slow and costly process. In America this work is done on special coping or shearing machines; one-half the flange is sheared off, then the other half; this leaves the web extending to the full depth of the joist, which is then laid on its side and the web portion is sheared off on the bevel to fit into the joist, to which the notched joist is to be connected. The whole operation takes but about a minute. The writer once adapted one of Messrs. de Burgh's punches to do the notching according to the American method; this machine could notch ordinary sized joists at the rate of 40 notches an hour, and was capable of notching the largest sized joists; for these latter, however, the cut with the cold saw and the hand chisel is probably as good a way as any; but where works have a large amount of notching to do, such as cross joists, a smaller machine, capable of notching joists up to 10 inches deep, would probably be a good investment.

After the fitting work is done, there comes the question of painting; the safest covering to specify is two coats of linseed oil, either raw or boiled; this forms an elastic transparent skin, which does not conceal defects of workmanship in the same way as an ordinary paint does; no paint of course is of much good unless the steel is first cleaned of scale, otherwise when it flakes off the paint goes with it. As a general rule it is worse than useless to specify any paint that contains pigments, such as red oxide of iron. The reason is this—freshly painted steelwork is slippery, and for that reason dangerous stuff to handle in slings when loading it on carts; the object of the contractors' painters is to make the paint dry as quickly as possible, so as to be able to send it out of the yard; to do this a large amount of drier, such as benzine, is often mixed with the paint. This certainly makes it dry rapidly, but the quicker it dries the less good it is as a protective covering for the steel; such a paint will begin to flake off almost as soon as it is dry, then it is useless to apply linseed oil or a better class of paint unless the first coat of poor quality is scraped off.

After the steelwork is erected and bolted in position just sufficiently to keep it in its place, the practice in America is to have gangs of riveters following the erection gangs, who rivet together the whole of the work; bolts have given place to rivets for all steel framed buildings of any great height. In England this is rarely done, and the connections are almost invariably bolted together. There is not the same necessity for rivetted connections in an English building. The object of rivetting the connections of the steel framework is to give it rigidity; this is most important in a very high building, whose rigidity is almost entirely dependent on the steelwork, and cannot rely to any great extent on that supplied by the walls, which are only external ones, and usually but a brick and a half thick. In the case of English buildings, their height is comparatively small, and the walls substantially thick; so that the walls are quite capable of supplying all the rigidity necessary. Moreover, in America the joist connections depend mainly on angle cleats connecting the web of one joist to the web of another, the bolts or rivets being in shear; hence rivets are preferable to bolts. The practice in English work is rather to make the joist bearings take their seating steel on steel—for example, cross joists rest on continuous shelf angles, and bearer girders are carried on brackets, so that the bolts are seldom subjected to a shearing stress. Cases occur sometimes in English work where it is advisable that the work should be rivetted together in situ, the reason being almost invariably a desire for providing extra rigidity in the structure.

Comparisons are said to be odious, and comparisons between English and American practice have been frequently made in these articles, without, it is to be hoped, wounding any susceptibilities. Each country has evolved its own methods in regard to steelwork design; evolution is governed by environment, and generally works out its own salvation along the lines that suit it best.

America may claim the credit for devising the skeleton framework; in her case it was an absolute necessity in order to satisfy her lofty ideals in architecture. In this country steelwork takes a lower position; it is not so much an absolute necessity, but rather a luxury in architecture. It provides a fire resisting, or rather a non-combustible, material for the floors; it enables the shop-keeper to display a wide and uninterrupted expanse of shop front; it relieves the architect of most of his constructional worries, for walls and chimney flues become independent of open spaces in the floors below; all this it may do and more, but it is very improbable that the typical American steel framed structure, that is to say, a self-contained framework in itself, will ever become the standard method of construction for English buildings. For isolated buildings especially of the warehouse class there is no question as to the suitability of the steel framed building. Where, however, there are such things as party walls, and party walls may mean internal walls dividing a building into restricted cubical contents, and the thickness of these walls remains regulated by our Building Acts, as indeed they are likely to do so, then it is better to consider these walls as a constructional feature of the building rather than as so much dead load to be supported on steel girders and stanchions.

It is a very simple matter to strike a balance between the cost of brickwork and steelwork; for example, take a 20 feet length of wall as required under the present Building Act for an ordinary six-storeyed building; such a wall would carry at each floor level about 5 or 6 feet depth of floor bay at either side of it without exceeding the allowable safe pressure on the brickwork. Under the proposed new Building Act the reduced thickness would save about $2\frac{1}{2}$ rods of brickwork, worth about 40*l.*; in order to effect this saving a steel framework would be required costing about 110*l.* in girders and stanchions; hardly an economic proceeding. When, however, the building rises to ten or twelve storeys, then the balance sheet would show a very different result; in fact, it is then that steel skeleton construction becomes almost imperative.

It will be generally found, where different countries adopt different methods, that these methods are those most suited to the local requirements; this undoubtedly is true in regard to English and American practice in steel construction.

The previous articles in this series, which is now completed, appeared on January 8, 15 and 29; February 5 and 19; March 5 and 19; April 2 and 16; May 14.

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THE HITTITES.*

OUR subject for this lecture is the Hittites, and at the outset I shall beg that indulgence which you will readily accord to the treatment of a new science dealing with an unknown people using an unknown script and language. The subject, however, is not altogether new, so that a lengthy introduction is unnecessary; but inasmuch as it seems to be ten years ago since the problem of the Hittites was last dealt with before the Royal Institution by Dr. Wright, we may refresh our memories by briefly reviewing the circumstances under which that problem arose. Psychologically I suppose that is the right preparation for what will follow.

There were four sources of evidence:—(1) The monuments and archives of the Pharaohs recounting their warfare with the Kheta and their allies in the North of Syria; (2) the references to the Hittites in the Old Testament, vague at all times, particularly in the Book of Genesis, but more readily intelligible after the settlement of the Israelites in Canaan; (3) the later records of Assyria, giving glimpses of the final overthrow of the Hatti; and (4) a series of prehistoric and unexplained monuments associated with peculiar hieroglyphic inscriptions in the North of Syria. It was in pondering upon these materials that Professor Sayce came to the natural conclusion that the unexplained monuments in question must be those of the Hittites, and finding the same hieroglyphics even in the west of Asia Minor was led, in 1876, to his dramatic inference of a forgotten empire, an Oriental Power rivalling those of Egypt and Assyria. It was a brilliant hypothesis, imaginative and scholarly, smiled upon indulgently by the age of over-cautious and easier destructive criticism that is happily passing by, but confirmed none the less thirty years afterwards—that is, two years ago—in its main features by the discovery of Hittite archives at Boghaz Keui, in the north centre of Asia Minor, archives including diplomatic correspondence with the Courts of Babylon and of Thebes. The discoveries of Layard and Schliemann, Mariette and even of Champollion have not had effects more reaching than will these.

As Professor Sayce has published the results of his reasonings, and the main features of the problem are well known, we will select for illustration from this preliminary material only some few details of history and archæology that will be of special interest to us in the course of our inquiry.

Historically, our first reference to the Kheta in the eighteenth dynasty is in the twenty-third year of Thothmes III., B.C. 1474, when they are referred to as the great Kheta, or Kheta the great, in distinction to a possibly smaller element also called Kheta among the Hittite peoples. They were then seated in the North of Syria; but looking back, there are earlier traces of the gathering and oncoming of the various tribes in the North of Syria, who later together formed the Hittite confederacy, under the leadership of the Kheta chieftain. (It is in this sense, by the way, that we use the word Hittite.) Thus in his twenty-third year we find the same king addressing his army before Megiddo, saying:—"That (vile) enemy of Kadesh has come and entered Megiddo, having associated with himself other chiefs of all the lands previously obedient to Egypt as far as Naharina."

The last-named country, seemingly somewhere on the plains between Aleppo or Aintabb and the Euphrates, is mentioned several times previously, even as far back as the "reign of Thothmes," about B.C. 1550; for we find in the biography of Aahmes at El Kab an account of an expedition to repress a rising there, when the narrative says, "We found that enemy who had plotted conspiracy." So that the land had been conquered earlier, though no Egyptian record of the fact has come down to us.

Whoever "that enemy" may have been, we have reason to feel the Hittite presence, even upon the frontiers of Egypt, at a much earlier date—namely, in the twelfth dynasty. The reading "Kheta du Stela," C 1, in the Louvre, has not been explained away, in spite of the wrigglings of philologists. And the strangers immigrant into Egypt depicted on the tomb walls at Beni Hassan are witness to the presence in South Syria of a culture influence which has one peculiarity in common with that which typifies the Hittites—*e.g.*, the turning-up shoe and several features nearly related, as the embroideries and the lyre. This presence of an advance guard, settled already in South Syria, would explain many of the difficulties of the references in the Book of Genesis. However that may be, from the time of Thothmes III. onwards the ever-renewed struggles of the Pharaohs with the Hittites are matter of common history. In the time of Amenhotep III. Egypt made an alliance with the Mitani (east of the Euphrates), who report in one of the Tell El Amarna letters a struggle with the Khatti. This struggle was destined to continue, but we learn from one of the recently discovered tablets of Boghaz Keui that it was not until 100 years later that the Mitani country was absorbed into the Hittite power. Further letters in the following reign, that of Khuenaten, indicate the leaguing together of the principalities of Syria with the Kheta, who from the North of Syria had gradually spread their influence south until, in 1375, they were finally established in Kadesh, in the North Lebanon; indeed, a Kheta leader addresses a letter in a foreign language to Egypt about that time.

The monuments of Seti and Rameses the Great take up the story. The offensive and defensive alliance of C——, B.C. 1300, did not altogether end the struggle, for Rameses III. claims to have made a living chief of the Kheta captive; but the circumstances of these later wars are different. It is suggested, indeed, by the name of the mother of Psamtek III. in much later times, viz., Ti-eut-Kheta, that these may have been colonies of the Kheta in Egypt for several centuries. With regard to the treaty of peace, I will refer to one of the seals, which is described as the image of Sut—— embracing the great chief of the Kheta. This recalls, as the late Italian scholar De Cara pointed out, one of the sculptures of Boghaz Keui. These sculptures we shall consider in the light of recent discoveries, but the suggestion at the time was far-seeing and noteworthy. It is also remarkable that the other seal is described as representing the image of Sut—— embracing the great Queen of the Kheta, who was priestess of the god.

From other monuments of Rameses II. we glean much as to the racial types of the Hittite confederates, their arms and chariots and their fortresses. The frontier stronghold of Kadesh is several times represented, showing us the extra mural towers which were used for purposes of defence, giving an enfilading fire against attack. This type was a definite stage more advanced than the Egyptian fortresses that we know, and will be of interest to compare these pictures with plans of Hittite fortresses that we shall consider in the next lecture.

Other temple sculptures (or mural decorations) show us the Hittite captives and warriors, in which many types may be made out, while several are conspicuous. These types may be compared with those of Hamath, Kyzyl Hissar, Eyuk, Kartal. Egyptian evidence of confederacy is confirmed by the Biblical references in the later books. Thus, "All the kings of the Hittites" (I. Kings). Earlier reference (Genesis) places Hittites in South of Palestine around Hebron; intermarriage was frequent. The words, "Thy father was an Amorite, thy mother a Hittite" (Ezekiel xvi. 3, 45), are now full of a new ethnographical importance. This may well have been an earlier settling of Kheta or some branch of the Hittite people, coming by way of the mountain ranges fringing the seaboard of Syria, where the types mostly survive.

Assyrian monuments (Kheta) do not appear until 1100, but the Hittite archives make mention of Assyria 200 years earlier. At the time of Tiglath Pileser, Lheta, in the Orontes, and Carchemish, were some of their cities. Sargon (721-4 B.C.) finally overcame the Hatti.

* Abstract of an illustrated lecture delivered at the Royal Institution by Professor John Garstang, B.Litt., M.A., F.S.A., John Rankin Professor of Archæology, University of Liverpool.

HERTFORD COLLEGE.

By S. G. HAMILTON, M.A.

THE present foundation of Hertford College dates only from 1874, but the College is the heir of two halls which have successively occupied its site. The earliest of these, Hart Hall, was established between 1280 and 1300 by a certain ELIAS OF HERTFORD, from whom the College derives its name and its arms. The device of the hart's head with the cross between the antlers figured on the seal of ELIAS, and probably appeared also on the gate of his Hall, which seems to have been known from the earliest times as *Aula Cervina* or *le Herthalle*.

In 1312 Hart Hall was purchased by WALTER STAPELDON, Bishop of Exeter, and for a time was actually the home of his new foundation, soon removed to the present Exeter College; later WILLIAM OF WYKEHAM'S scholars were housed in its buildings while New College

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was in course of erection. After their migration the Hall remained for a long period a dependency of Exeter College; the scholars of Exeter resorted to Hart Hall for their lectures and performed their academical exercises in common with the scholars of the Hall, under a Principal, who was always the nominee, and generally a Fellow, of the College. This condition of affairs lasted until the time of PHILIP RONDELL, who was Principal 1548-99. Like the majority of his predecessors, he was a Fellow of Exeter, and during the first period of his rule no doubt acted, as they had done, as the delegate of the College in charge of what was described as "their tenement or house ordained for the advancement of learning, commonly called Hart Hall." But when Exeter College, under its new charter of 1566, began to receive commoners as well as scholars within its walls, and to provide for their tuition at home, Hart Hall gradually ceased to be resorted to by Exeter scholars, and by the end of RONDELL'S long principalship had pretty well achieved its independence.

It is natural that the earliest extant buildings of Hertford College should date from this important epoch in the development of Hart Hall. RONDELL built the north-eastern corner of the existing quadrangle, including the old Hall, which was still the dining-hall of the College as late as 1888. It is now the library, and, it may be hoped, will still serve some useful purpose in the College when the library is transferred, as it soon must be, elsewhere. The next addition to the buildings, which still survives, is the Jacobean block immediately opposite the gate. This was built by Dr. PRICE, RONDELL'S second successor, as a lodging for the Principal, a purpose which it served until 1805. The top storey, however, with its gables, so happily designed as to be easily mistaken for a part of the original building, is an addition of the last century, for which the credit is due to the munificence and good taste of Dr. MACBRIDE. The subsequent buildings of Principals ILES (1622-33) and THORNTON (1688-1707) have been demolished, though the kitchen of the former continued in use as long as RONDELL'S dining-hall; and the gates of the latter still serve their original purpose, though hung in a new archway.

In 1710, when Dr. RICHARD NEWTON, the founder of the first Hertford College, became Principal, Hart Hall held the first place among Oxford halls, and rose to still greater eminence under the care of the new Principal, who established in it a scheme of teaching and discipline which he fondly hoped would be a model for the reform of all other halls and colleges. But the great ambition of his life was to make his scheme permanent by procuring the incorporation of his Hall as a college. With this object in view he built a chapel, which was consecrated in 1716, and has been in use until the present time, when it is about to be replaced by a worthier edifice; he built also the south-eastern angle of the College, part of which still remains. By these buildings the southern side of the quadrangle, until then void, was filled in; and with these additions to his Hall, and his code of statutes, Dr. NEWTON applied for a charter of incorporation for Hertford College in 1723. He met with bitter opposition from many quarters, especially from Exeter College, the owner, it must be remembered, of a large part of the Hall. A strong party among the Fellows, led by Dr. CONYBEARE (who became rector in 1730), succeeded in obstructing the progress of NEWTON'S foundation for nearly twenty years. NEWTON'S persistence, however, triumphed in the end, and the new College received its charter on September 8, 1740.

NEWTON had had a hard struggle to found his College, and the College had a hard struggle to maintain its position; for NEWTON, in his scheme of reform, aimed especially at economy, and his method of enforcing economy was to keep his College poor, that it might not be extravagant. The endowment originally proposed would have been insufficient, even if it had been completed; but it never was, and the College was strictly forbidden to accept more. In the circumstances it is very much to the honour of Dr. NEWTON and his successors that the College did actually exist with credit for fifty years. Its most flourishing period was the principalship of Dr. DURELL (1757-75), in whose time CHARLES JAMES FOX matriculated. Under DURELL'S successor, Dr. HODGSON, it steadily declined, and after his death in 1805 no Principal was appointed.

Meanwhile in the shadow of Magdalen College, almost from the time of its foundation, had been growing up a Hall which took its origin from the Grammar Lecture founded by WAYNFLETE for the benefit, in the first instance, of his own foundation. But the lecture attracted other students, who, though not members of the College, occupied buildings belonging and adjoining to it. This small community, existing at first on sufferance, gradually won its way to the position of an academical hall, a position which was fully established by the time that THOMAS HOBBES matriculated as a member of Magdalen Hall in 1601. But its dependence on Magdalen College was unquestioned, and it was a surprise to the Fellows of Magdalen to discover in 1694, after litigation, that they had not legally even the right, which they had exercised for two hundred years, of appointing the Principal of the Hall. By the decision of the Court of Common Pleas, Magdalen College found that a part of the site intended by their founder for the use of his foundation had become the property of the University in trust for a Hall which WILLIAM OF WAYNFLETE had never thought of establishing. So Magdalen Hall continued to occupy its buildings, of which nothing now remains but the graceful turret which is incorporated with the new St. Swithun's buildings of Magdalen College.

After the failure to appoint a new Principal of Hertford on the death of Dr. HODGSON in 1805, the College was falling rapidly to ruin. It was still supposed to exist as long as the eccentric RICHARD HEWITT, the last surviving Fellow, continued as Vice-Principal; but no degrees were taken from the College later than 1810, and HEWITT'S fellowship expired in 1814. The vacant rooms were invaded and occupied by all manner of queer characters, until it became necessary that something should be done to preserve the buildings from further waste. In the end an inquisition was held on May 4, 1815, by Commission under the Great Seal, by which it was found that the College had become dissolved on June 28, 1805, one month after Dr. HODGSON'S death, and its property escheated to the Crown. The fact was that Magdalen College had seen its opportunity to recover what it had lost in 1694. The inquest on the defunct Hertford College was but the first step openly taken to carry out an arrangement by which Magdalen Hall was to be transplanted to the site of Hertford, while Magdalen College was to recover possession of its former property. An Act of Parliament sanctioned the scheme, and the dissolved College was immediately afterwards granted by Letters Patent to the University in order to carry it out. A disastrous, but in the circumstances rather opportune, fire hastened the migration of the Hall. The greater part of the old Magdalen Hall was burned down on January 9, 1820. The first stone of the new buildings on the Hertford site was laid on May 3 the same year, and Magdalen Hall took possession of its new home two years later.

The new buildings of Magdalen Hall consisted of the two blocks of equal size facing the Schools tower which still form the front of Hertford College, but they were then connected, not as now, by the College Gate and Hall, but by a stone screen with an archway in the middle, in which THORNTON'S gates were hung. The southern block was, as it now is, the Principal's house; the northern block occupied by rooms. These buildings, with the addition of NEWTON'S chapel and angle at the south-east, Dr. PRICE'S buildings on the east side. RONDELL'S hall and buttery and Dr. ILES'S kitchen on the north, formed the quadrangle of Magdalen Hall as it stood in 1874. In that year the cherished desire of Dr. MICHELL, who had succeeded Dr. MACBRIDE as Principal in 1868, of turning the Hall into a College was realised through the munificent endowment provided by THOMAS CHARLES BARING, M.P. for South Essex.

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The Act of Parliament by which the present Hertford College was constituted received the Royal assent August 7, 1874; but for more than ten years the new foundation had to content itself with the buildings which had been vacated by Magdalen Hall. It was not until 1886-8 that the first step was taken to provide the College with adequate accommodation. It was then that the new hall was built, with the College gate underneath, in which the doors set up just two hundred years before by Principal THORNTON have found, it may be hoped, their final resting-place. The carving of the drinking stag above them is also reproduced from THORNTON'S gate. By this building the gap in the frontage of the College towards the Bodleian was filled, and the whole front made more ornamental, though the severe simplicity of style, of which Dr. NEWTON had set the example in his angle, is still maintained. Inside the quadrangle the construction of the staircase leading to the hall distantly but distinctly suggests the famous staircase of the Château of Blois.

Mr. T. G. JACKSON, who has borne so great a part in making the outward appearance of modern Oxford what it is, was the architect of the new hall, and it is from his designs that all the subsequent new buildings of the College have been erected. In 1889-90 a large part of the northern side of the quadrangle, containing Dr. ILES'S kitchen, and the mean entry, which had served as the College gate, was demolished, and in its place rose the block of rooms towards New College Street. Soon afterwards the College acquired from the City the site of the old City Ditch on the other side of the street, and from Merton College a piece of ground behind this with a frontage upon Holywell; on this land two sides of what will eventually be a second quadrangle have already been built, and building is still in progress. But the most interesting feature of this recent acquisition of the College is the octagonal fourteenth-century chapel of "Our Lady at Smithgate," the shell of which has been recently exposed by the demolition of the houses adjoining; the doorway, with its carved representation of the Annunciation, has never been hidden. This is the chapel in which, as WOOD tells us, it was the custom for candidates for degrees to "pray for the Regents" (who were to examine them) before entering the Schools close by. It is to be hoped that as much as possible of this interesting relic of mediæval Oxford will be preserved, enshrined in the new buildings with which it is to be incorporated.

Though this and much more remains to be done, the reconstruction at any rate of the older part of the College has now been completed by the erection of the new chapel, which is certainly one of the most pleasing and successful of Mr. JACKSON'S buildings.* The inadequate size of the old chapel built by Dr. NEWTON may be judged by the fact that the oak panelling and the marble pavement of the old have been found just sufficient for the ante-chapel of the new; but it is satisfactory that a place has been found for some memorial of the chapel in which Dr. NEWTON may be said to have laid the foundations of the first Hertford College.

ILLUSTRATIONS.

COMPETITION DESIGN FOR BANQUETING HALL AND BALL ROOM, FREEMASONS' HALL, LONDON.

THIS drawing was submitted with Messrs. ERNEST RUNTZ & FORD'S design in a limited competition for the rebuilding of Freemasons' Hall. This room was intended to adjoin the "Temple," as did the old one, but it is considerably larger, occupying an area of 8,797 square feet, including galleries, being 4,449 square feet in excess of the former hall.

In the main the plan is rectangular; it is divided into three squares, the central one surmounted by a dome 42 feet 6 inches in diameter and 46 feet in height, and having a recess with a gallery over on the east side. The end squares have segmental arched ceilings 38 feet in height, each with galleries, and the whole is decoratively treated in the style of the Renaissance and capable of subdivision by means of partitions into three banqueting halls.

* The new chapel was opened on October 7, last year.

OXFORD COLLEGE SERIES, HERTFORD.—ENTRANCE—INTERIOR OF HALL.

SEE article on page 381 by S. G. HAMILTON, M.A.

LODGE AND STABLES AT CHALFONT ST. GILES, BUCKS.

THIS is planned as a lodge and yard on one side and stable and motor house on the other. The materials are small-grooved Fletton brick lime-washed, and the roof is thatched with Norfolk reeds. The fittings inside cottage and stable are very simple; casements from Messrs. HENRY HOPE & SON, LTD. The architects were Messrs. FORBES & TATE.

HOUSE AT CHALFONT ST. GILES, BUCKS, FOR ARCHIBALD GROVE, ESQ., M.P.

THIS house is built of Dutch bricks and roof with old pantiles. The accommodation is ten bedrooms and four reception rooms. It is situated in the centre of a wood, and since the photographs have been taken the garden scheme has been begun. Messrs. AMES & HUNTER supplied the Dutch bricks and tiles. Messrs. HENRY HOPE & SONS, LTD., supplied the casements and door furniture. Messrs. FORBES & TATE were the architects.

HOUSE AT CHALFONT ST. GILES, BUCKS, FOR J. EDWIN FORBES, ESQ.—NORTH ELEVATION—SOUTH ELEVATION.

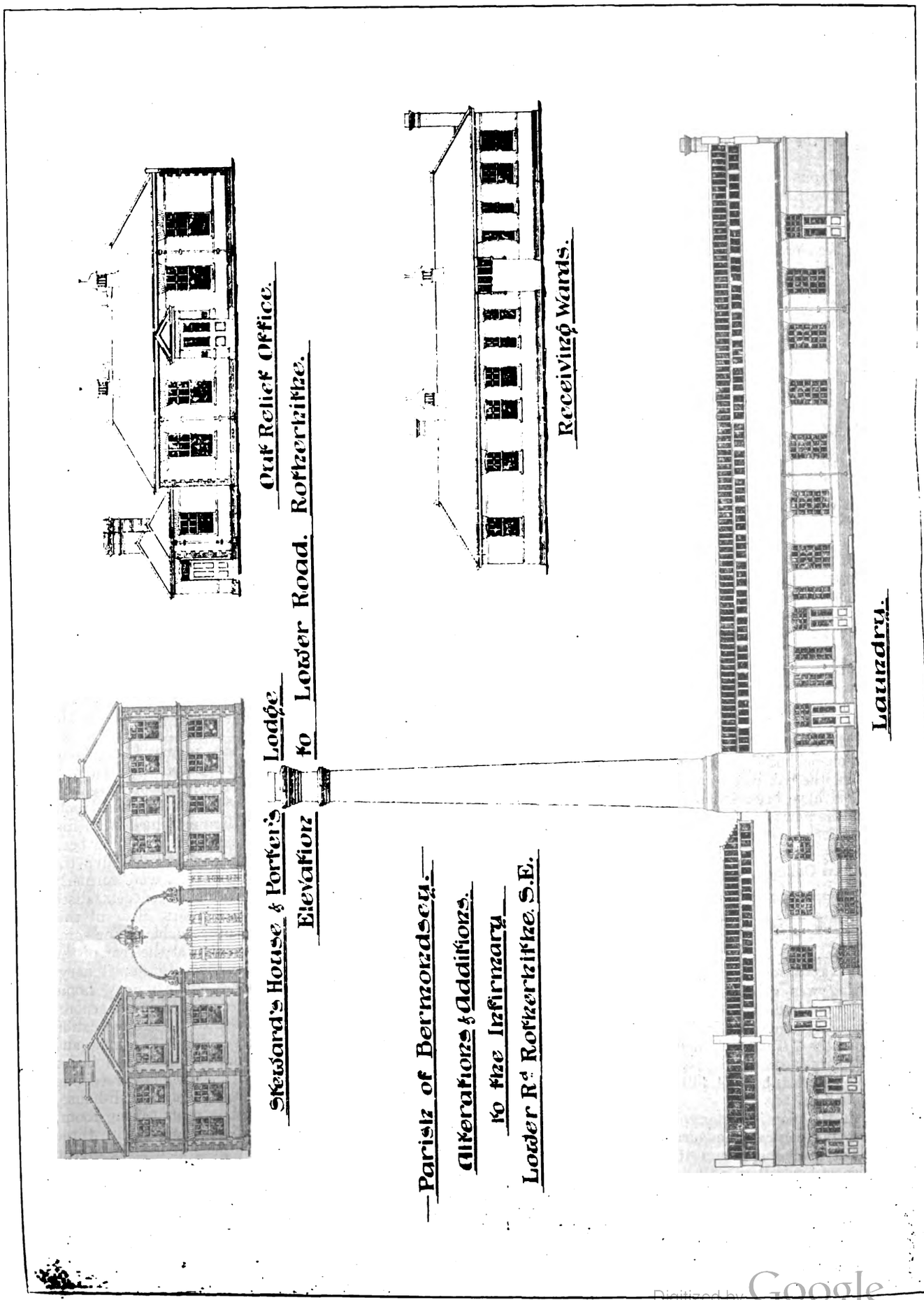
THIS house was designed for J. EDWIN FORBES, of the firm of FORBES & TATE, the architects. It is in the middle of open woodland and is designed with large reception rooms and open-air loggia. The garden scheme was designed by Miss JEKYLL. The house is built in sand-faced bricks and roofed with old country tiles.

PARISH OF BERMONDSEY.—THE INFIRMARY, LOWER ROAD, ROTHERHITHE—SITE PLAN.

THE alterations which have just been completed to the Bermondsey Infirmary have been confined to the staffing and administrative portions of the institute rather than to the wards and patients' accommodation. The site plan illustrated shows the new work in hatched lines and the old work in solid black. With regard to the administration block, however, this plan does not show as clearly as might be desired the large amount of alterations made, which have been chiefly connected with enlarging the capacity of this part of the establishment in order to meet the extra demands made upon it by the increase in the work of the infirmary. Thus, the kitchen and scullery have been structurally enlarged and fitted up with extra and modern cooking apparatus. What was formerly the steward's and his clerks' offices have now been added to and converted into a nurses' mess room and a servery and china store. Rooms which were formerly used as store rooms of various kinds have now been cleared out and used as staff mess rooms. Thus the whole of the dining arrangements, which were formerly spread over several buildings, have now been centralised into the administration block. The first floor of this block has been altered and fitted up as cubicles for some of the staff. The old laundry, situated at the rear of the administration block, has been denuded of its machinery, &c., and refitted as a general store. The nurses' home has been enlarged by the addition of a new wing to accommodate twenty-eight nurses and also by a large recreation room. New bath annexes have been built to a male and a female ward building. The new laundry and boiler house contains, as will be seen from the plan, receiving room, foul linen wash-house, large general wash-house, drying closets, ironing and mangling room, airing room, delivery room, and office. The boiler house, with three 27-feet boilers, which supply the general heating of the institution, and coal store attached, the engine room, fitted with a MARSHALL'S horizontal engine and feed water heaters, &c., and the engineer's workshop, &c., complete this building. The new receiving wards contain male

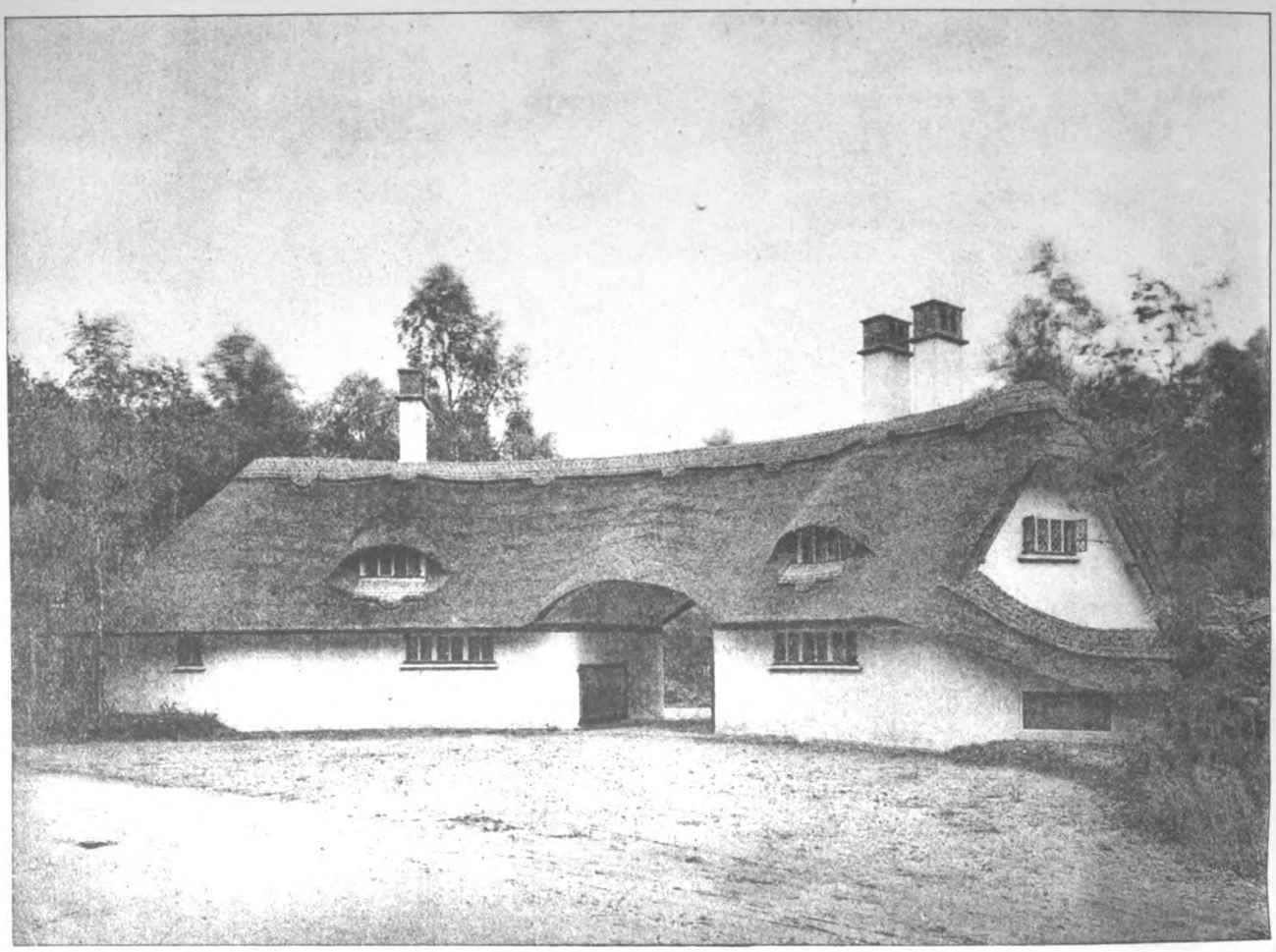
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and female wards, clothes store, bath rooms, &c. The building formerly used as a receiving ward has now been turned into an isolation ward block for male and female patients. The buildings fronting on to the main lower road are the steward's house and porter's lodge on either side of the main entrance gates, and the out-relief building. The engineer's house, as will be seen, is placed near the laundry. The well house opposite is built over a well 316 feet deep, from which water supply is obtained. The contract, for the sum of 41,785*l.*, has been carried out by Messrs. WALTER LAWRENCE & SON, of Canal Works, Waltham Cross; the engineering by Messrs. J. & F. MAY, of High Holborn; well and pumps by Messrs. BAKER & SONS; electric lighting by the Salisbury Electrical Engineering Co., of New Kent Road. The clerk of works was Mr. J. CARPENTER, and the whole of the works have been executed according to the plans and under the supervision of Mr. ARTHUR H. NEWMAN, F.R.I.B.A., F.S.I., of 31 Tooley Street, London Bridge, S.E., the architect to the Board.



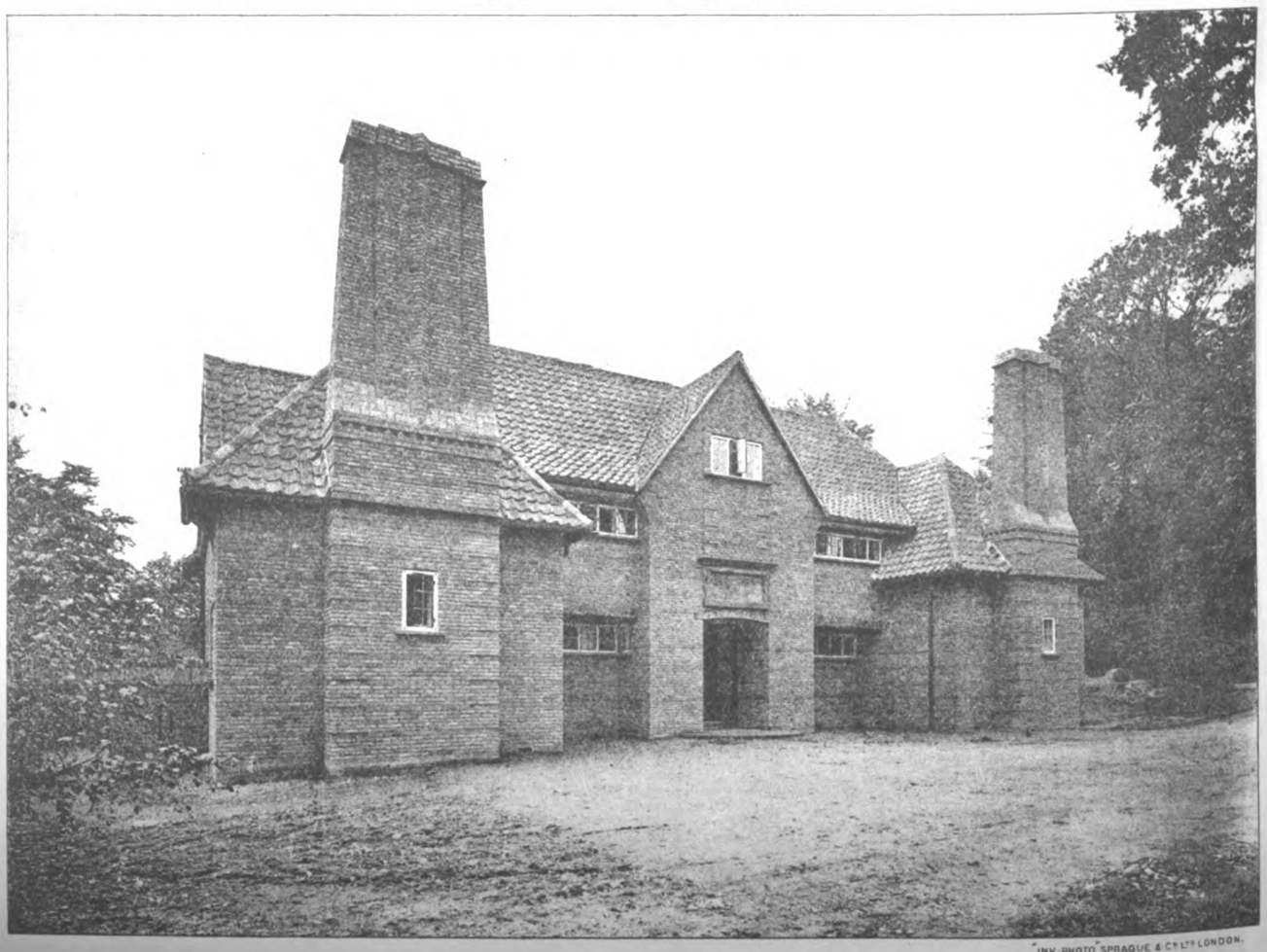
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LODGE AND STABLES AT CHALFONT ST GILES, BUCKS.

Messrs. FORBES & TATE, Architects.



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HOUSE AT CHALFONT ST. GILES, BUCKS, FOR ARCHIBALD GROVE, ESQ., M.P.

Messrs. FORBES & TATE, Architects.

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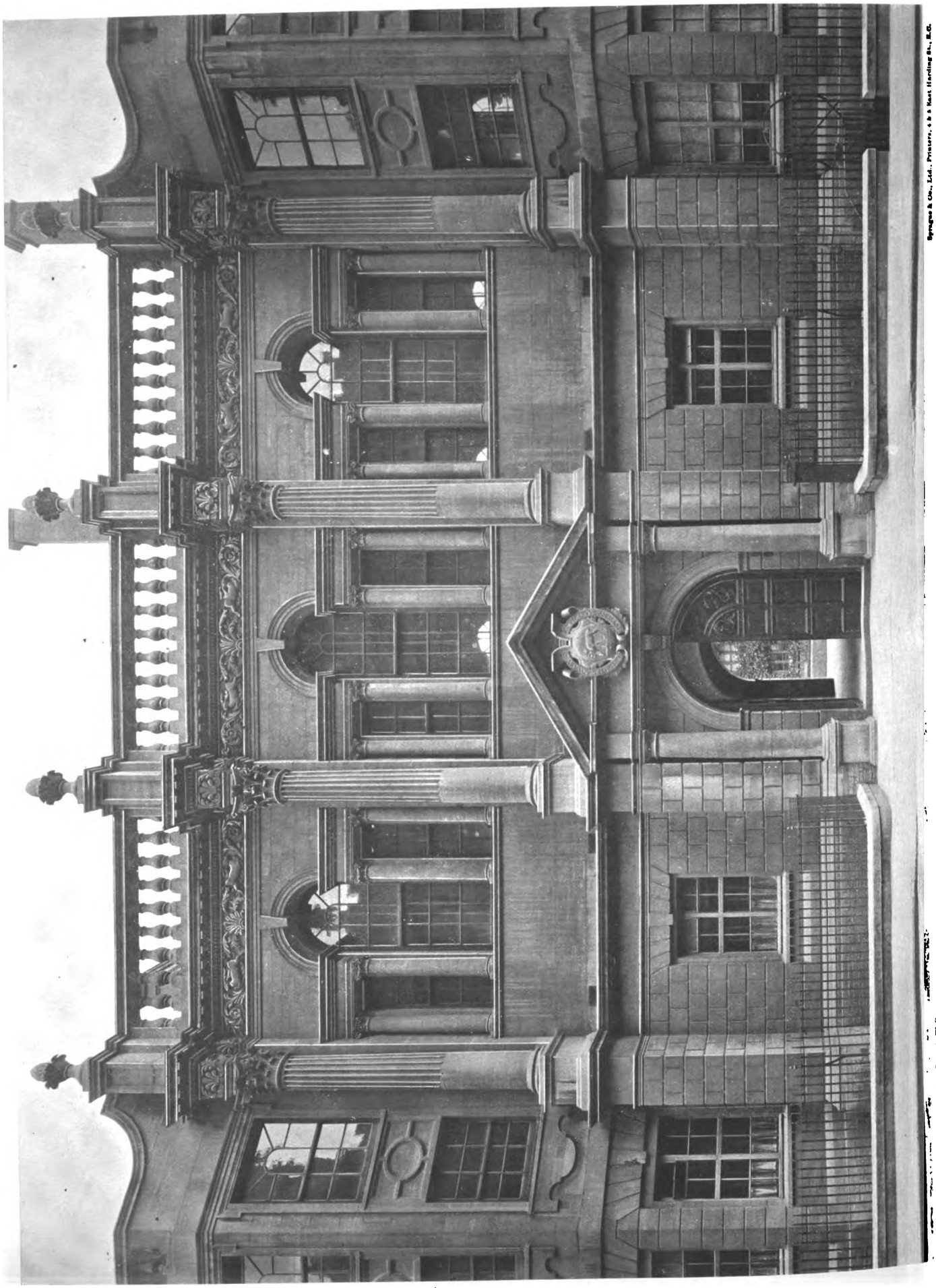


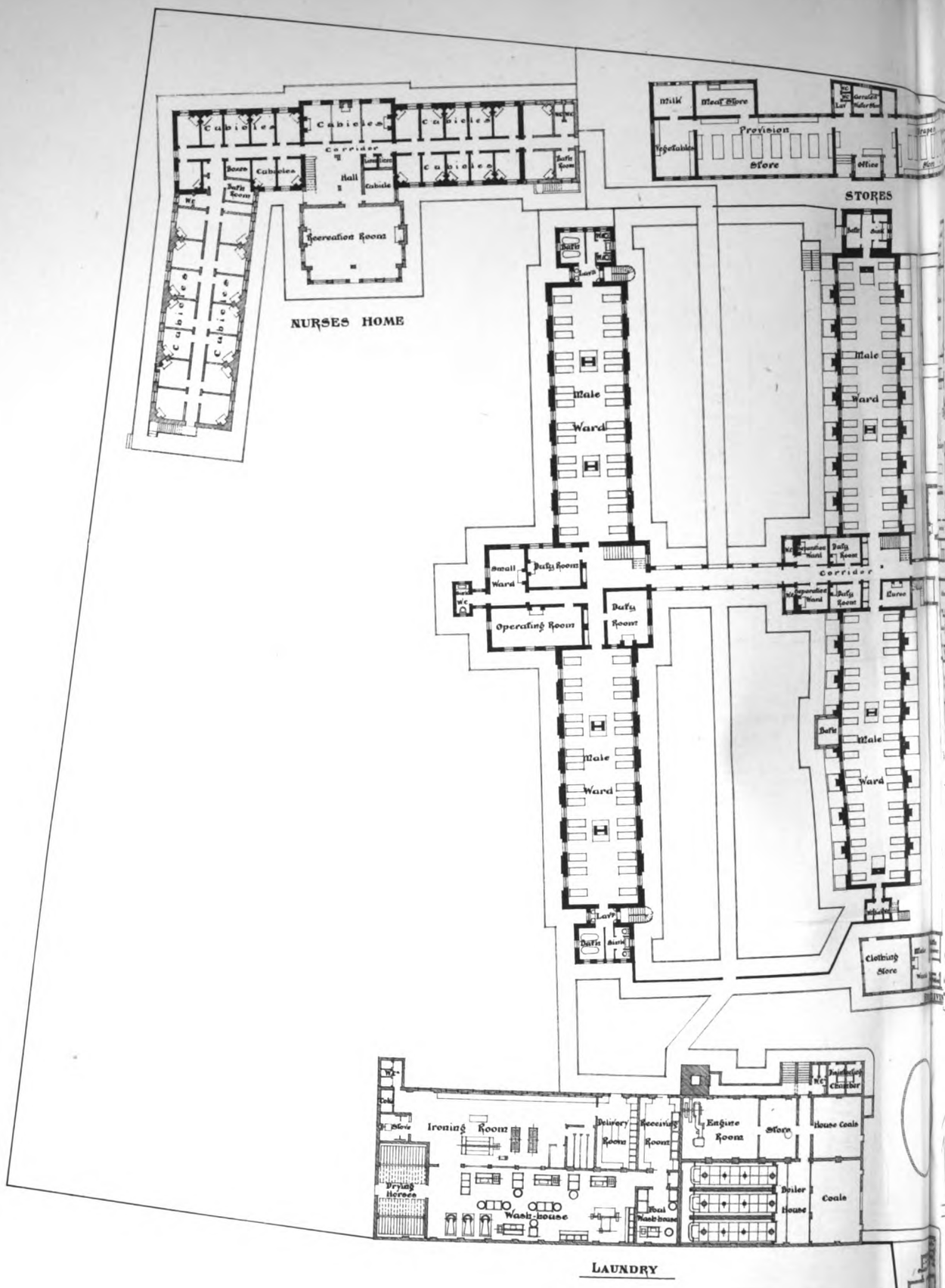
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— PARISH OF BERMONDSEY —

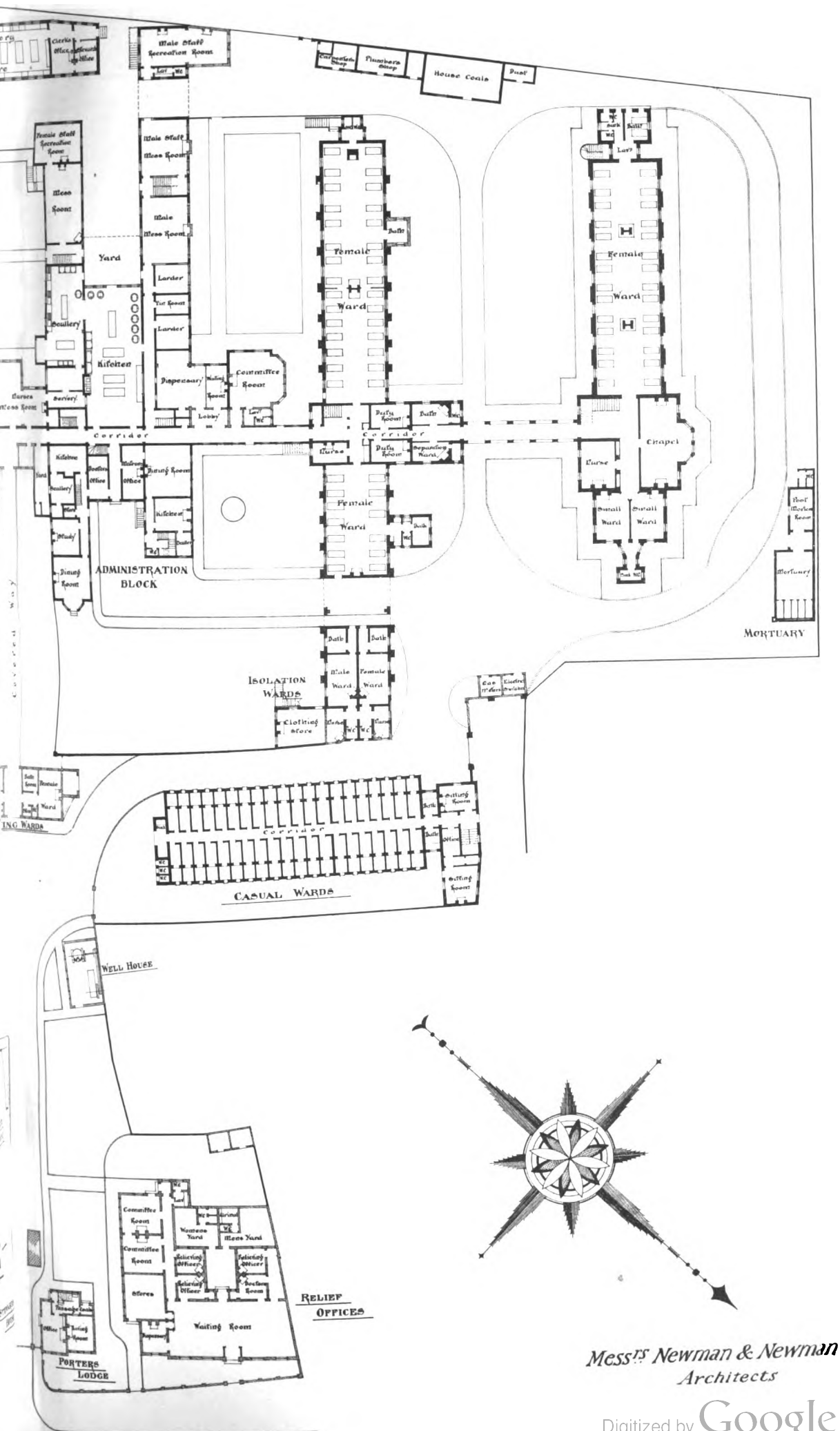
— THE INFIRMARY-LOWER ROAD-ROTHERHITHE —

— SITE PLAN —

SCALE ... OF FEET

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1909.



Messrs Newman & Newman
Architects

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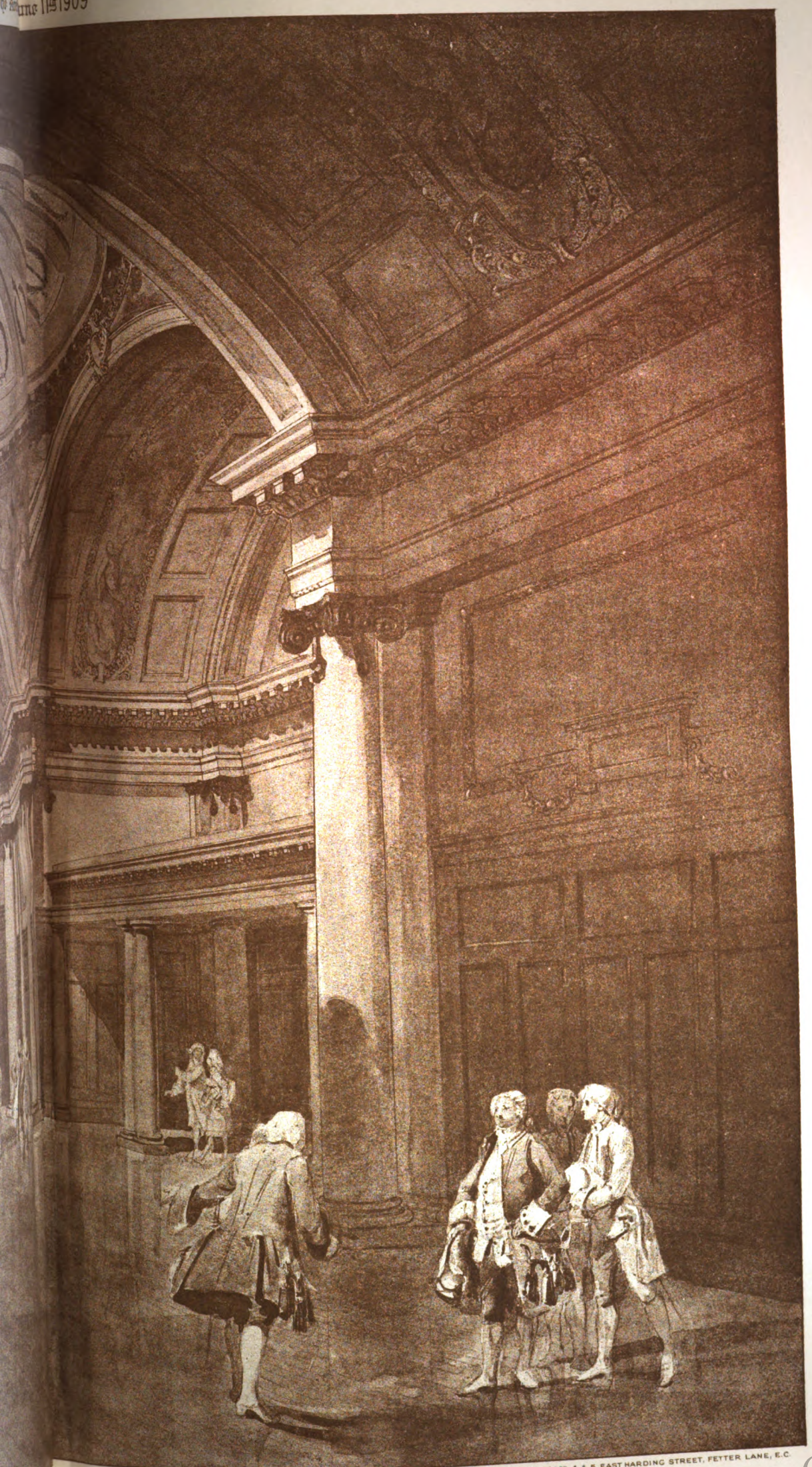
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COMPETITION DESIGN FOR BANQUETING H
By Messrs.

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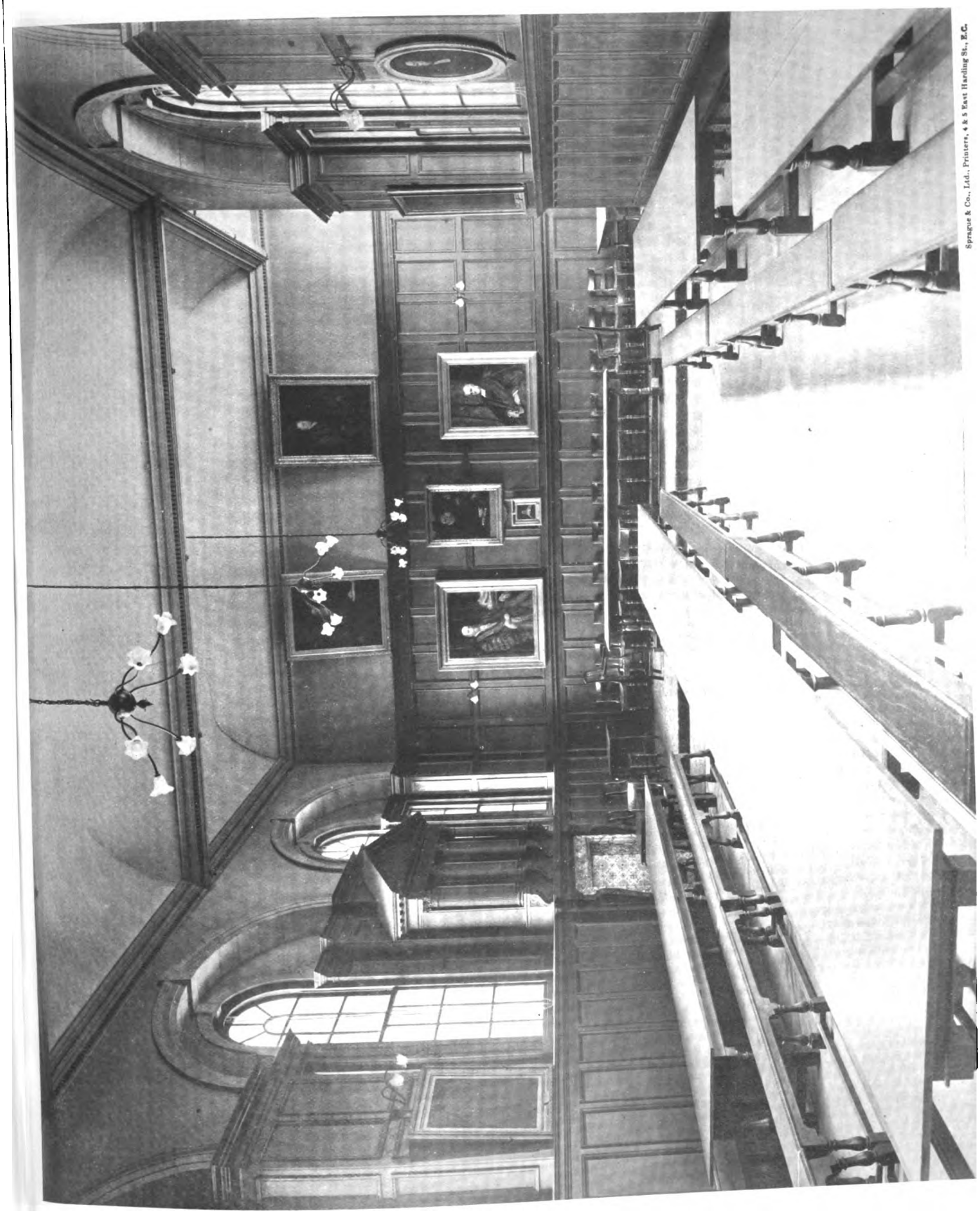
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BALL ROOM, FREEMASONS' HALL. LONDON.

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UNIVERSITY

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OXFORD COLLEGE SERIES. No. 46.—HERTFORD: INTERIOR OF HALL.

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NORTH ELEVATION.



SOUTH ELEVATION.

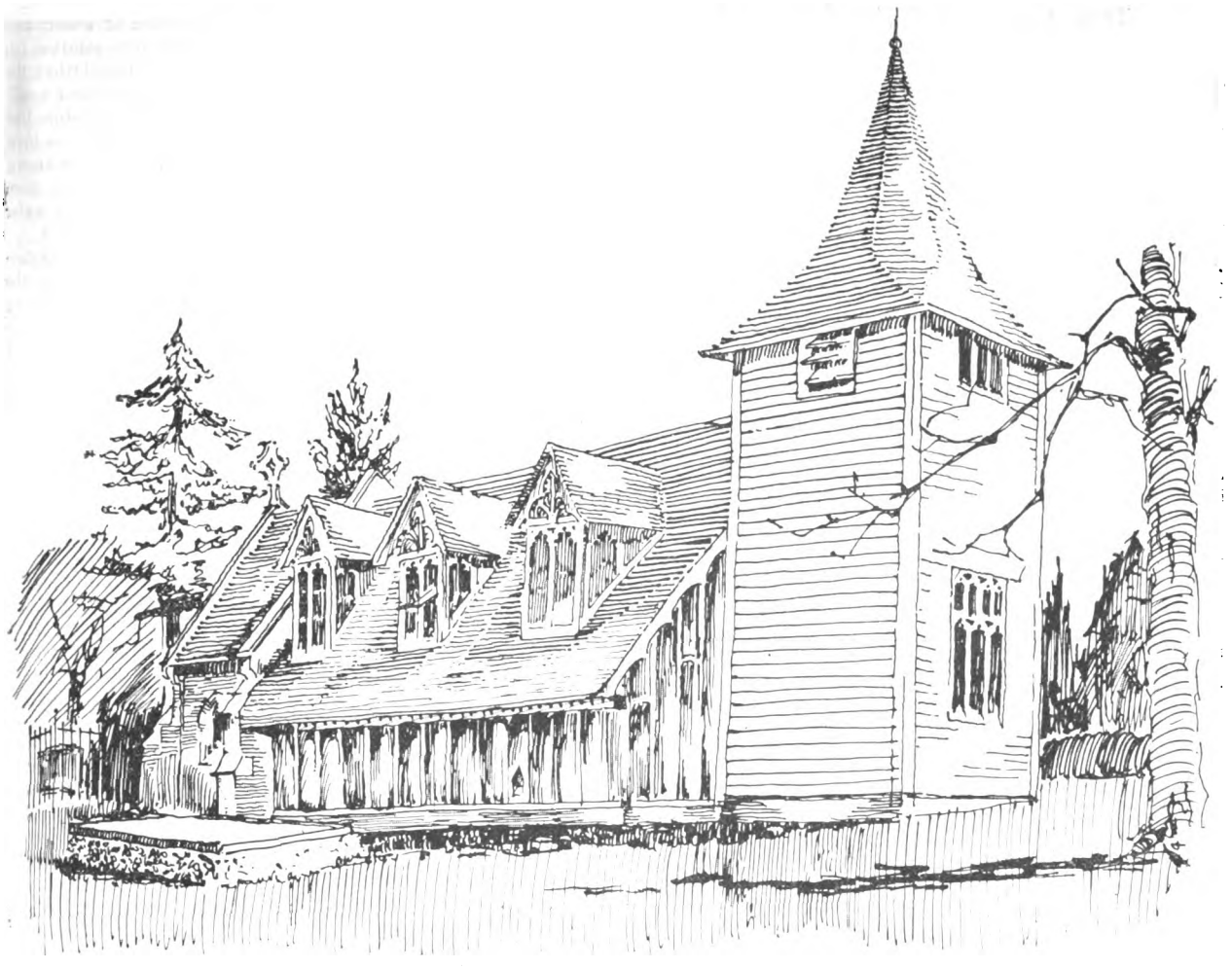
HOUSE AT CHALFONT ST. GILES, BUCKS, FOR J. EDWIN FORBES, ESQ.

MESSRS. BUTLER & TATE, Architects.

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THE SAXON TIMBER CHURCH AT GREENSTEAD, ESSEX. From a Sketch by ADRIAN HARDMAN.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

AT a business general meeting held on Monday last the officers, Council, and standing committees for the ensuing session were declared duly elected, in accordance with the scrutineers' report, as follows:—

The Council.

President.—Ernest George.

Vice-Presidents.—Professor Reginald Blomfield, A.R.A., M.A.Oxon., F.S.A.; Alfred William Stephens Cross, M.A.Cantab.; Edward Guy Dawber; James Sivewright Gibson.

Hon. Secretary.—Henry Thomas Hare.

Members of Council.—John James Burnet, A.R.S.A. (Glasgow); Max Clarke; William Adam Forsyth; John Alfred Gotch, F.S.A. (Kettering); Alexander Graham, F.S.A.; Edwin Thomas Hall; George Hubbard, F.S.A.; Henry Vaughan Lanchester; Edwin Landseer Lutyens; Mervyn Edmund Macartney, F.S.A.; Charles Edward Mallows; Ernest Newton; Andrew Noble Prentice; Halsey Ralph Ricardo; John Slater, B.A.Lond.; Leonard Stokes; Paul Waterhouse, M.A.Oxon.; Edmund Wimperis.

Associate Members of Council.—Alan Edward Munby, M.A.Cantab.; Professor Charles Herbert Reilly, M.A.Cantab.; Herbert Winkler Wills; Arthur Needham Wilson.

Representatives of Allied Societies.—Frederick Batchelor, A.R.H.A. (Royal Institute of the Architects of Ireland); George Bell (Glasgow Institute of Architects); George Thomas Brown (Northern Architectural Association); Arthur Stansfeld Dixon, M.A.Oxon. (Birmingham Architectural Association); Thomas Edgar Eccles (Liverpool Architectural Society); Mowbray Aston Green (Bristol Society of Architects) Percy Robinson (Leeds and Yorks Architectural Society); John Watson (Edinburgh Architectural Association); Percy Scott Worthington, M.A.Oxon. (Manchester Society of Architects).

Representative of the Architectural Association (London).—Henry Tanner, jun. [*F.*].

The Standing Committees.

Art.—Fellows: Walter Henry Brierley, F.S.A.; Edward Guy Dawber; William Flockhart; James Sivewright Gibson; Henry Thomas Hare; Professor William Richard Lethaby; Edwin Landseer Lutyens; Edwin Alfred Rickards; John William Simpson; Paul Waterhouse, M.A.Oxon.—Associates: William Henry Bidlake, M.A.Cantab.; Arthur Thomas Bolton; Sydney Kyffin Greenslade; Thomas Geoffry Lucas; Walter John Tapper; Septimus Warwick.

Literature.—Fellows: Alfred William Stephens Cross, M.A.Cantab.; John Alfred Gotch, F.S.A.; George Hubbard, F.S.A.; Halsey Ralph Ricardo; Professor Frederick Moore Simpson; Professor Ravenscroft Elsey Smith; Richard Phené Spiers, F.S.A.; Henry Heathcote Statham; Charles Harrison Townsend; Paul Waterhouse, M.A.Oxon.—Associates: William Curtis Green; Herbert Passmore; Arthur James Stratton; Harry Inigo Triggs; William Henry Ward, M.A.Cantab.; Percy Leslie Waterhouse, M.A.Cantab.

Practice.—Fellows: William Henry Atkin Berry; Max Clarke; Alfred William Stephens Cross, M.A.Cantab.; George Hubbard, F.S.A.; Sydney Perks, F.S.A.; Alfred Saxon Snell; Henry Tanner, jun.; Thomas Henry Watson; William Henry White; William Woodward.—Associates: Edward Greenop; Edwin Gunn; Edwin Richard Hewitt; Harry John Pearson; Horatio Porter, M.A.Cantab.; Augustus William Tanner.

Science.—Fellows: Harry Percy Adams; Max Clarke; Bernard Dicksee; William Dunn; Matthew Garbutt; Francis Hooper; Charles Stanley Peach; Sydney Perks, F.S.A.; Herbert Duncan Searles-Wood; Lewis Solomon.—Associates: Henry William Burrows, F.G.S.; Edwin Richard Hewitt; Alan Edward Munby, M.A.Cantab; Digby Lewis Solomon, B.Sc.Lond.; Ernest William Malpas Wonnacott; Ernest Alexander Young.

Auditors.—John Hudson [*F.*]; Charles Edward Hutchinson [*A.*].

The following members were elected:—As Fellows.—Arthur Thomas Bolton, Frederick Dare Clapham, Henry Arthur Crouch, John Stanley Heath, Edward Skinner (Ceylon), Percy Leslie Waterhouse. As Associates.—Donald Macpherson Gordon (Montreal), James Charles Morrell (Melbourne), Harold Beckwith Richards (Detroit, Mich., U.S.A.), William Arthur Rigg (London).

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THE CONCRETE INSTITUTE.*

(*Concluded from last week.*)

THE cement introduced into these mills for the purpose of finishing was in a coarsely ground condition, having previously been dealt with by some form of preliminary grinder, during which process, owing to the friction entailed, the temperature of the material was raised to a point ranging between 140° and 160° Fahr. The friction due to the action of the attrition of the steel balls or flint pebbles against themselves, the sides of the mill, and the passing cement, caused the temperature in the tube mill to be still further increased, and it was at this point where moisture was introduced in the form of a regulated supply of steam, which still further increased the temperature and enabled it to be maintained at a point above 180° Fahr., preferably about 200° Fahr, at or above which temperature the operation is most successfully conducted, and the cement operated upon was made to take up uniformly throughout an amount of water, in practice about 1 per cent. or a little under, with which it combined chemically, and which could not be expelled except by ignition.

The thoroughness of the process will be realised when it was understood that the time of passage through the tube mill was about two hours, and that each particle of cement was being continuously submitted for that period of time to a moist atmosphere acting upon its surface, which latter was removed by the attrition of the balls or pebbles, exposing a fresh surface upon which a similar action took place, until the whole left the mill at a temperature which had been gradually increasing until the operation was complete. In this way the operation of exposure to moisture was accomplished at a temperature above the critical point necessary for the purpose, and in such a manner that no mechanical difficulties presented themselves in the blocking of the machinery or apparatus.

The facts mentioned in reference to the importance of carrying out the process at or above a certain temperature were not generally known.

Now let them return to the other method of retarding the setting time known to the ancients, i.e., the addition of gypsum to the product of the intermittent kiln during or after the process of grinding.

With this class of cement, containing already sulphates equivalent to about 1.5 per cent. SO_3, derived, as previously stated, from the sulphur compounds in the fuel, it was generally sufficient to add 1½ per cent. of gypsum to obtain a slow-setting cement; the effect, however, in most cases was only transient, as it was well known that the effect of aeration, even when the cement was packed, almost invariably resulted in such cement returning first to its original quick-setting condition before subsequently becoming slow setting, and largely inert through excessive exposure to the atmosphere. This peculiarity of cements slowed by gypsum had been the cause of much difficulty to the manufacturer, and many conflicting theories were propounded as to the cause of such reflex action.

A slow-setting cement containing 0.95 per cent. of SO_3, of which only 0.35 per cent. was added, retained this property of slow setting for long periods in commercial packages, as it was also known to do when stored in bulk.

It was difficult to give any definite chemical or physical explanation of the fact that the presence of as little as 1 per cent. of combined water in cement, which had been taken up at a high temperature, should not only in itself have the effect of appreciably slowing the setting time, but that when present in conjunction with even small percentages of gypsum the slowing effect of the combination was maintained.

The presence of 1 per cent. of combined water had also an enormous influence on the action of cement when tested for soundness under the boiling test, more particularly under the method invented by Le Chatelier and now usually adopted, by which method and with which apparatus it was thought the actual expansion of the cement could be measured.

By means of the steaming process described the proportion of gypsum required to be added to produce a slow-setting cement was much reduced, and if advantage were taken of the greater solubility of plaster of Paris ($CaOSO_3\ \frac{1}{2}H_2O$) over that of raw gypsum ($CaOSO_3\ 2H_2O$) the quantity of SO_3 introduced into a cement might be reduced to a minimum.

The author had referred to this subject on former occasions. Inasmuch as the effect of gypsum in retarding the initial set of cement depended upon the rapidity of solubility in the period immediately after the addition of water, and the quantity that could quickly be brought into solution (in which condition it was alone active), it followed that the form of gypsum having this property most developed would be the most effective. The quantity required to produce like results when plaster was used might be one-third less than with gypsum, and this was important in view of the known defects produced by the addition of gypsum to cement, more especially if the cement was to be deposited under water (more particularly sea-water) before setting commenced.

Le Chatelier, in a paper read at the meeting of the International Testing Association at Brussels, describing the behaviour of cements in sea-water, said:—"By introducing important quantities of calcium sulphate into hydraulic cements, it is possible to bring about their disintegration at more or less rapid speed; and as a rule destruction proceeds faster when the material is in the sea than when it lies under fresh water."

It was important, in view of the chemical action which was said to take place between the added sulphate of lime (gypsum) or the soluble constituents of sea-water, with the aluminate of lime in the cement, forming a compound said to be sulpho-aluminate of lime, that the amount of added gypsum should be kept as low as possible.

The action referred to by Le Chatelier was continually in evidence with all cements to which more than 2 per cent. of gypsum had been added to retard the setting time, when such cements were tested by the accelerated methods for determining the ultimate soundness, more particularly when they were subjected to the primary stages of that quantitative boiling test, which appeared in most specifications, introduced by Le Chatelier himself and which bore his name.

This test was designed with the object of detecting rapidly any inherent unsoundness in cement, so that a knowledge as to the constancy of volume of any cement might be obtained previous to its use in the work.

To those who had much experience in the orthodox working of this apparatus it was apparent that the conclusions drawn might frequently be entirely fallacious, and many perfectly sound cements thereby rejected, while others of doubtful quality for certain conditions of work were not detected. In adopting this test the fact seemed to have been entirely overlooked that many cements, more especially those containing over or about 2 per cent. of gypsum, were found to expand considerably during the primary immersion in cold water and might show but a slight further expansion during the second, or boiling, stage of the operation. Such cements would be passed as satisfactory by this test, and no doubt many would prove to be so, if allowed to harden before immersion in water. It would seem, however, that as at present conducted the test entirely failed to detect (unless a record of the expansion during the cold-water immersion was included) a cement containing an unsafe percentage of gypsum, which cement might be required for work where the concrete was of necessity deposited under water immediately after gauging.

The period of immersion before boiling stipulated in the Le Chatelier test was a very important factor in affecting the results, and appeared to be entirely arbitrary. It might be that certain cements, perfectly sound in cold and in boiling water, and especially those of a very slow-setting character, would fail to pass if boiled twenty-four hours after gauging, whereas at thirty-six or forty-eight hours, or even longer, the results might be perfectly satisfactory.

Now as to the causes of expansion of certain cements when boiled, this might be due to (1) an insufficient reduction and amalgamation of the raw materials, (2) incomplete or irregular calcination, or (3) a predominance of small unground particles of clinker in the finished cement. The Le Chatelier test was designed to guard against the results of such irregularities in the course of manufacture, and as regards points 1 and 2 was useful and effective, as unsoundness due to either of these causes might subsequently develop, causing disintegration. The expansion under these circumstances was probably due entirely to chemical causes, resulting either from unbalanced proportions of the raw materials, possibly also in an unsuitable mechanical condition, refusing to form during calcination a chemical combination of the same uniform character as would be the case if chemically balanced and thoroughly amalgamated; or, given a satisfactory raw material in all respects, the expansion on boiling might be due to the fact that during calcination the raw material, either wholly or in part, might not have been brought up to the requisite temperature at which the principal compounds constituting Portland cement were formed.

The expansion, however, due to the third cause, i.e.,

* A paper on the Setting of Portland Cement, read by Mr. H. K. C. Bamber on May 27.

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the presence of unground particles of well-manufactured clinker, came under a different category, for the material causing expansion was of identical composition, and having the same chemical and physical properties as the finer-ground portions of the cement, which latter, per se, were entirely free from expansion when boiled. The cause in this case was rather more of a physical character than a chemical one, although it must be admitted that the hydration of the particles of clinker at the high temperature, which in the author's opinion was the cause of the expansion in this case, was a chemical process.

It was evident that the mere reduction of the clinker to a fine powder did not in any way change the chemical composition of the cement, and if any difference was noticeable under the Le Chatelier boiling test between a finely ground and the same coarsely ground clinker, the former being perfectly sound and the latter showing expansion, this expansion must be due to the action of water at a high temperature on these particles.

In the author's opinion the conclusions drawn from the results of tests under the Le Chatelier method, brought about through this latter cause, might be misleading, because it was assumed that these particles causing expansion consequent upon hydration at a high temperature would equally expand at normal temperatures, which had yet to be proved.

From experiments it would appear that the larger particles of clinker remaining even in a commercially finely ground cement, which were hydrated with expansion when in contact with boiling water under the Le Chatelier test, were also hydrated, and perhaps also with expansion, by contact with steam at a high temperature, although in a comparatively dry condition, during the process of grinding.

This would seem to be the logical reason of the fact that while cement manufactured from clinker chemically well balanced and thoroughly calcined would expand when submitted to the Le Chatelier test, it would not expand under the same conditions if it had been previously treated by the hydrating process.

Attempts had been made to use other materials for regulating the setting time, such as calcium chloride, sodium carbonate, &c., but as far as the author was aware these methods have not proved commercially successful. At the present time the processes employed were practically confined to watering the clinker, hydrating by means of steam during grinding, and the addition of gypsum. With these methods individually, or with a combination of same, cement could be produced having setting times suitable for all requirements.

Although the methods described made it possible to produce cement with definite setting properties, it must be remembered that the activity of the chemical process of setting was dependent upon the hygroscopic condition and temperature of the atmosphere or surrounding conditions under which concrete work was being carried out, a high temperature and a dry atmosphere tending to increase the rapidity of the set, and vice versâ.

Some tests indicating the change in the character of the setting time of cement due to temperature and atmospheric conditions, over which the manufacturer had no control, and which will always exist, were then referred to by the author, who thought their results should induce the engineer, architect, contractor, or other users of cement to supply the manufacturer with the fullest possible detail of the prevailing conditions under which the cement he purchased is likely to be used, so that the experience of those who have made this question a special study might be utilised to the full, and by the avoidance of failures thereby creating even greater confidence in the method of concrete construction, which, although developed of recent years to an enormous extent, was yet in its infancy.

Mr. Edward Holmes along with Mr. Edward M. Gibbs and Mr. Peter Marshall, has offered the Sheffield authorities to formulate a scheme for laying out the Rivelin Valley Road estate with due regard to the ultimate commercial development of the estate, and at the same time preserving the amenities of the valley and neighbourhood. The water committee have accepted the offer with thanks.

The Members of the Edinburgh Architectural Association paid a visit to Glasgow on Saturday under the leadership of the Glasgow Institute of Architects. The party drove round the city and inspected some of the more prominent buildings which have been recently erected, such as the Art Galleries, the School of Art, the Mitchell Library, the Institute of Engineers and Shipbuilders, the Clyde Trust buildings, and the new Liberal Club.

THE PRESERVATION OF IRON AND STEEL.*

(Continued from last week.)

THE electro-chemical explanation of the corrosion of iron is not complicated, and so far has been found in accordance with all the facts. Briefly stated, the explanation is as follows:—Iron has a certain solution tension, even when the iron is chemically pure and the solvent pure water. The solution tension is modified by impurities or additional substances contained in the metal and in the solvent. The effect of even the slightest segregation in the metal, or even of unequal stresses and strains in the surface, will therefore throw the surface out of equilibrium, and the solution tension will be greater at some points than at others. The points or nodes of maximum solution pressure will be electro-positive to those of minimum pressure, and a current will flow, provided the surface points are in contact through a conducting film. If the film is water or in any way moist the higher its conductivity the more rapidly iron will pass into solution in the electro-positive areas, and the faster corrosion proceeds. Positive hydrogen ions migrate to the negative areas, negative hydroxyls to the positive. By a hydrogen ion is meant a dissociated hydrogen atom carrying its equivalent static electrical charge which may be represented by the symbol $\overset{+}{H}$. The hydroxyl ion is written $\overline{OH}$. Water, which may be expressed by the symbol HOH, is made up of the dissociation products $\overset{+}{H}$ and $\overline{OH}$. An acid like hydrochloric acid (HCl) dissociates into $\overset{+}{H}$ and $\overline{Cl}$. An acid is always highly dissociated in solution, while water itself is only slightly dissociated. This explains why the presence of an acid increases the concentration of the hydrogen ions. Ionisation always takes place in every solution of an inorganic compound, and even the purest water is slightly dissociated into its constituent ions $\overset{+}{H}$ and $\overline{OH}$. The more ionised a solution is the higher its electrical conductivity and the more rapid the damage to the underlying iron. If the concentration of the hydrogen ions is sufficiently high, which is only the same as saying if the solution is sufficiently acid, the hydrogen ions wil exchange their electrostatic charges with the iron sweeping into solution, and gaseous hydrogen is seen escaping from the system. If, however, as is usual in ordinary rusting, the acidity is not high enough to produce this result, the hydrogen ions will polarise around the positive nodes, and the so-called electrical double layer of Helmholtz will be formed.† This polarisation effect resists and slows down the action. Nevertheless, although it cannot be seen, some exchange takes place and iron slowly pushes through, as is shown by the development of the blue nodes in the ferroxyl test. For every exchange of static charge between iron and hydrogen at the positive node, a corresponding negative hydroxyl ion appears at the negative node, which is shown in pink with the ferroxyl indicator. In other words, as fast as the iron sweeps into solution, the concentration of ferrous hydroxide grows, but the ferrous reaction appears in one place and the hydroxyl in another. It is now that the oxygen of the atmosphere dissolved in the solution takes up its work, the ferrous ions are oxidised to the insoluble ferric condition, which results in the precipitation of rust and the action of hydrolysis proceeds. The formation of the insoluble ferroso-ferric carbonates and hydroxides changing to the red ferric hydroxide known as rust is familiar to everyone. Even the purest iron obtainable shows the electrolytic nodes in the ferroxyl indicator, which proves that the equilibrium is so delicate that it is affected by the physical condition of the surfaces as well as by the chemical constitution of the metal. In a recent publication ‡ the author has discussed this subject at length. It was observed that in making ferroxyl mounts an indentation, scratch or wound of any kind on the surface of the steel invariably became positive to its surrounding area and thus formed a centre of corrosion. If this had occurred only upon milled specimens which carried a coat of scale or blue oxide, the explanation would be simple; but the fact is, if a freshly polished steel mirror receives a cut before immersion, the marked place comes out in blue and corrosion takes place more rapidly. It has been known

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* A paper by Allerton S. Cushman, Assistant Director, Office of Public Roads, United States Department of Agriculture, presented to the Iron and Steel Institute.

† *Wiedermann's Annaler*, 1879, vol. vii. p. 337.

‡ *Transactions of the American Society for Testing Materials*, 1908, vol. viii. p. 244.

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for a long time that indentations or injuries on the water surfaces of boilers become centres of corrosion and pitting. It has been shown by Walker and others that the polarity is affected by stresses and strains on the surface, and it would seem, in view of all the facts, that this condition is determined by a number of widely different causes, which may be classified as electrical, chemical and mechanical. It seems probable that the surfaces of steel which are subject to the condensation moisture of the atmosphere are always in a state of electrical strain and polarity. The ferroxyl tests show that in a large majority of cases the positive spots once formed remain positive, and so corrosion proceeds steadily to the formation of destructive pitholes.

Those who have followed the above explanation will understand the statement of the author that the rusting of iron is primarily due, not to attack by oxygen, but by hydrogen in its ionised condition. Nevertheless, the function of oxygen in carrying on the process of rusting, although a secondary one, is absolutely essential to its progress, for in the absence of oxygen rust is not formed. It is owing to these separate though co-ordinated functions of hydrogen and oxygen that the formation of rust can be inhibited by the addition to the water of certain oxidising agents, as well as by certain reducing agents, a seeming paradox that no other theory attempts to explain. The strong reducing agent pyrogallol will inhibit rusting by interference with the function of the oxygen, while such conspicuous oxidising agents as chromic acid and its soluble salts, by inducing a passive condition, interfere with the action of the hydrogen ions.

Let us now examine this theory in the light of some additional well-known facts. That the presence of acid is necessary for the continued corrosion of iron has been believed for a long time, and some authorities have even contended that carbonic acid is the sole cause of the rusting of iron. In the opinion of the author this is true only inasmuch as carbonic acid is one of the factors in the hydrolysis which produces hydrogen ions. Iron does not rust in alkaline solutions, which contain an excess of hydroxyl ions, provided the alkalinity is high enough, but in dilute alkaline solutions rusting goes on in a dangerous fashion, the tendency to pit being accentuated. This action is incompatible with the theory that free acid is necessary to induce rusting, but is explained by the electro-chemical theory. Hydrogen and hydroxyl ions can exist in a solution at the same time to a considerable extent only when they are separated or held apart by potential differences, and therefore in the rusting of iron the concentration of hydroxyl ions, or, in other words, the alkalinity, must reach a certain value before rusting is entirely prohibited. This is because, owing to the very slight dissociation of water, an excess of hydroxyl ions would be incompatible with the presence of free oxygen ions.

The Passivity of Iron.

Chromic acid and solutions of its salts inhibit corrosion of iron and steel by inducing a passive condition of the surface. This passive condition is maintained not only while the metallic surface is in contact with the solution, but also for a certain length of time after the iron is clean and dry. The passive condition, however, gradually disappears. There is a vast literature * on the subject of passivity, and the three following theories have been advanced to account for it:†—(1) A layer of oxide is formed on the surface; (2) oxygen is plated out on the surface, polarising it to the condition of an oxygen electrode; (3) the solution tension of the iron is lowered by the change of the elementary iron to the condition of its highest valency, in which state it behaves as though it were a noble metal. The first theory is untenable, and each of the other two, though based on observed facts, offers incomprehensible difficulties. It is not, however, the intention of this paper to discuss these theories, but merely to present the subject in sufficient detail to permit the consideration of the practical bearing of the general theory on the important subject of the preservation of iron.

Preservative Coatings.

The various forms of iron and steel used in the arts and industries may be, for our present purpose, conveniently classified according to the methods in most general use for their preservation.

* For the bibliography and discussion of the passive state, *see* Byers, *Journal of the American Chemical Society*, vol. xxx., Part II. p. 1718.

† H. C. Jones, *Elements of Physical Chemistry*, 1907, p. 441.

Preservative Coatings for Various Forms of Iron and Steel.

Coatings.	Forms of Iron and Steel.
Zinc, tin, copper, lead.	Roofing and sheathing of buildings; wire for telegraph, fencing, suspension cables, &c.; nails, screws, bolts, fittings, &c.; tanks, vessels, and utensils; chains for special purposes; pipes and tubes for special purposes.
Paints, varnishes, bitumens, cements, &c.	Structural iron and steel; decorative iron work, fire-escapes, railings, &c.; locomotives and cars; smoke stacks, gas and oil tanks; pipes; machinery (in part); boats and ships; boilers (on the outside); trolley poles, masts, posts, mail-boxes, &c.
Lacquers, varnishes, japans, and enamels.	Small articles, hardware utensils, implements, tools, cans, &c.
Processed after manufacture to form a skin of oxide, phosphide, or some other compound.	Structural steel, gun barrels, &c.
Usually unprotected.	Machinery (in part); tools and farming implements (in part); chains; boilers and tanks (inside); railroad rails, plates and bolts.

Taking up these preservative coatings in the order indicated, we may inquire how successful the present methods of manufacture and preservation are, and whether or not the electro-chemical explanation of corrosion is likely to be of any practical value in indicating improvements in methods of protection.

It is unnecessary to discuss at length the dissatisfaction which is so widespread among consumers of modern steel and iron, who complain that it rusts and corrodes much more rapidly than older metals made largely by hand-working in past times. The technical and scientific press is crowded with evidence of the truth of this contention.* A prominent American railway engineer, in considering the possible conservation of forest trees which would result from the substitution of steel for hardwood railroad ties, has pointed out that unless more rust-resistant metal is manufactured, such a course could not be economically followed. He further points out that the rate at which both wood and iron decay leaves little to be said in favour of either material, though reafforestation is possible, while iron ore is not capable of reproduction.

(*To be continued.*)

SOME THOUGHTS ON ENGLISH ARCHITECTURE OF TO-DAY.

By VIATOR.

THROUGH which end of the telescope should an observer glance in order to gain the best, the correct, visual grasp of architectural presentments? Should minor details be obscured, and merely broad effects noted; or, on the contrary, should the lens be used that magnifies instead of diminishing the object, thus forcing on our gaze every detail minutely? There are but few buildings that would bear such scrutiny as last implied—few buildings, whether ancient or modern, and (though no laudator temporis acti at the expense of to-day) the latter would bear such scrutiny less capably than the former.

But, irrespective of this, the just mode of observance of any building is that, dependent upon the consideration that a supercritical gazer makes no allowance for general effect, which is, at last, the most desirable effect to be obtained. Whether the principle to be observed is that "he who runs may read" or "he who stands in crowded thoroughfares should not be given too much to read," either of these suggests the desirability of broad effects as opposed to minute detail.

To an increasing extent is this consideration heeded nowadays in the British Isles; the feeling is perhaps French, though ante-dating the entente; nor need we feel any humiliation in thus borrowing from our neighbours; for England's greatness owes its origin to her Norman ancestry,

* *Railroad Age Gazette*, 1908, vol. xlv. p. 24.

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consequently French influence worked upon by insular requirements is without reproach Broad effects, however, do not connote a mask of ugliness; and too often the latter is suggested, whence is obtained the New Art, a deplorable phase, whose passing is not yet.

These few jottings are not concerned with holding up to condemnation or to commendation any individuals or buildings, the object being to display motifs rather than motif-producers. Nor need anything more than this passing notice of ancient art be set down here. The glories of the past are indeed universal heirlooms, gaining in interest and in reverential consideration with the flight of time. The works of to-day, on the other hand, are properly open to criticism, as by this means improvement is possible, and the continuation of exercises and experiments, which can but travesty art, may be thus discouraged.

If we are correct in saying that a building should provide broad effects, this implies that everything in the design and grouping must have the relative importance that it may properly demand—that and no more. A further deduction is that "art for its own sake" is to have a different interpretation from that advocated by extremists, whom we hostilely designate "purists." The expression of art is first and last for the satisfaction of the capable beholder in general, and not of the producer in particular; the over-elaboration observable in some buildings could only be justified if the first-personal equation were admissible. Mutatis mutandis, the same equation would alone justify the cowhouse architecture of to-day.

Dealing with this vast London merely, are there two dozen, are there even a dozen, buildings of the last century that would incontestably rank as fine examples of architecture in the eye of the capable observer? And yet if we set aside a too extremely stringent standard, if we apply but the small lens of the telescope, if we will satisfy ourselves with general effect instead of absorbing inconsiderable details, we shall experience greater and at the same time rational satisfaction from much of our modern architecture, and we shall be cognisant of signs of improvement, giving golden hopes for the future.

The agreement between internal disposition and external expression is becoming progressively marked in these days, even when it entails (what has been termed) an ametrical elevation; such honesty is truly the best policy, the virtue of it bringing in its train the due reward in the increased interest and vigour appertaining to the appearance of a building so treated. It is not many years since such treatment would have been regarded with horror. Let it be granted that the struggle between revealment and concealment is long-contested and that the latter dies hard, but the dragon will finally be slain.

This, then, is one of the broad effects that should be characterised for the benefit of observers, and another is the abolition of meaningless and superabundant adornment of surfaces. The eye demands that these shall be broad and restful, and that groupings shall be well defined and well disposed. The desideratum is for ornament that is characteristic of the building, and for such ornament only; or, if there be no special character, then the decoration should be at least restful and of good repute.

In this respect, too, the signs of the times are on the whole healthy, though some terrible warnings—or shall we venture to say backslidings?—meet the eye in some quite modern buildings. That sensitive organ seeks a resting-place in such instances as hopelessly as the dove on its first flight from the Ark. Mostly it is modern Gothic that so offends, a fact much to be regretted by true lovers of the vernacular, as the numerous examples of Gothic restraint evidence the superiority of the latter. It is not the application of the small lens of the telescope that will serve to obliterate such over-elaborated designs; nothing short of shutting the eyes can remove the effect of restlessness thus obtruded upon the notice of the passer-by. In the desire, however, to obtain breadth and restraint, some modern work exhibits all the defects of the New Art, which resembles nothing on the earth beneath the heavens, and, it may be fervently hoped, resembles nothing in the heavens above. Broad effects and limitless effects are distinguishable; we want the former and should shun the latter. It is a question of massing, not only in regard to constructive materials, but respecting colour also. We see chessboard treatment here, and there we are confronted and affronted by the spotted fever.

When all is said about the British "sheep" and the proletariat, it is however true that well considered buildings will gain the suffrages of the crowd in its moments of self-forgetfulness; and even though, maybe, unwitting of the basis of its approval, such approval will be far more often just than ignoble. Dr. Samuel Johnson rightly threw scorn on the saying, "He who drives fat oxen must himself be fat," and for all ideas of this nature similar scorn is appropriate; lovers of good design are not necessarily, nor perhaps principally, confined to the ranks of those who can produce it.

The rapprochement between the arts and crafts is in every way to be commended as long as a spirit of selflessness and subordination rules, exhibiting a desire to promote the best results, regardless of the relative prominence or middle distance of the collaborators. Perhaps adherence to this principle will come most easily to the architect, whose portion of the work, in the vast majority of cases, will necessarily hold first rank. But from this very fact it is evident that the architect is thus in the best position to foster to the utmost the friendly collaboration of the other arts and of the crafts. To the unbiassed observer there seems no more reason why architectural qualities should not be applied to engineering structures, than for the engineer to collaborate with the architect, and the latter is found ever ready to subordinate himself in the work on those public memorials where the sculptor takes first rank. Such being the case, the architect should be able to reckon on the cordial co-operation of others, whether artsman or craftsman.

It is a hopeful sign in present-day England that we have set aside the restless searching after a new style; the period is not far to seek when such searching was in evidence, but now the attempt to create a style has given place to the healthier idea of grafting on to existing types the motifs naturally arising from modern requirements. To reject ancient and established styles, whose merits are apparent, would be childish; but side by side with them, or, as just suggested, by adapting their underlying characteristics, a new style or many new styles may arise by degrees. Evolution is always to be preferred to revolution.

DISCONNECTING TRAPS.

AT a meeting of the Sanitary Inspectors' Association held recently at Bath, Mr. J. T. Moss-Flower, C.E., F.R.S.I., opened a discussion on the disconnecting trap in drains. He stated:—

That it is most desirable that there should be fixed on the line of drain between the house and the sewer an intercepting trap, so as to keep the sewer air as far from the house as possible.

That the fixing in a proper manner of an intercepting trap of suitable size, shape and form affords an effectual barrier to the passage of any germ of disease or sewer air from the sewer to the house.

That he had examined the drainage of houses where there was no intercepting trap between the house and the sewer, so that the sewer air was enabled to pass freely to the inside of the house through defective drains and sanitary fittings, and that this was alleged by medical attendants to have been the indirect, if not the direct, cause of the specific form of disease from which the inmates were suffering.

That he had examined the drainage and sanitary arrangements of a large number of houses where in each case there was an intercepting trap on the line of drain, and he gave particulars of the defects discovered, such as periodical syphoning of traps of water-closets, which allowed drain air to enter the house, and which, but for the intercepting trap, would have given a free and uninterrupted passage to the house for the sewer air.

That, in the absence of a trap on the line of drain, any germs of disease which may find their way into the sewer from an infected stool or otherwise may pass up the house drain of a neighbouring house and into the house through one of the numerous defects that may exist in the drains and general sanitary arrangements and be imbibed by the inmates.

That he had never known any evils to arise in connection with the numerous systems of drainage constructed by him during the last twenty years in connection with which intercepting traps were fixed, and that of the large number of intercepting traps fixed by him he has only known of one becoming choked, and that was due to the carelessness of workmen in allowing some cement to fall into the well of the trap.

That the abolition of the intercepting trap would prove very disastrous, and that it would not be advisable in any case unless the public sewers were constructed, covered,

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cleansed, ventilated and kept at all times so as not to be a nuisance or injurious to health, and unless the house drainage and general sanitary arrangements of all houses draining into the public sewer were also constructed and maintained constantly in a perfectly sound state; but since it is not possible to insure this, the intercepting trap is the best safeguard to the health of the inmates of houses.

That where complaints have been made against the use of the intercepting trap they arise from one or more of the following defects:—(*a*) The trap is too large or too small; in the former case difficult to flush, and in the latter liable to choke. (*b*) The trap is of improper shape and form, offering obstacles to the flushing out of its contents. (*c*) The invert of the outlet of the trap is on a level with, or above the level of, the inlet, in the latter case causing the sewage to pond back in the drain. (*d*) Carelessness of workmen in fixing the trap out of level, either tipping it towards the outlet, thereby breaking or reducing the water seal, or tipping it towards the house and making the outlet higher than the inlet, thus causing the sewage to pond back in the drain, as in (*c*); also in not clearing the cement from the inside of the pipes at the joints, &c. (*e*) By fixing the traps, in cases where there are no special automatic flushing tanks, so far from the house that all ordinary flushes of water have so spread out along the invert of the drain as to have no flushing power by the time they reach the trap. (*f*) By giving too little fall to the house drains to which the traps are connected, causing the traps to choke. (*g*) In the case of disconnecting chambers by fixing intercepting traps with inspection eyes leading to sewer, which inspection eyes are capped by a plain stoneware disc that can be easily blown out by pressure of air or otherwise, these stoppers under normal conditions being seldom tight and allowing sewer air to enter the drain.

That the foregoing defects can be avoided if proper care be observed, and that by carefully selecting the trap and taking due care in fixing and in selecting the position no evils need arise, and that as regards the inspection eye on the outlet end of manholes the disc closing the opening should be so arranged that it cannot be removed by sewer men thrusting the rods up the house drains from the sewer, or by pressure caused by sewage or air, and yet so that it could, if necessary, be quickly opened from the ground level without entering the manhole.

That he has made detailed examinations of a large number of premises where one or another of such diseases as typhoid fever, diphtheria, blood-poisoning, &c., has broken out, and in every case he has found serious defects which admitted either drain or sewer air to the house, to which defects the medical attendant has attributed the disease.

That in other cases, particularly in boarding schools, where there has been no specific form of disease that could be diagnosed by the medical attendant, but a general low condition of health has been prevalent among the inmates, he has found the sanitary arrangements most defective.

That in his opinion it would be necessary, in the event of the intercepting trap being abolished:—(*a*) To insist on a very high standard of workmanship and material in connection with the construction of house drains and sanitary arrangements generally; (*b*) to arrange for a much better system of supervising the carrying out of such work; (*c*) to arrange for periodical tests and examinations at much more frequent intervals than are usual at present to make sure of the pipes and fittings being maintained tight and sound and proof against allowing drain or sewer air to pass into the house; (*d*) to discontinue the practice of providing low-level inlet ventilators to drains, as now provided under most local authorities' by-laws, and to arrange for all ventilating openings to be carried to a point well above the roof and away from all windows. (This plan, it was pointed out, is desirable even where there is an intercepting trap, but it would be much more so were the interceptor abolished.)

That his observations, extending over a period of many years, make it clear to him that the low condition of health shown by the inmates of houses where drain or sewer air has access to the house is often to be attributable to the imbibation of drain or sewer air.

Mr. Moss-Flower then went on to speak of the ventilation of sewers and drains, and said that the ventilation of sewers and drains is absolutely necessary, and in the case of house drains (*a*) to prevent the air in any part of the drains or pipes from being compressed to such an extent (by the discharge into the drains or pipes of water) as would endanger loss by momentum of the water seal of traps; (*b*) to prevent stagnation of the air in the drain, so that if there were defects in the drains or fittings the air passing into the house because of them would not be so harmful or obnoxious as would be the case where there is no ventilation.

That in the case of drains there should be not less than two ventilating openings as far apart as possible, and that low-level inlet openings, now often fixed in basement areas and such places, should not be permitted, a low-level inlet only being allowed where it can be fixed a long way from the house, and where the discharges from it cannot be a danger to the occupants of the house or anyone else.

That since one of the objects aimed at by those who advocate the abolition of the intercepting trap is the ventilation of the sewer by means of the soil pipe continuation to the roof, the point of outlet for the ventilating pipe would have to be selected with great care, and that in many instances it would be most difficult to find a point which would be sufficiently far from windows and other openings into the house to avoid a nuisance and danger to the health of the inmates.

That the ventilating pipes from the drains of one house should not be so arranged that, although the outlets may be clear of all the openings into the house they serve, they may be a danger to the inmates of an adjoining house, as is very often found to be the case.

That, as regards sewers, his experience teaches him that ventilating openings at the ground level are the most undesirable and give rise at least to serious nuisances.

That, generally speaking, tall ventilating shafts and columns fixed in carefully selected positions are the most desirable, and that in places where columns must be erected in exposed positions and close to frequented places and houses, then one of the forms of lamps for cremating the emanations is desirable.

That if the size and form of sewers are properly apportioned to the work they have to do, and they be constructed of non-absorbent and otherwise proper materials, and be laid with self-cleansing velocities, and be regularly flushed and have ventilating shafts fixed at proper and convenient places so as to prevent undue pressure from rise of temperature, rapid increase in volume of flow, &c., and manufacturers' refuse, which should be properly treated before being discharged into sewers, and steam and hot liquids above a certain temperature be excluded from the sewer, much will have been done to reduce the nuisance caused by the emanation from sewers.

LONDON MUNICIPAL HEAT SUPPLY.

By ALFRED E. WHEELER, C.E.

(*Continued from last week.*)

IN order to make my proposals as clear as possible, I will classify them under the following four heads:—(1) Quantity of heat. (2) Generation of heat. (3) System of distribution. (4) Payment for supplies.

(1) *Quantity of Heat.*

To arrive at the amount of heat which is likely to be required, and which must be provided for, is necessarily no simple matter, and sound judgment, rather than strictly theoretical figures, will be found of the greatest assistance. First it will materially assist if we consider the purposes for which heat will be required, and in this connection I take the opportunity of inserting a reminder that as smoke abatement is the object of the scheme, the coal fire may be considered as out of the question, therefore a quantity of heat sufficient to entirely supersede the open fire must be provided for.

The purposes for which heat is required are generally three in number:—(1) Heating buildings and apartments. (2) Preparing food for consumption. (3) Heating water for domestic uses. In addition to these some consumers may require steam for various purposes.

Either of these objects could be accomplished by means of gas ranges and fires, but there is very little doubt that from the standpoint of cost, which is the factor which appeals most strongly to the majority of the community, Nos. 1 and 3 will be most suitably accomplished by the public supply, as the comparison made in a later section (payment for supplies) shows the cost of heat by supply mains to be infinitely less than that furnished by any other means. We will therefore assume that the great bulk of the heat available will be supplied for purposes Nos. 1 and 3, that cooking will be accomplished by gas ranges, and that small steam supplies may be generated by either means.

The estimate of the population of the County of London, made by the Registrar-General in June, 1906, was 4,721,216,

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and as it is usual with all calculations for public supply to make allowance on a *per capita* basis, I propose to make my calculations for our heat supply on the same lines, although the method is not an ideal one.

As an example of the failure to meet the case in a representative way, the two instances of the boroughs of Kensington and Stepney will clearly illustrate.

The population of the former borough is generally of a superior class to that of the latter, and accustomed to a higher standard of domestic comfort. We should, therefore, quite naturally expect a greater heat demand from Kensington than from Stepney in proportion to the population, yet by our *per capita* method of computation we are confronted with this paradox:—Stepney has 1,700 head of population per acre; whilst Kensington has but 805 head, rather less than half; although for reasons just stated we would expect a greater demand from Kensington than from Stepney, we are actually allowing a *reduced* supply per unit of area.

It would therefore seem to be more accurate to allow heat in proportion to the area or to the rateable value of the houses and buildings. However, for the present purposes, the population method will serve.

It has been estimated that the coal consumption per head for the United Kingdom averages 1.25 tons per annum, which at a heat value of 14,500 B.T.U. per lb. gives a heat consumption of 6,200 B.T.U. per head per hour of an eighteen-hour day.

As previously pointed out, about 58 per cent. of the total heat of the coal burnt in most open grates is lost by imperfect combustion or up the chimney, therefore the net value of the heat per head per hour would work out at about 2,600 B.T.U. To be quite upon the safe side, I propose to calculate on the basis of 5,000 B.T.U. per head per hour, which gives a maximum hourly requirement of some 23,528 millions of B.T.U., supposing that each household were drawing upon the heat supply the maximum amount simultaneously.

For a large portion of the year, during the warmer periods, the London households will require but little heat for warming purposes and a comparatively small amount for hot water supplies. At all times the demand is likely to fluctuate considerably, therefore we are faced by the difficulty of providing for a heat supply which may vary between limits as wide as 50 or more per cent. above or below normal, and which might conceivably involve a large capital charge and interest upon plant lying idle for a considerable portion of the year, a condition to be avoided as far as possible. Here it is, therefore, that our judgment will avail us most in determining what proportion of the total heat we should be prepared with, making due allowance for all possible fluctuations in demand.

As will be presently shown, all heat for whatever purpose would be drawn from the same mains, therefore the variations in demand will no doubt go far to equalise each other. It should also be pointed out that although the figures given represent a capacity sufficient to supply the entire population, a not inconsiderable share of the duty would necessarily fall upon the gas and electric supply companies.

Taking all these various factors into consideration, and duly considering the possibilities of an increase in the number of consumers for which it is necessary to make provision, it is suggested that a plant equal to an hourly duty of 66 per cent. of the total should easily meet all our requirements: the hourly output will therefore be 15,672 millions of B. T. U.

These figures, of course, apply only to the requirements of the residential suburbs of London outside the City. To deal with the latter area is a somewhat different matter, the population being largely a day population only. As a way out of the difficulty, it is proposed to provide for the City a supply in the same ratio to its area as that of other thickly populated districts, an arbitrary figure of 338 millions of B.T.U. per hour being suggested.

(2) *Generation of Heat.*

Before proceeding to a description of the method of generating the heat a brief description of the system by which the heat would be supplied will perhaps facilitate a better understanding of the methods of generation and dissemination. The heat would be generated in specially constructed water tube boilers, provided with forced draught and mechanically fired. Each boiler would have about 5,200 square feet of heating surface and 57.65 square feet of grate surface, and be arranged to burn smokelessly 30 lbs. of coal per square foot of grate surface per hour, with a thermal efficiency of at least 72 per cent. The heat would be distributed by means of water heated to 350 degrees Fahr. under 250 lbs. per square inch pressure, pumped through the supply mains, and returning to the boilers at 250 degrees Fahr., each 1 lb. of water thus conveying 100 B.T.U. The heat would be supplied to the consumers by the indirect method, that is, each consumer would be provided with units of heating surface of a standard heating duty which would be connected to the supply mains with a meter in circuit, the heating surface being fixed in a tank or other enclosure, and surrounded by water for the purpose of removing the heat; the enclosure or tank taking the place of the boiler or calorifier well known to all heating engineers. It will be seen that this system possesses among many others five distinct advantages, viz.:—

1. The water of circulation being constantly re-used, all accumulation of scale is thereby obviated in the mains, and on the interior of the heating surfaces of the boilers, the importance of which cannot be exaggerated, when it is remembered that so much depends upon the tubes of the boilers being kept free from scale, both from the standpoint of expense in cleaning and tube replacement, and also the loss of heat efficiency.

2. This method of circulating the water merely requires the replacement of 100 B.T.U. per 1 lb. of water per hour. If on the other hand hot water were supplied direct to consumers at, say, 200 degrees Fahr., an additional 50 B.T.U. per lb. would need to be transmitted at an increase in fuel cost by probably nearly 50 per cent.

3. To deliver heated water direct would involve a large annual charge for water at the central station, the suggested method avoiding such a charge.

4. The system of generating heat under pressure will permit an increase of temperature by 50 degrees if necessary (while still maintaining the same temperature head), to meet any suddenly increased demand for heat.

5. With a single pair of mains such a system would enable all heat requirements to be met, and while being principally directed to heating water, the heat could also be applied to the generation of small supplies of steam. Further, the suggested method obviates the necessity for separate mains for heating, hot water supply purposes and for steam supplies.

(*To be continued.*)

ART EXHIBITIONS.

THE ninety-sixth exhibition at the French Gallery is devoted to four acknowledged masters of painting; they are Israels, Mathew Maris, Harpignies and Lhermite. Their names will be familiar to everyone who has sufficient interest to pay a visit to the single room at 120 Pall Mall, S.W. But it is almost a certainty that very few of the ordinary visitors will possess anything but the haziest ideas as to the positions occupied by these four great masters and their relationship to contemporary art. If this is the case it would have been a great help had some introductory notes been inserted in the catalogue, thereby rendering more intelligent the admiration and interest which cannot fail to be excited by these sixty works. Mathew Maris is an artist of the strongest individuality, as is suggested by the portrait of himself. Though he has passed the three score years and ten, it is believed that the total number of works by him in existence is less than seventy, and of these seventeen are now on view in the French Gallery. They cover a considerable period of years, and are of sufficient variety to ensure that there will be something attractive for everybody. Only the initiated can appreciate "The Christening," a pastel; but such a picture as "The Young Cook" or "The Prince and Princess" will appeal to all. Each of the pictures shows in a greater or less degree the poetic and fanciful sympathies of Maris. There seems to be one exception to this in No. 11, "On the Beach," where the painter apparently found himself overpowered by the commonplace. Joseph Israels seems to be haunted by thoughts of tragedy, from which he can rarely escape. The place d'honneur of the gallery is accorded to his large picture, "The Drowned Fisherman"—a melancholy procession headed by a young woman with two small children; she is followed by two sailors carrying the gruesome body, and a line of men and women. The storm has almost passed and left the water innocently calm, though its severity is unmistakably shown in the wrecked fishing-smack as well as in the sky. The same feeling of sadness must have inspired the "Sheltering from the Storm," where a helpless shepherd and a small flock are standing assaulted by a pitiless storm. "Honoured Old Age" is a stern portrayal of an old peasant woman trying to warm herself over a small fire, though there is here nothing to wring the heart, for the dame assuredly counts herself happy. The landscapes by H. Harpignies and

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L. Lhermite make an interesting comparison. It is difficult to realise that M. Harpignies painted "Sunset on the Banks of the Ain" at the age of eighty-five. The artist cannot have lost anything with the years to have achieved such a chef-d'œuvre. Unlike many of his other pictures, the atmosphere is full of iridiscence. M. Lhermite is represented by several country scenes. Nos. 44 and 45 might be the same river viewed from opposite banks, yet there is no suggestion of repetition. The whole collection is a memorable one, and it is believed, and it is to be hoped, that it may be exhibited in some provincial cities.

There are many who are reduced by the poems of Robert Browning into a state of bewilderment. It would be incorrect to say that a key is now offered by which their inner meaning may be read; but we do say that a new interpreter has arisen in Miss E. Fortescue-Brickdale, A.R.W.S., whose illustrations have been published with certain of the poems by Messrs. Chatto & Windus. The original of these with a few others are now on exhibition at the Dowdeswell Galleries. No doubt the translation is a very free one, and that Miss Fortescue-Brickdale drew more from her own imagination than she did from the poet. Yet this was almost inevitable in the case of Browning, whose genius was too quick to be content with expanding or developing one fixed idea. The water-colours show at any rate what a wealth of fancy may be drawn out of the poems. The artist has come to her task with the assurance of past successes, and has thereby gained in freedom and boldness. The pictures are gay with colour from a generous palette, and the subjects have all that picturesqueness and charm that might be expected from a lady artist with a love for poetry. On the few occasions when she permits herself to leave the realms of fancy there seems a certain lack of pleasure. An exception is, "But God has a few of us whom He whispers in the ear." The girl carrying the pail is no doubt a most conscientious maid-of-all-work, but her mind evidently travels on a plane that few can hope to reach. The pictures are charming, none the less so because their meaning is (unlike Browning's) not difficult to decipher.

NOTABILIA.

THE photographic and literary snapshots given in the *Badminton Magazine* for June, under the title of "Motoring in Touraine," may be recommended to anyone contemplating a tour in France, whether on foot, awheel, in a motor, or by train. Touraine offers splendid roads, a kindly and unspoilt population, some unrivalled and well-known châteaux (which include Chenonceaux, Amboise and Azay-le-Rideau), and many historically interesting towns. The letterpress has been written fluently and enthusiastically. We might perhaps remark, at the risk of seeming hypercritical, that Chenonceaux should not be described as "du vrai Gothique," and that the corners of Azay-le-Rideau are not marked by square turrets, but by round towers with conical roofs.

The *Antiquary* gives an account of "Some recent discoveries at Burgh Castle" (near Great Yarmouth), in which is recorded the addition of more interesting specimens of Romano-British pottery than in the past to the examples found at Burgh. "A graphic method of finding the point of sunrise on Midsummer Day," by C. W. Dymond, F.S.A., should be suggestive and useful, not only to those interested in prehistoric monuments, but to students of the orientation of our Mediæval churches.

OUR CONTEMPORARIES FROM OVER-SEAS.

THE *Architectural Record* commences with an article for the client on "Selecting the Suburban Home Site," with the keynote of which we agree. "A building site is, or should be so considered, an object of art—a jewel in the rough;" hence the desirability of the prospective home-builder being guided in the selection of the site by the artist who is to design the house. "A Monumental Work of Landscape Architecture" is an account of the metropolitan park system of Boston. "Architecture in the United States," by Claude Bragdon, is a critical history of the earlier phase and of the birth of taste in American architecture. An illustrated account of the châteaux of le Lude and de Jarzé is an interesting study.

Moderne Bauformen as usual deals wholly with examples of the "new art" as at present being practised in Germany, where they have got away from the irresponsible and uneasy meanderings of curved lines that characterised the first stages of l'art nouveau. "New art" in Germany is now restrained and dignified, marked, if anything, by an almost affected simplicity. The examples given in the present number are mostly from the designs of Professor Alfred Grenander, of Berlin; Herr Rudolf Bitzan, of Dresden; and the trading firm of furniture makers, Anton Pössenbacher, of Munich. The applicability of "new art" to many uses, from railway stations to churches, is illustrated in several instances by coloured views of quite harmonious schemes of interior decoration.

Het Huis has an interesting article on the old-world village of Rijnsburg, between Leyden and Katwijk, with illustrations from photographs and old engravings of its eighteenth-century work and ruined abbey. A view of the house occupied by Spinoza is of literary interest. A modern house in Rotterdam, of which Mr. D. F. Tersteeg is architect, is illustrated by plans and photographs. There are some quite refreshing designs for cottage pianos, simply and logically treated.

The *Engineering Record* gives a description, with illustrations, of "The building and equipment of the Keewatin flour-mill," which has a milling capacity of 5,000 bushels per day and possesses a grain storage elevator with a capacity of 750,000 bushels.

GENERAL.

The Shropshire Archæological Society held their annual meeting on Saturday. The report of the Council stated that the restoration of the tower of the Abbey Church, Shrewsbury, had been brought to a successful conclusion. Attention had been lately called to the interesting Norman chapel, now in ruins, situate at Malinslee. It possessed many interesting features, and on more than one occasion the Society had assisted in its protection. There was now an idea on the part of the parochial authorities to completely restore it, so that it might be used for Divine worship.

Messrs. Sharman & Archer, of Wellingborough, have been appointed by the Northants education committee architects for the proposed county girls' school at Wellingborough. The secondary school buildings sub-committee reported that they had authorised the secretary to inspect, with the architects, any six modern girls' secondary schools which he thought it desirable to see.

The New Church of St. Alban's, Bournemouth, was dedicated by the Bishop of Winchester on Thursday, June 3. The church, which has been built at a cost of 12,000*l.*, occupies a favourable site on the Charminster Road. There is a considerable fall in the level of the site from west to east, of which the architect has taken advantage by placing large crypt vestries under the chancel and chapel, and connecting same with the church by a broad flight of stone steps. Although the cost of building has necessarily been increased by the requirements of the site, yet the external architectural effect of the east end thus raised some 17 feet higher from the ground level is greatly enhanced, and this added to the fact that the vestries obtained are large and spacious enough to be used for parochial purposes fully compensates for the additional outlay involved. The plan of the church consists of a nave 93 feet 6 inches in length by 30 feet 6 inches in width, with lofty double transept north and south. A lofty arch carried up nearly to the whole height of the church divides the nave and chancel, the latter being 40 feet in length by 27 feet 6 inches in breadth. Passages for returning communicants are placed on either side, divided from the choir by oak screens, with galleries over on the north and south sides for musicians and the organ respectively. An apsidal-ended chapel is thrown out east of the north transept, and a sacristy is placed on the south side of the chancel. A baptistery is placed centrally between two western porches, and a tower and spire (not yet completed) will occupy a position at the western junction of the north transept and aisle. There is accommodation for 812 adults and a choir of forty-two, with musicians' gallery in addition. The external facing is of Purbeck rock-faced stone relieved by bands and dressings of Monk's Park stone. The interior is faced with red and yellow stock bricks, relieved with Corsham Down stone bands and dressings. The whole of the floor of the body of the church is of Goddard's wood block. The chancel is paved with various coloured marbles, and the chapel and baptistery with Rust's mosaic. The heating is by low pressure hot water supplied by Messrs. C. P. Kinnell & Co. The church is lighted by electricity, the wiring being carried out by Messrs. Bryant & Co., of Bournemouth. The whole work has been excellently carried out by Messrs. Bowman & Sons, builders, of Stamford, from the designs and under the supervision of Mr. G. H. Fellowes Prynne, F.R.I.B.A., architect, of Westminster, S.W.

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The Architect.

THE WEEK.

Business meetings at the Royal Institute are usually amusing, but show a dangerous tendency to descend from the plane of comedy to that of farce, and certainly are rapidly demolishing all grounds of justification for the claim made by some members of the Council of respect for the high business ability with which the affairs of the Institute are managed by them. The proceedings on Monday last show that the business ability of the Council does not extend to the management of a general meeting. Amendments are allowed to be piled on top of amendments, even to the extent of considering those to propositions that are not before the meeting; members of Council, as well as ordinary members, speak two, three, and even four times on the same question, and discuss previous amendments when subsequent ones have been proposed; the Chairman and his colleagues on the Council hold whispered consultations whilst the Secretary starts counting votes on a proposition that has not been put by the Chairman; the Chairman declares a resolution carried, and then, after elaborate and prolonged calculations to ascertain how many votes are two-thirds of twenty-six, finds that it has not been, and puts it again, when the opponents are so flustered that it is legally carried.

Amidst such an imbroglio and muddle it is not surprising that the consideration of the new by-laws proceeds slowly, the total result of last Monday's meeting being the adoption of three non-contentious by-laws without discussion, and the passing of one other with an amendment after much talk and floundering amongst propositions and divisions. The amendment which took up so much time and was finally adopted was one extending the principle of a limited term of office proposed by the Council for Presidents, Vice-Presidents, and Honorary Secretaries to ordinary members of Council also, the precise method determined being that one-sixth of these ordinary members, seniors in service, should be ineligible for re-election for two years. The meeting was not at all influenced by the forebodings of present members of the Council as to the terrible disasters that would arise from the enforcement of such a regulation, nor was it to be diverted from its wishes by the naïve request that the matter might be referred back to the by-laws committee, after being told that the result of prolonged and very careful consideration of the subject at many meetings of the committee and two or three meetings of the Council was that the President's forecast of the adoption of the principle of limitation was ignored.

It is not surprising that London is following the lead of Lancashire, and we expected that such an event would happen. Lancashire has set the fashion—a bad one—of limiting competitions by geographical terms. Now the Council of the Metropolitan Borough of Deptford, in their advertisement of a competition for a new library at New Cross, limit the same to "architects practising in the City or County of London." Though the principle is one with which we do not agree, it is only right that if it is adopted by the provinces it should be followed by the metropolis. The guinea deposit for a view of the conditions is to be refunded if the particulars are returned within twenty-one days.

Public opinion in Paris is reflected in the Municipal Council, and thus the action of the latter in insisting on the observance of the regulations respecting the height and architectural design of buildings is generally approved. The tendency towards the erection of sky-scrapers is to be nipped in the bud by the abrogation of the decree of 1902, permitting the erection of buildings 100 feet high. The erection of abnormally lofty buildings is but the speculator's dodge for getting the better of his landlord and recouping himself with an enhanced profit on an inflated ground rent. When there is a limit to the height to which a building may be carried, there is also a limit to the ground rent on which it can expect to make a profit and therefore to the unearned increment of the ground owner. It is surely right that the general welfare of the public should not be sacrificed to the profits of the lucky owner of the land, and the Parisians are shrewd enough to see that both the beauty of their city and the health of its inhabitants will suffer by the advent of the *gratte ciel*.

As the *Times* rightly points out, one of the principal elements of the charm of Mont Saint-Michel is that it is an island, at any rate practically so at high-water and sufficiently for æsthetic effect despite the causeway made in 1880. The causeway has undoubtedly rendered easier the reclamation of land in the shallow bay and accelerated its silting up. It is now proposed to remove for 1,000 metres the embankment on which the causeway runs and to carry the latter for this distance on a stockade of piles. Further, the reclamation of land is proposed to be forbidden within 1,000 metres of the island, which with these remedial measures may still retain its character, to which so much of its charm is due, of a sea-girt isle.

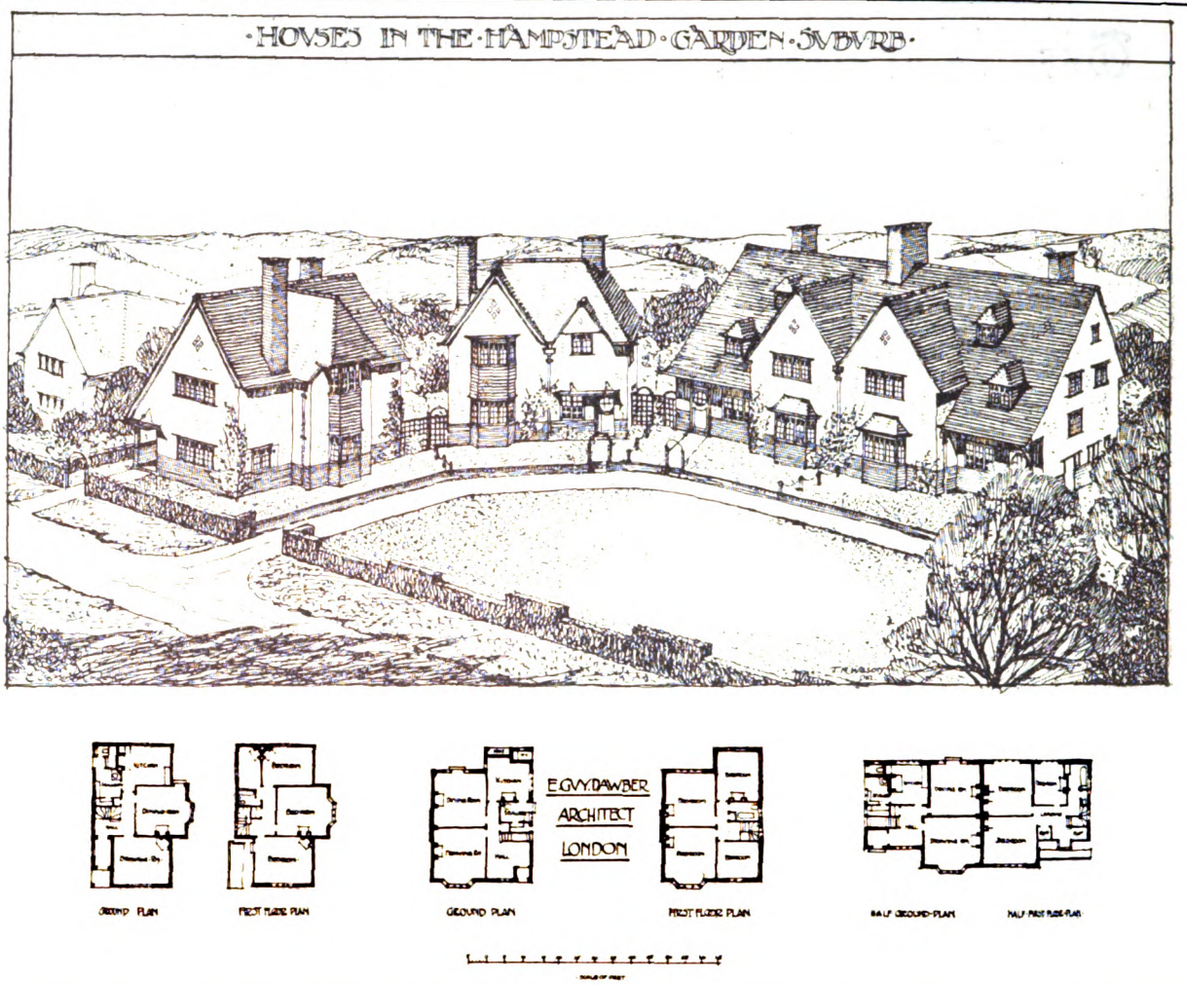
We are glad to learn that the Freemasons of the Province of Lancashire have succeeded in raising the sum of 10,000*l*., to which they pledged themselves for the erection of the chapter-house of the new Liverpool Cathedral as a memorial to the late Earl of Lathom, their P.G.M. The chapter-house, for which Mr. Gilbert Scott has prepared a fresh design, is to be a distinct and octagonal building on the north side of the cathedral, and will be commenced in the immediate future.

The Norfolk and Norwich Archæological Society have done well to hold their annual meeting this year at East Dereham rather than in the city of Norwich, as they have usually done. Such decentralisation widens the area of interest and leads many to join a society which thus shows that its field is the county rather than the county town. In this way many matters are brought to the notice of the Association which otherwise would be perchance known only locally, and in archæology and antiquarianism a wide dissemination of knowledge, particularly when relating to new discoveries, is of the highest importance, as it is only by collating separate and scattered data that any generalisation of historical science is possible.

Faculty law is a fearsome thing and receives illustration from the case of the parish church of St. Anne and St. Agnes with St. John Zachary, Gresham Street, in the City of London. Here some adjoining owners had raised their buildings and rearranged their lights overlooking the churchyard, and although the arrangements and compensations were approved by all concerned, the rector, the churchwardens, the building owners, the Ecclesiastical Commissioners, and the Bishop of London, as patron of the benefice, a faculty was necessary to enable the various parties to enter into a mutually satisfactory agreement.

The excavations at Caersws by Professor Bosanquet, F.S.A., on behalf of the Liverpool Committee of Excavations and Research in Wales and the Marches are proceeding satisfactorily, and the clay mound that held the feet of the supports of the watchman's tower has been discovered. The main road to the prætorium has been uncovered, and it is expected that the plan of this, the headquarters of the largest Roman camp in Wales, will in a few days be recognisable.

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GREEK ARCHITECTURE.

FEW architectural students have hitherto given much attention in their study of Greek architecture to the methods of construction in use among the Greeks, save to that of the marble-built temples of the Periclean age. We are glad therefore to find in the latest addition to the list of books on Greek architecture for the serious student * that considerable attention is given to the details of construction, not only in stone and marble, but in wood, brick, terra-cotta, concrete, stucco and metals.

It will be a revelation to many architectural students to be informed that the Greek method of constructing floors was by the use of a system of girders which supported the joists, on which were laid the boards; that half-timber construction was in common use, and that piles were not infrequently employed, elder, elm and oak being considered the most suitable timbers for this purpose. In brickwork the value of bond by means of stretchers and headers was well recognised, and although our knowledge is not precise it would appear that the arrangement of headers and stretchers in alternate courses or English bond was most general. In connection with the question of bond, Professor MARQUAND is not quite correct in stating that "in modern brickwork it is customary in England and the United States to lay a course of headers above every five or six, or even ten courses of stretchers." It may be customary in the States, but in England such a method is known as "garden wall bond," and is seldom employed except for the purpose indicated by the designation. Bond timber was a device that according to Professor MARQUAND dates back as far as the second prehistoric settlement at Troy, about 2200 B.C. Though the bricks used by the Greeks were for the most part merely sun dried, the making of baked or burnt brick was not unknown to them, and the many examples left of terra-cotta work prove that its manufacture was well understood even to such technical details as the lightening and cradling of the back, and the use of slip for facing.

Professor MARQUAND's book is logically arranged on a synthetic system, commencing with the details of construction, into which, as may be gathered from instances that we have already quoted, he goes very thoroughly and minutely. Having thus formed the nucleus he proceeds to build up around it by explaining the architectural forms in which the methods of construction were employed. Under the term "architectural forms," he considers the varied treatment adopted by the Greeks in foundations, walls, antæ, doors and windows, pillars, columns and piers, entablatures, ceilings and roofs. In the description of all these remarkable thoroughness is shown, and the student has lucidly presented to him the evolution of, as well as the variations from, the prevalent type in each instance. The account, for example, of the Ionic capital, and the light that is thrown upon its development by a study of archaic examples is most informing. For this information and much of a similar character the British and American student has in the past been obliged to refer almost entirely to the works of German writers, a rather hopeless source of information to most English-speaking architectural students.

The important subject, in Greek architecture, of proportion is broadly treated by Professor MARQUAND, who in default of the writings of architects and architectural critics of the Hellenistic period seems to us to attach rather too much importance to the works of VITRUVIUS, and too little to the investigations of PENROSE, COCKERELL and PENNETHORNE. Granting that the principles and theories laid down by VITRUVIUS are in the main founded on the buildings, the writings and the traditions of Greek architects, those on whom he relied belonged rather to the Hellenistic period than to the best epoch of Greek architecture. Professor MARQUAND rightly points out that what he terms major ratios and minor ratios were employed, that is, that ratios of proportion were observed between major dimensions or parts of buildings as well as between minor elements, but he

* *Greek Architecture.* By Allan Marquand, Ph.D., L.H.D., Professor of Art and Archæology in Princeton University. (New York: The MacMillan Company. 10*s.* net.)

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scarcely sufficiently emphasises what seems to us a most important doctrine, which we think PENROSE has clearly established, that in any particular building, at least of the best period, harmony of proportion and hence of æsthetic effect is maintained by the use of a definite system of ratios throughout.

After proportion Professor MARQUAND takes up the subject of decoration, with which he deals in the same thorough fashion as the other divisions of his theme. He rightly attaches importance to the polychromatic treatment of decoration by Greek artists and fully explains the various types of Greek ornament, selecting his examples from all periods from the prehistoric work of Knossos, Tryns and Mycenæ, to the latest phase of Greek influence in the buildings of Pompeii.

Having thus considered the various architectural elements of Greek architecture in respect to their technique, forms, proportions and decorations, our author then turns his attention to the combination of these elements and treats of composition and style. In dealing with style, however, he omits, as many do, to point out that it affects plan as well as elevation and section, that the primal plans of Doric temples are distinct from those of the Ionic style, and are as much a mark of differentiation as the respective orders. He however makes the interesting point that the mingling of the styles of Greek architecture was from the evidence of vase paintings probably more frequent than is ordinarily supposed.

Following and completing the discussion of the means and methods of Greek architecture, Professor MARQUAND describes in a systematic manner a great number of the monuments of that activity, under the various headings of towns and their defences, water supply, religious monuments, governmental buildings, commercial buildings, buildings for physical culture, buildings for intellectual and social purposes, buildings for domestic use, and even includes the Greek methods in naval architecture and sepulchral architecture. The Professor thus disposes of the very general fallacy that Greek architectural monuments are confined to temples and theatres. He is able to do this by the completeness of the purview that he takes of Greek architecture as a whole and by full utilisation of all that has been discovered since the days of STUART and REVETT. In fine we have in this book, for the English speaking, serious architectural student, an account of Greek architecture complete and logical, comprehensive of all that has been discovered up to date of Greek work from the earliest prehistoric times to the destruction of Pompeii.

COMPETITION FOR MIDDLESBROUGH PUBLIC LIBRARY.

UNSUCCESSFUL competitors are, of course, naturally dissatisfied with the award in most, if not in all, cases, and in the case of this competition the dissatisfaction has been so general that, in addition to many letters from individual competitors, a memorial signed by 108 of the competing architects has been sent to the promoters protesting against the award on the ground that both the first and second premiated designs violated the conditions.

This memorial has been considered by the Middlesbrough Free Library Committee with considerable care and with emphatic expressions of opinion on the part of several of the members that the complaint of the memorialists was well founded.

It was brought out at the committee that the assessor, Mr. GIBSON, had been supplied with the conditions of the competition and with a copy of the replies to questions by competitors, so that he was aware of the conditions and stipulations to which competitors were supposed to work. Mr. GIBSON, knowing the conditions, made his award, which the library committee and the Town Council loyally accepted. The complaints of the protesting architects were submitted to Mr. GIBSON, and he replied by letter that he saw nothing in the conditions which would have prevented any of the competitors sending in plans on the lines of the first and second premiated designs, that the plans were in accordance with the general conditions, and that he held that the authors of the successful plans had complied with the spirit as well as with the letter of the conditions. Mr. GIBSON also sent a telegram, which we will not reproduce, as it was no doubt hastily written. It is only fair to Messrs. RUSSELL & COOPER to mention that they, in a letter read before the library committee, repudiated the statement that they had violated the conditions.

When both the assessor, Mr. GIBSON, and the winners deny that the conditions were violated, it is obvious that the library committee have done only what is right in maintaining the assessor's award.

But this does not mean that Mr. GIBSON has dealt more leniently with the infraction of the letter of the conditions than most of the competitors consider justifiable.

The source of the whole trouble is that the conditions were prepared by a committee not composed of competition experts before an assessor was appointed. Mr. GIBSON and Messrs. RUSSELL & COOPER are old hands and phenomenally successful ones at the competition game, and know perfectly well that the best design for any particular building is very often only to be produced by a wise disregard of the letter of the conditions. They, in fact, regard it as a point of the game that when the conditions are stupid they are to be evaded, of course, with as little flagrancy as possible.

The memorialists, therefore, cannot hope for any redress of their grievance from the Middlesbrough people. The only thing they can do is to bring the matter before the Royal Institute and its President, and formulate their complaint against the assessor appointed by the recognised head of the profession.

ARCHITECTURE: ITS TRUE PRINCIPLES.—XII.

By R. OWEN ALLSOP.

ARCHITECTURAL CHIAROSCURO.

THE greater part of RUSKIN's writings on architectural design seem to indicate an intense appreciation of light and shade, its disposition over buildings by reason of their masses and by solid and voids. Unfortunately for architecture in this country the effects of light and shade are not often comparable to those countries where light and shade are more highly contrasted—that is, where the sunlight is intense and shadow correspondingly impressive. Neither are atmospheric conditions so congenial. Some few days in the year we may notice those clear limpid shadows which, while dark compared to the lighted surfaces, yet are full of detail. As a general rule, the dark recesses of English architecture are covered with a blue-grey veil that hides the details beyond.

The effects of architectural chiaroscuro are referable in their root cause to the principles of contrast and gradation. The gradation on a round pillar, the flat shading of a square abacus, the blackness under a portico, the brilliancy of the most lightened parts of the column, the broad illumination of the architrave and the shade under and shadow below that, are all results of contrast and gradation.

If we regard the purest form of architecture as that which, being executed in stone or marble, is unadorned with colour, evidently the whole composition rests on the arrangement of light and shade. The work then may be more truly compared to that of the sculptor, where alone light and shade are the causes of the most beautiful effects that his chisel brings into being.

Taking this view, the building must be considered much with the eyes of an engraver or black-and-white artist. Such will endeavour to arrange an harmonious balance of light and shade, and the licence of the artist will enable him to do much to render attractive a work of architecture not, strictly speaking, well arranged in this particular.

The engraver recognises three "colours"—"black," "white," and "grey." The exact fault of a bad monochromatic drawing (after actual bad draughtsmanship) is to be "all over alike"—one tame, insipid grey tone in which—if black and white exist—they are not given their

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full value. This insipid greyness we were all familiar with in the early efforts of photography.

In like manner a building may, in its light and shade, have the defect of insipidity—that is, a monotonous greyness. Now, black enhances white, and grey harmonises both, the one to the other and to itself. The opposite extreme to insipid greyness is what is called in photography a "chalky" print—hard lights and shades, ill-managed grey tones. In architecture this latter is the most common defect in its chiaroscuro, the ugly black patches and the glaring lights. Such cannot be called bold contrasts, being merely offensive, whereas the bold contrast is always pleasing. Hence we must infer that the harmonious disposition of light and shade about the building will depend upon the arrangement of the half tones. The introduction of a little grey into the chalky picture softens down the effects, and without in any way destroying the contrasts. To remedy too prevalent greyness there must be introduced shading and brilliant light—using the term to signify, the one recesses, that cause blackness, and the other projections or flat surfaces, that catch the light.

The architectural photograph may be considered as an arrangement of various patches of light and shade. Mere lines may be neglected and narrow shadows take their place. The picture formed consists, then, of masses of positive dark and positive light, with spreads of neutral

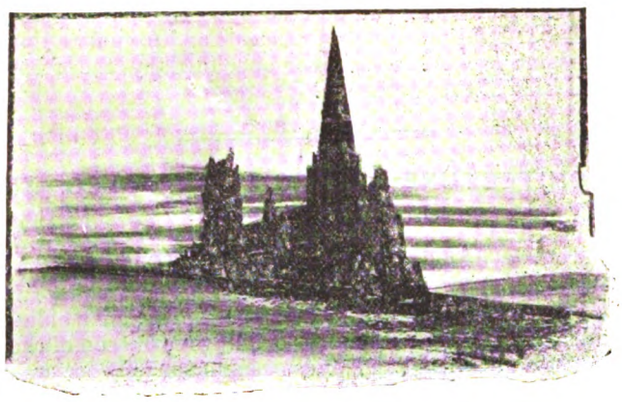


FIG. 29.

hues called grey, which may graduate from the darkest black to the lightest white.

We must for the moment neglect "proportion," because we wish to confine ourselves to the examination of the lights. If we take a genuinely ugly building—one markedly offensive to the eye—and discount the effects of ill-judged proportions (in heights and widths), we see that we have presented to us a conglomeration of ill-formed, ungraceful, harsh, on the one hand, or ill-defined, timid, half-hearted shading which, if in itself offensive to the eye, it almost necessarily follows produces light parts that must be equally offensive. What is itself beautiful cannot make its surroundings ugly. If in this manner we exhaustively study the photographs of many buildings we shall arrive at the conclusion—and this seems to be what RUSKIN intends to convey—that its beauty or ugliness reside in the shape and relative quantities of its main lighted parts and shaded parts, together with the effect of such cast shadows as are included in the picture formed. As a rule such buildings as we adjudge deficient in beauty of light and shade will be found also wholly wanting in well-considered half-tones. Fortunately for the truly sensitive eye, the passing and changing effects of light and shade and the gradation that naturally comes over a plane surface, softens down much that would be unbearably harsh. Much of the harshness of modern architecture arises from the general absence of curved surfaces with their beautiful varied grey effects.

The broad effects of light and shade that the sensitive eye appreciates at once in all old Classical architecture is killed in modern design by overloading the subject with a multiplicity of subordinate parts and details. It were as though the architect having received a commission for a considerable building, seemed afraid that if he did not do enough he would be considered lacking in ideas. Certainly a more deplorable idea never seized on any art. No noble chiaroscuro can result from the piling up of various forms and details. The more that is added the more hopelessly offensive the effect. The amount of architectural work in the Belgian Palais de Justice might be cut down to one-fourth and the building become four times as imposing in effect. To put things mathematically, one might be tempted to say that the effect of a building is inversely as the square of its elaboration. This is in a measure true—within certain limits—although in a sense it is further true that no added ornament could increase the majestic effect of a Stonehenge or of the Great Pyramid.

The reason is that we lose the broad effect of sunshine on plain orifices and shadow in plain openings. Also that every line and form added to a composition in some way (unless by design or principle necessary) decreases and detracts from the effect of those previously

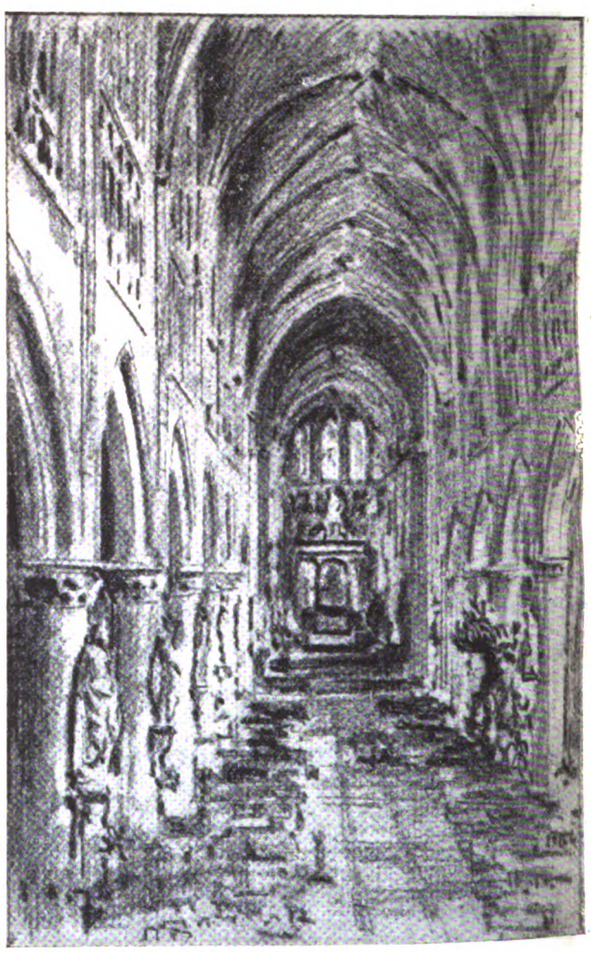


FIG. 30.—MALINES.

given. How is it then that the plain warehouse is not a fine work of architecture? The answer to this apparent paradox is doubtless that the true work of architecture "proposes an effect on the human mind, not merely a service to the human frame."

Ornament and enrichment may be disposed to give grey effects in monochromatic presentations of buildings. Thus a diapered spandrel gives a grey tone to the spandrel walls and softens the contrast between dark triforium and brilliant clerestory. A general rule might be stated that if the lights be taken care of the shadows will take care of themselves. We know this to be a good guide in monochromatic draughtsmanship. Moreover, much variety of half-tone comes naturally where there is a sufficiency of plain wall-surface. That which is a uniform tint considered as a plain superficies on elevation is not so in natural, perspective effect. Nature

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always harmonises by half-tones, so that the main thing is the light. Shadow like trouble must come so that the thing is to make the most of the happy moments. Moreover, it is a fact that (all things being appreciable mainly by contrasts, as heat to cold, round to square) to obtain brilliant lights, shadows must be introduced. Without such there can be no sunshine effects, and hence we may consider that to take care of the lights means in reality *the careful introduction of dark parts*. In an ugly building such will be great square black patches repeated *ad nauseam* as in a "sky-scraper."

It may be possible to suggest some slight illustration of the above remarks. Fig. 29 has the three primary engraver's colours plainly marked. Fig. 30—no doubt principally owing to bad drawing, if in part also to the presence of sculpture on the pillar shafts—is essentially "all-over-alike"—spotty; whereas in fig. 31 the light and shade masses, at any rate more effectively than in the other drawing. Fig. 32 is in three colours, more exactly so than in the case of the other illustration given, where there is



FIG. 31.—GREAT YARMOUTH.

some little variety of grey. The examples primarily concern drawing, it may be urged. To appreciate their bearing on actual design needs deductive, analogous reasoning. The general indication is that what is required is focus, concentration, and condensation, as distinct from "work" of equal, monotonous value in all parts.

Monotony, with hard outline, seems the most objectionable attribute of a building. It is common in questions of design to refer to lines of light and breadths of light, but not sufficient attention seems to have been given to



FIG. 32.—PETERBOROUGH.

what may be termed "broken" light, best seen, perhaps, in a summer sky with fleecy clouds, and most beautiful when graduating from great masses into cloud dust, as it may be termed. This is a direct and pure contrast to the broad stretch of light or shade. We are conscious of this broken-light effect when before an elaborate building, such as a rich Flamboyant cathedral front, or we need go no farther than our London Eleanor Cross. In such work the fullest value seems given to the contrast of richness of detail with simplicity of mass. Again, geometrical regularity of dark and light—as in window tracery—contrasts with irregular, broken light and shade, and the enhancement is mutual. Most principles of design bear upon, as foundation, what may be called contrast, relief or comparison. The physiological basis seems to be that, if we continue to look at what is round, we gradually lose the appreciation of roundness and must restore the balance by beholding squareness. For a similar reason, doubtless, if we gaze long at a word, we may note that it gradually tends to become an uncouth, meaningless sign.

The relative shapelessness of a shadow enhances the geometrical regularity of the object itself. It would seem that whereas, as children, we learn to draw and shade cubes, prisms, spheres and cylinders, we do not thoroughly investigate the nature of the lights and shades about such objects; so that their æsthetic value is not, in later life, understood. Yet if we decompose, as it were, architecture it is found to be built up of combinations of these elementary forms, and such may perhaps be assumed to be its true atoms. A brick or a stone block has its practical value in building. Its form and light and shade effects constitute its architectural value.

(*To be continued.*)

THE HAMPSTEAD GARDEN SUBURB.

FOR some three or four hundred years Hampstead has been known to Londoners as a place of refuge. Indeed it is not improbable that before even the days of the Norman invasion it had come to be regarded as a haven of rest from the toil of city life. Edward the Confessor is believed to have gifted it to the monks of his Abbey of Westminster, and their rights were respected by the Conqueror. The royal munificence was repeated some centuries later when Henry VIII. assigned the manor for his new bishopric of Westminster. It was during his reign that, in consequence of a prophesied inundation, large crowds fled from the city and encamped on the heights of Hampstead. Similar scenes were witnessed at the time of the Great Plague and the Great Fire.

Both Henry VIII. and James I. were attracted to the district for the sport it offered. It appears to have been in the time of the latter monarch that Hampstead suggested itself as offering delectable sites for country villas. At the end of the seventeenth century some 260 houses were erected there and from thenceforth it became more and more fashionable. The world of art set the seal of its approval on it. George Romney erected a house from his own designs and under his personal supervision at a cost of 2,733*l.* on Holly Bush Hill. In the plan everything was made subservient to the studio and gallery; in consequence, on the death of this fashionable portrait-painter, shortly after its completion, the house could find no purchaser, and was replaced by an assembly room. A still greater enthusiast was John Constable, who had a house in Well Walk, the little drawing-room of which commanded "a view unsurpassed in Europe—from Westminster Abbey to Gravesend. The dome of St. Paul's in the air seems to realise Michel Angelo's words on seeing the Parthenon, 'I will build such a thing in the sky.'" Sir Gilbert Scott and his son George Gilbert Scott resided there many years later. Writers as well as artists were attracted to the place. It is however as a resort for the many rather than for the select few that we now wish to consider Hampstead.

The Heath is generally regarded as the loveliest of London's open spaces. In 1905 the Hampstead Garden Suburb Trust proclaimed its policy as to dealing with the land that lay to the westward of the Heath. In the course of their letter they said:—

"Our aim is that the new suburb may be laid out as a whole on an orderly plan. When different plots are disposed of to different builders, and each builder considers his own interest, the result is what may be seen in the unsightly modern streets. Our hope is that every road may have its own characteristic, that small open spaces may be within reach of every child and old person, that no house may darken or offend a neighbour's house, that the whole may be so grouped round central features and central buildings,

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and that from every part there shall be good views or glimpses of distant country. We believe that the successful example of such a plan of town development might take away some of the anxiety now caused by town extension. We aim at preserving natural beauty. Hampstead Heath, by reason of the spacious views it offers, is a resort for Londoners which is yearly more appreciated. If the Eton College Estate, occupying as it does the foreground of the wide western view, is covered with the usual long, narrow



THE HAMPSTEAD TENANTS, LTD.—COTTAGES IN HAMPSTEAD WAY—RENTS FROM 6*s.* 6*d.* TO 8*s.* 6*d.* PER WEEK.

streets, or built over by block dwellings, much of this attraction will be lost. Our object is so to lay out the ground that every tree may be kept, hedgerows duly considered, and the foreground of the distant view be preserved, if not as open fields yet as a gardened district, and the buildings kept in harmony with the surroundings."

This ideal was rendered substantially nearer of attainment when in May 1906 the Hampstead Garden Suburb Trust, Ltd., was formed, under the presidency of the Right Hon. Alfred Lyttelton, K.C., M.P., and when, shortly after, the 240 acres were purchased for 112,000*l.* from the Trustees. Of this area eighty were added to the Heath. In May of the following year the Hampstead Tenants, Ltd., began operations, and in March 1908 it was followed by the Garden Suburb Development Company. The general scheme for both was prepared by Messrs. Barry Parker & Raymond Unwin, in consultation with Mr. E. L. Lutyens. It was, of course, considerably controlled by the Hampstead Garden Suburb Act of 1906. Of the Hampstead Tenants, Ltd., we shall speak later.

(1) THE GARDEN SUBURB DEVELOPMENT CO. (HAMPSTEAD), LTD.

The Development Company have since obtained the co-operation of a large number of other architects in the preparation of designs for houses. They include Mr. Michael Bunney, Mr. Courtenay Crickmer, Mr. E. Guy Dawber, Messrs. Horace Field & Simmons, Mr. W. Curtis Green, Mr. P. Morley Horder, Messrs. Joseph & Smithem, Messrs. Langley & Baines, Mr. Geoffry Lucas, Mr. Arnold Mitchell, Mr. M. H. Baillie Scott, Mr. C. Harrison Townsend, Mr. W. H. Ward, M.A., Mr. Edgar Wood. Building work was begun in March 1908, and already over sixty houses are in occupation and nearly the same number in course of erection. Their values vary from 350*l.* to ten times that amount. All the houses have been erected by the same contractor—W. Moss & Sons, Ltd.—whose tender was the lowest in the first instance, and from which a schedule of prices has been drawn up as a basis for future work. The illustrations distributed throughout our pages show a few of their houses. The site conditions are of the happiest.



COTTAGES IN ASMUN'S PLACE.

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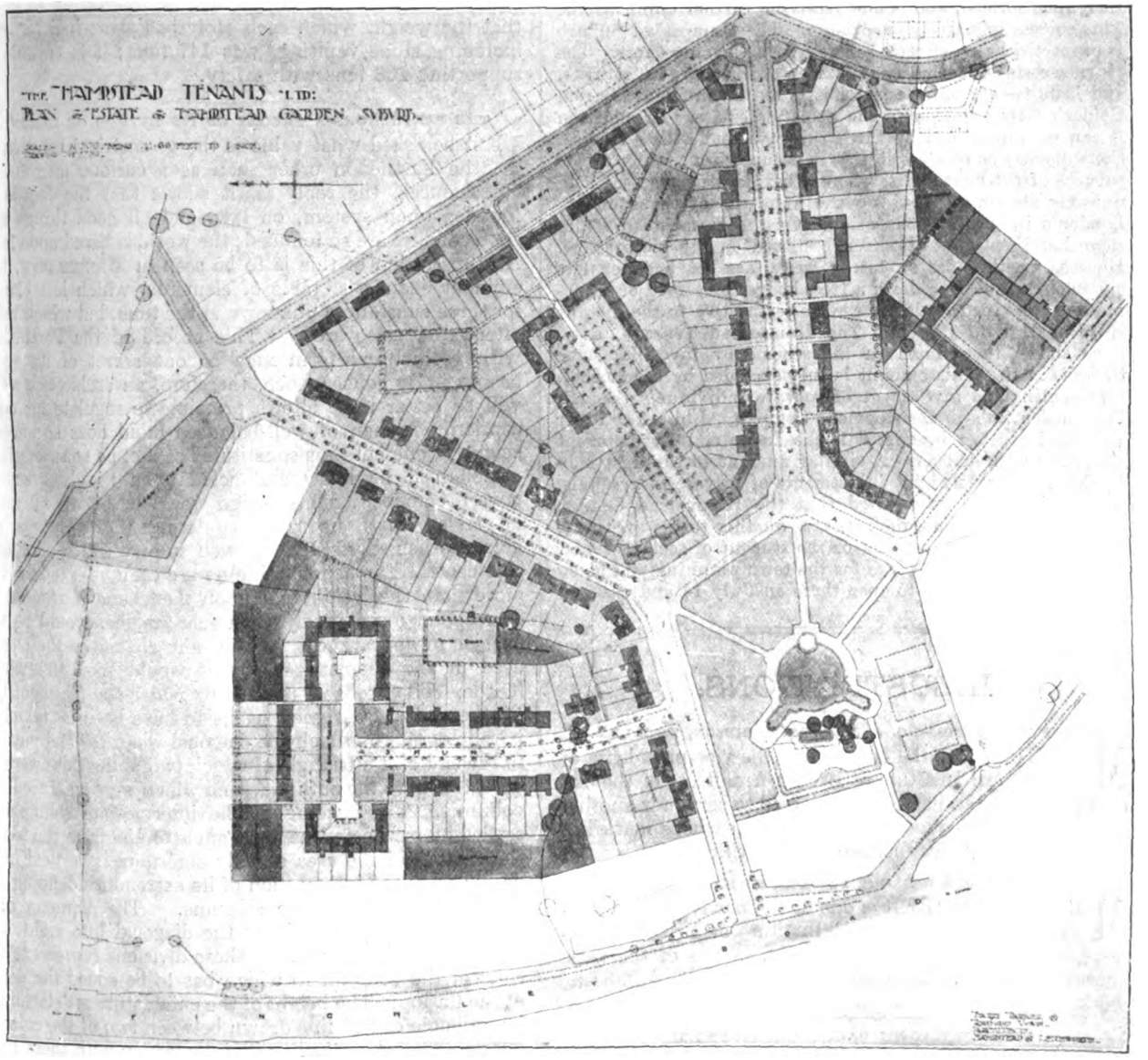
The names of the architects are a guarantee that nothing would be done to create a discord with the beautiful surroundings. The Development Company, it should be here explained, control an option not over the entire estate, but only over a portion of it. Intending owners may inspect the plans already in the possession of the company, or they may put forward plans by their own architect, which (after they have obtained the approval of the ground landlords, the original Trust) are then carried out by the company's builders. The company is not a philanthropic one, but a commercial concern, which realises that the beautiful may be exploited in estate development.

(2) THE HAMPSTEAD TENANTS, LTD.

When the Trust acquired some 240 acres from the Eton College authorities they stated:—"We desire to do something to meet the housing problem by putting within the reach of working people the opportunity of taking a cottage with a garden within a twopenny fare of central London and at a moderate rent. . . . We desire to promote a better understanding between the members of the classes who form our nation. Our object, therefore, is not merely to provide houses for the industrial classes. We propose that some of the beautiful sites round the Heath should be let to wealthy persons who can afford to pay a large sum for their land, and to have extensive gardens." The first portion of this article has dealt with a company concerned with the erection of houses of the more expensive class. But the idea of the promoters when they acquired the 240 acres was to do something besides that, for the provision of houses costing 350*l.* or 3,500*l.* offers not the slightest help towards a solution of the housing problem. That side of the scheme comes within the range of the Hampstead Tenants, Ltd.—a branch of the Co-Partnership Tenants, Ltd., a society which very successfully endeavours to solve the housing problem on commercial principles. The Hampstead Tenants, Ltd., has been organised to return a profit to those who invest their money in it. But that profit is limited to 5 per cent., while any surplus profits are added to the shares of the tenant members as a dividend on rent. Their scheme is an interesting one, and may here be accorded a little of the attention and examination that its organisers invite. The share capital is in shares of 10*l.* each, payable in full, or 5*l.* on allotment and the rest by instalment. The maximum dividend is, as already stated, 5 per cent., and past experience has clearly shown that this will be well within the profits. The Society has power to raise loan stock, on which 4 per cent. is paid; this interest is met before any dividend is declared on the shares.

Every prospective tenant must become a member of the Society by the investment of 5*l.* in the shares before he can take one of their "substantially built houses, provided with good sanitary and other arrangements." He then pays a fair market rental (which, in comparison with the rents of the ordinary suburb, must seem a low one), plus a regular sum for rates and taxes. The surplus after the charges have been met is credited to him in proportion to his rent. These profits, however, are not paid out in cash, but are credited to him as share capital, so that the tenant can never become the owner of his house, but he does become, in course of time, the owner of the value of the house, this being represented by shares, which will find ready purchasers inside or outside the Society. If they are retained, the 5 per cent. interest paid on them can be set against the weekly rent. This accumulating share capital also acts as a reserve which may be drawn upon for the payment of arrears of rent.

All external repairs are carried out by the Society; the internal repairs are done by the tenant, or, if necessary, by the company, who deduct the cost from the tenant's rent bonus. The social life that is aimed at is that of a large



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happy family enjoying in common means of indoor and outdoor recreation. The end of one vista is closed in by a range of houses under one continuous roof and with slightly projecting wings, while in front is a bowling green. In another case the houses are laid out round three sides of a triangle, with gardens converging into a tennis court. It is noteworthy that the backs of these houses are no less picturesque than the fronts, and are entirely free from the customary hideous outbuildings. The first part of a social institute has already been completed, and a club is now in course of erection.

In May 1907 Mrs. H. A. Barnett, a lady who figured very largely in the inception of the entire Garden Suburb scheme, cut the first sod, at the invitation of the Hampstead Tenants, Ltd. Since then the houses have been erected with all possible speed, though not fast enough to cope with the demand. When the number of applicants exceeded the supply of dwellings by a hundred it was announced by the Society that they would receive no further names. A second Society, called the Second Hampstead Tenants, Ltd., was thereupon formed, and is now receiving further applications. This success is scarcely surprising. The Hampstead Suburb is connected by an electric railway with Charing Cross. The journey costs 3*d*. each way (workmen's tickets are 2*d*. return), and lasts twenty minutes, and it is ten minutes' walk from Golder's Green station to the Society's estate. In addition it can be approached by three railways and a 'bus service. Consequently as to accessibility it is superior to many of the suburbs of the metropolis, where a bewildering maze of long unlovely streets swallows up the hundreds of thousands of London's industrial population. On the Hampstead estate there has been close attention bestowed on the picturesque. Houses, whether 6*s*. or 15*s*. a week, are set back or left out to obviate cutting down a tree, hedges preserved or transplanted; one road leads the eye in perspective to the distant spire of Harrow Church. The Hampstead Tenants, Ltd., have shown their faith in the scheme by investing some 80,000*l*. in it. This amount is only exceeded by the 85,000*l*. representing the investment of private individuals through the Garden Suburb Development Company, Ltd. The other principal concern interested is the Industrial Development Company with 40,000*l*. A similar amount to this last may be taken to represent the investments of private individuals. It may be confidently stated that the Hampstead Garden Suburb possesses a unique interest, whether to the architect, the houseowner, the artisan, or the student of social science, and is a most suitable place for the town-planning and housing exhibition that is to open there on July 14 and close on August 7.

ILLUSTRATIONS.

LIVING ARCHITECTS.—NO. 8, MR. J. G. S. GIBSON, V.P.R.I.B.A.

MR. GIBSON is the only one of the vice-presidents of the Royal Institute of British Architects of the expiring session who has been re-elected to serve for another year. He is, of course, one of the men whose mark has been made chiefly by success in competitions.

NO. 9, MR. E. GUY DAWBER, V.P.R.I.B.A.

MR. GUY DAWBER is one of the newly-elected vice-presidents of the Royal Institute of British Architects, and, as all our readers know, is one of the most successful of our modern architects in the field of domestic work.

STOCKPORT TOWN HALL.—THE GREAT HALL.

IN previous issues photographs have appeared of the main front and the council chamber of the Town Hall at Stockport. The great hall here illustrated is 114 feet long by 62 feet wide and 41 feet high, with a seating capacity of 1,250 on the floor level. There is a large stage at one end and a gallery seating 147 at the other. Behind the stage is placed the stage ante-room and dressing-rooms, the former 38 feet by 25 feet. The hall is divided into seven bays; both the entablature and curved ceiling, which is supported on large piers, are executed in richly modelled cast fibrous plaster work, special attention being given to the elaboration of the ventilating openings in the ceiling. Particular attention has been paid to the provision of sufficient fire appliances. The contractor was Mr. JOSIAH BRIGGS, of Stockport. The architect is Sir A. BRUMWELL THOMAS.

INTERIOR OF HOLYROOD ABBEY CHAPEL.

HOLYROOD ABBEY.—A THEORY OF ITS METHOD OF DESIGN.

THE diameters of the solid of the Holyrood Chapel columns are found by the same method which determines those of the Parthenon, viz. by passing a line at an angle of 60° across one of the bays and dividing it into seven, the number of columns in the nave; the result is the solid of the column. The same principle applies to Westminster Abbey, taking ten as the number of divisions, to Lincoln nine and to Southwell six divisions. The divisions in the three latter cases were made from small scale drawings, and it would be desirable to test the theory by means of large scale diagrams by anyone who has the material for their preparation. The transverse section of Holyrood Chapel is founded upon an equilateral triangle, and, as is well known, this form of triangle is applicable to much of the mediæval work, such as Westminster Abbey, Southwark Cathedral, Milan, and the Byzantine church of Santa Sophia. It will be interesting to know that the weight which each Holyrood shaft had to bear, including stone vaulting, was 147 tons; it is capable of supporting 208 tons with safety.

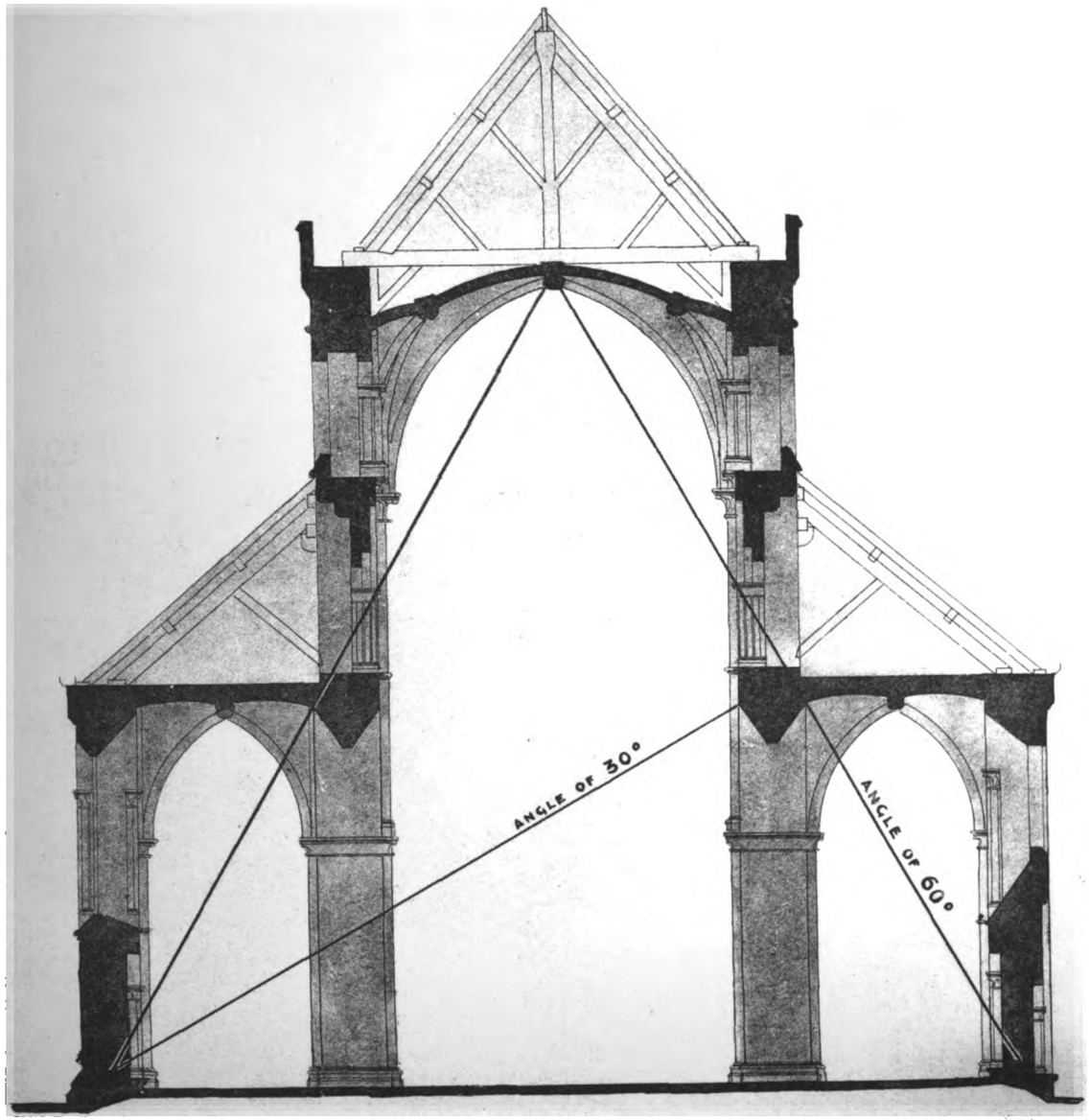
THE PARTHENON.—A THEORY OF ITS METHOD OF DESIGN.

IF it be asked what value is the geometrical solution of the Parthenon other than as a curious diagram of coincidences, the reply is, it shows that the façade is founded upon system, on law, and all good things and good conduct are so founded; the world is based upon law. An illustration of this is to be seen in MENDELIEFF, the eminent chemist's, table of elements, which left blanks for three substances unknown at the time, but which were afterwards discovered. This accord of the Parthenon with geometrical form may be one secret of its great beauty. By consequence, therefore, an architect's work will be better if he allows principle to regulate his conception. A man of well-balanced mind does so unconsciously; one not thus constituted cannot be so successful, although if he knew and acted upon the laws which govern composition his design would be better. It may be added that the rule regulating the diameters of columns has an æsthetic as well as practical application. The central Parthenon columns are each able to bear far more than the weight put upon them, and if reduced to correspond more nearly with that weight, would be too slender in appearance. Again, any change in the angles used in the geometrical figures would spoil the whole façade. The probable method by which the façade of the Parthenon was designed seems to have been by taking a parallelogram of which the diagonal was 22½° and putting to the end of it a triangle of which two of the sides were of 45°; this gave the outline within which were embraced the columns. The spacing of the intermediate columns is settled by passing a line at an angle of 45° from the top to the bottom of the area already determined, vertical lines drawn from the intersection of its extremities defining the space occupied by three columns. The diameter of a column is fixed by dividing the diagonal into eight, the number of columns; one of these divisions represents the solid of the column, to which has to be added the depth of the fluting. The height of the entablature is determined by an angle of 60° line drawn between two of the column lines continued vertically; its intersection with these lines fixes the height. The underside of stylobate is found by forming a square having for its three sides the top of the cornice and the lines bounding one-half the front. The top of the pediment is determined by taking one-half the frontage at the level of the top of the columns, and on this erecting the other two sides of a triangle at an angle of 45°, or alternatively by placing a triangle having the same base with its other two sides at an angle of 30° on the top of the cornice. The above suggested geometrical theory relating to the Parthenon was arrived at after finding that Mr. D. R. HAYS's system of angles did not work out with accuracy; and was reached in the course of preparing a lecture on "How to Know Good Architecture," which was delivered to the Scottish Industrial Art Association by Mr. G. S. AITKEN, and which we give elsewhere in this week's issue.

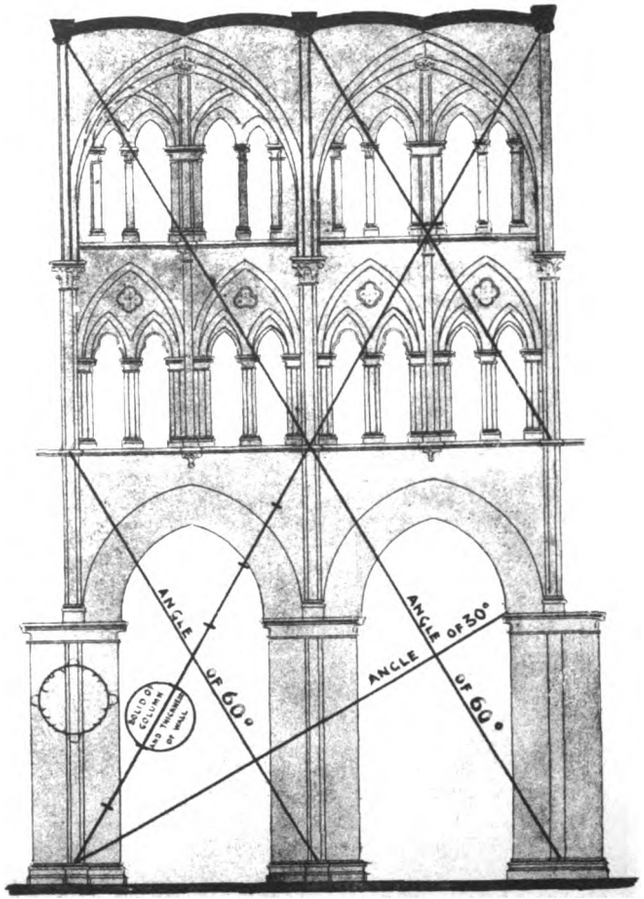
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HOLYROOD ABBEY.



TRANSVERSE SECTION



TWO BAYS

FEET. C.S. AITKEN DEL.

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HOLYROOD ABBEY: A THEORY OF ITS METHOD OF DESIGN.

DRAWN BY C. S. AITKEN, F.R.I.B.A.

The Architect, June 18th 1909.

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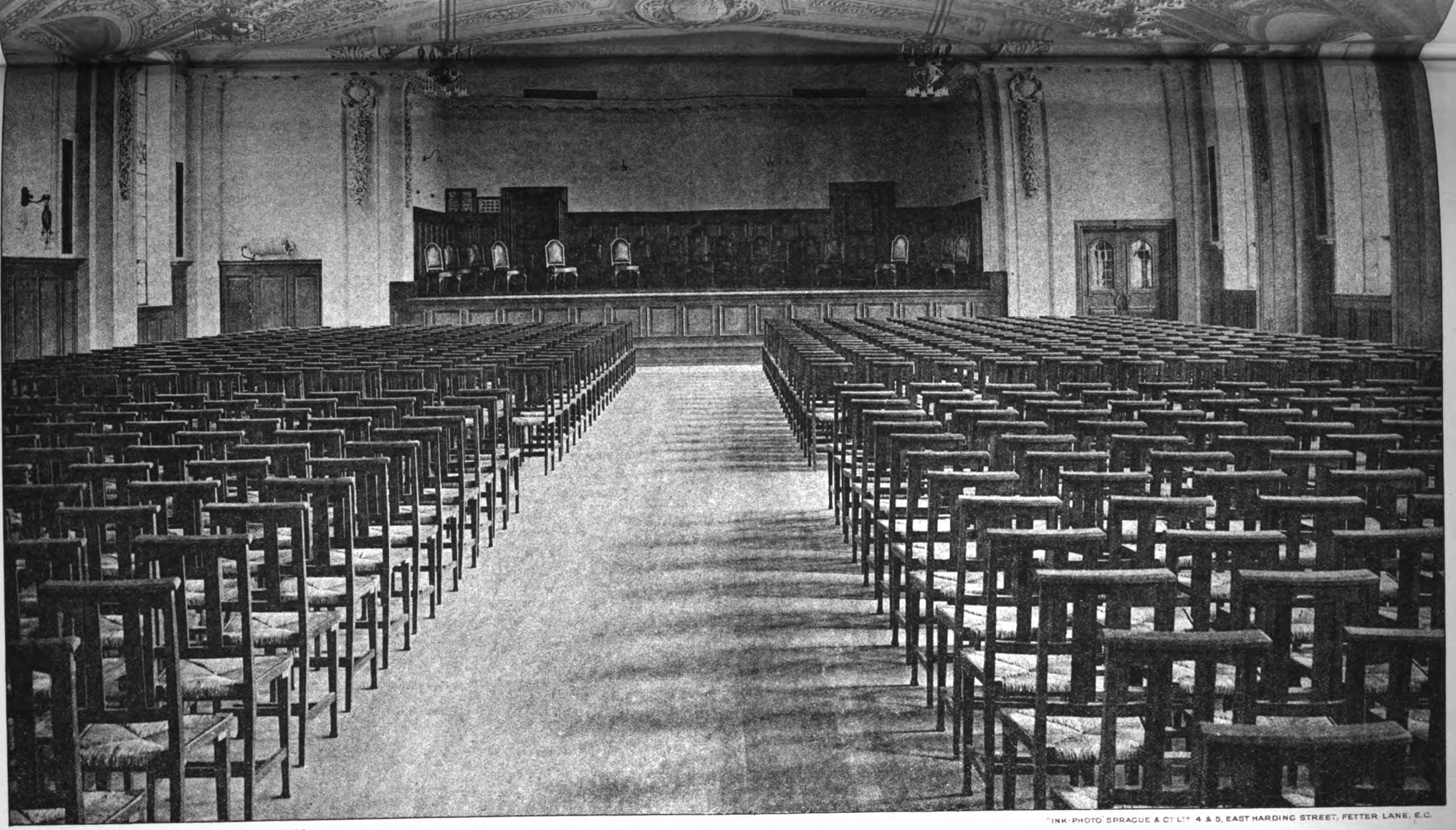
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LIVING ARCHITECTS. No. 8: MR. J. G. S. GIBSON, V.P.R.I.B.A.

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STOCKPORT TOWN HALL: THE GREAT HALL.

SIR A. BRUMWELL THOMAS, F.R.I.B.A., Architect.

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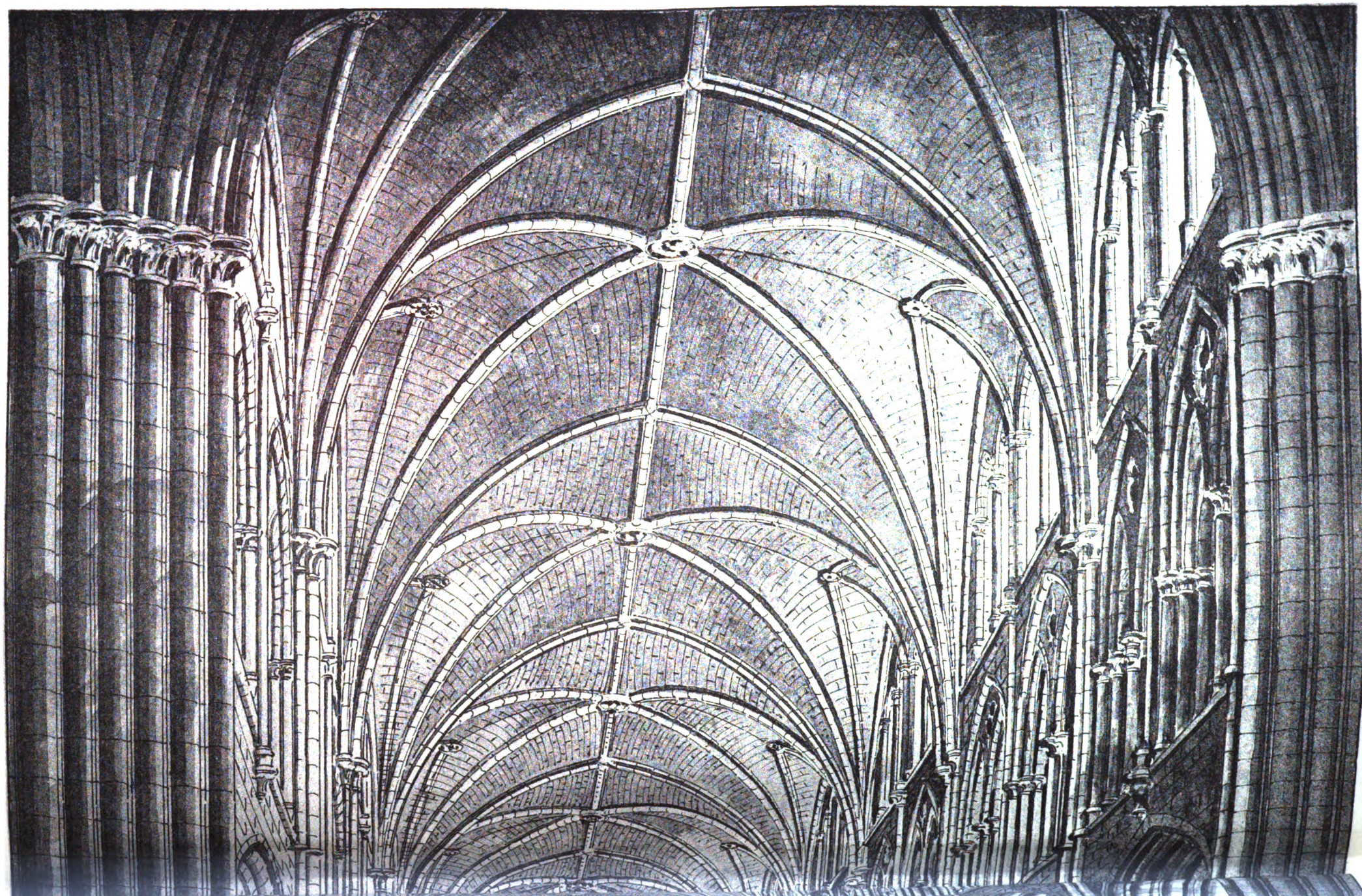


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INTERIOR OF HOLYROOD ABBEY CHAPEL.

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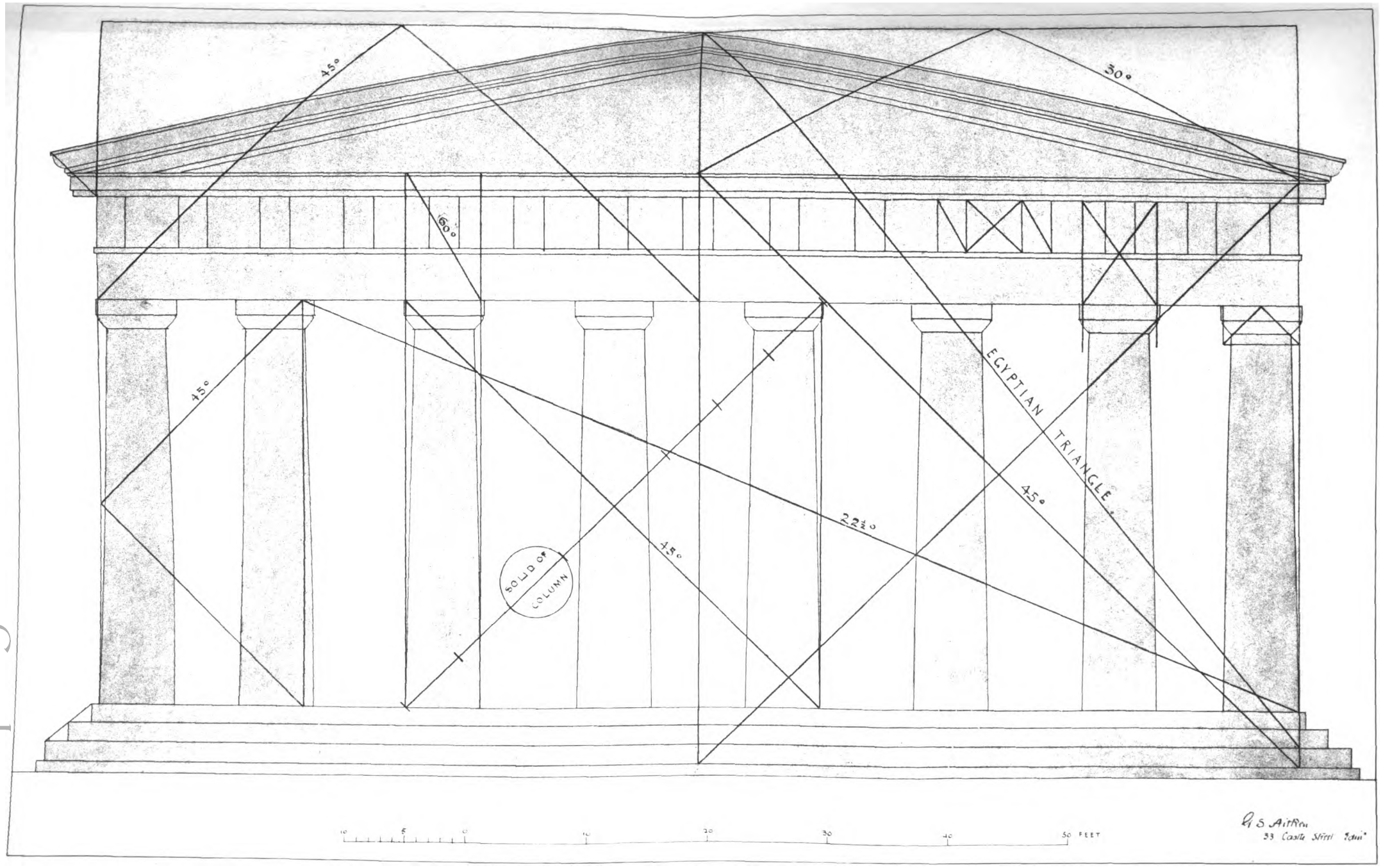


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THE PARTHENON: A THEORY OF ITS METHOD OF DESIGN.

Drawn by G. S. AITKEN, F.S.A. Scot.

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CARPENTERS' HALL, LONDON WALL.

CARPENTERS' HALL AND DRAPERS' HALL.*

Carpenters' Hall.

THIS building is quite modern, dating from 1876, when the old hall and building founded and commenced in 1428 were demolished. The latter are stated to have been a medley of style and perhaps of construction, and while perhaps the requirements of the company had out-grown them one cannot but regret their disappearance. There have, however, been preserved three most interesting frescoes, which formerly adorned the wall of the Livery Hall and represent:—(1) The repair of the Temple by King Josiah, who is shown giving directions to carpenters, wherein it is stated that no bargain was made, because they dealt justly; (2) Christ in the carpenter's shop at Nazareth; and (3) Christ in the synagogue when the cry was raised, "Is not this the carpenter's son?" A fourth fresco was originally there representing Noah constructing the Ark, but that fell to pieces, and we can only see a copy. The remainder, however, are in good preservation. They are painted on plaster laid on a sub-stratum of loam and straw held up by wattles.

How this composition was successfully removed and framed entire is a marvel and a tribute to the skill of Mr. Pocock, the architect, and all engaged upon the work.

These frescoes date approximately from early sixteenth century and were doubtless canvassed over and covered at the Reformation period, subsequently forgotten and not rediscovered until 1845.

There are some wardens' caps or crowns dating from 1561 and still in excellent order. The master's silver drinking cup is dated 1611, and those of the wardens 1611, 1612 and 1628 respectively. Formerly the junior warden was expected to make on election some gift of plate, and these took the form of silver apostle spoons. Several mentions occur in the books as to these. There is also a very good octagonal Jacobean table dated 1606, also the master's State chair, with back of richly carved mahogany, but its date is doubtful. The company's charters also are preserved. The Carpenters had a large garden which abutted on that of the Drapers' Company, and which is mentioned from time to time in the company's books. It was used for the pleasure and enjoyment chiefly of the master and wardens, who at one time had the privilege of using it as a drying ground. Although the great fire of 1666 very nearly approached the old buildings, they happily escaped only to be demolished two centuries later to make room for the present buildings.

Drapers' Hall.

Like that of the Carpenters', this hall is of modern construction, having been almost wholly rebuilt in the early seventies. Portions, however, of an older construction remain, which date from 1774. These are the walls of the court dining-room, and those of the court room, abutting upon Throgmorton Avenue, and in the latter room are to be seen the original plaster frieze and cornice, as well as

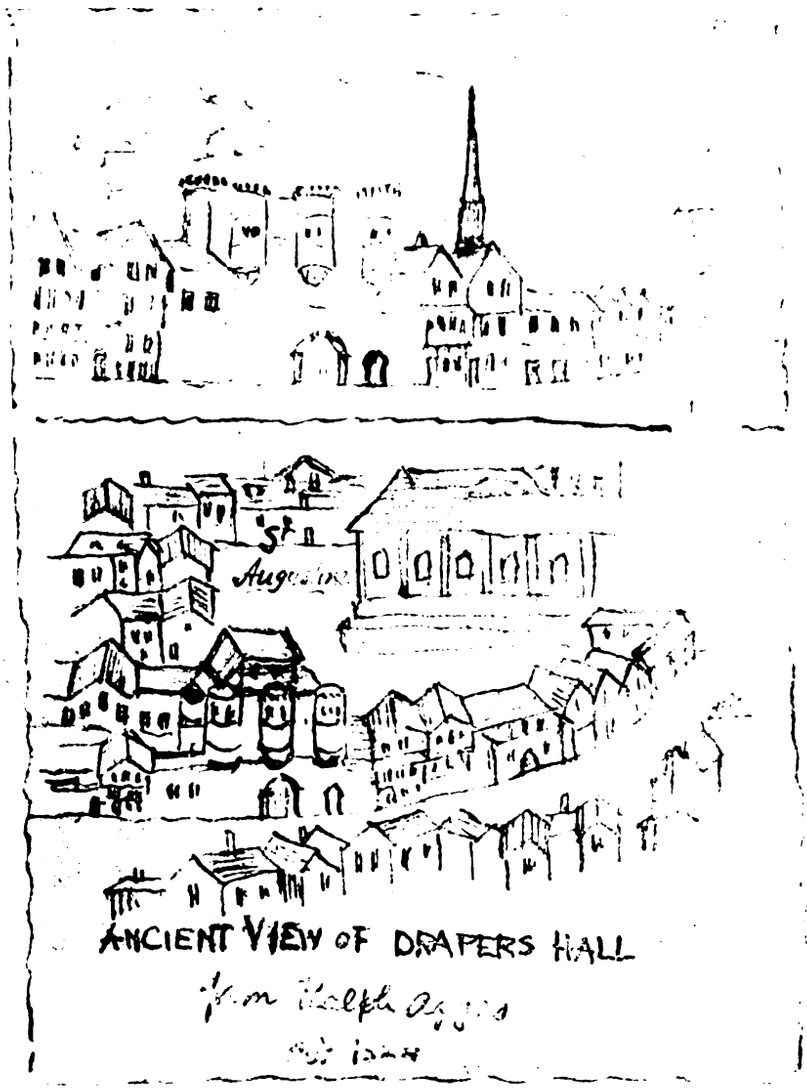
* Part of a paper read at a meeting of the Upper Norwood Athenæum by Mr. Frederick Higgs.

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the beautiful oak doors, architraves and linings, and also the window linings of the earlier buildings referred to.

The new buildings of 1872 are of an excellent character, and there is some beautiful work in them. They follow mainly the old lines which were laid down when the original building on this site (formerly the mansion of Cromwell, Earl of Essex) was destroyed by fire in 1666. The designer of the buildings then erected was Jerman, architect to the Fishmongers' Hall. They have been described as forming a lordly palace with quadrangle and piazza brick faced internally, and containing all the usual rooms and appurtenances proper to a company's hall.

There are to be seen in the Drapers' buildings a large number of valuable works of art, notably four tapestries covering portions of the walls of the court room and the drawing room, representing scenes in the story of Jason and Medea. These tapestries, originally made at the famous Gobelins factory during the later years of Louis XV., were given by his son Louis XVI. to the then Spanish Ambassador to France, passing from him to the Marquis of Salamanca, who sold them to Mr. Colman, of Stoke, near Slough, who, in turn, disposed of them to the company in 1881. They are very beautiful specimens of the art.



On the ceiling of the Livery Hall are three exceedingly good modern paintings by H. J. Draper; they are painted upon canvas secured to the ceiling, and represent scenes from Shakespeare's "Tempest" and "Midsummer Night's Dream." They also may be taken to represent in a minor form, "Morning," "Noon," and "Night." They are very beautiful productions, and it is a pleasure to reflect that they are the work of a British born artist.

In the other rooms are various oil paintings of royalties and notable members of the Drapers' Company by well-known artists. Over the door in the court dining-room is a picture representing the Holy Family, in beautiful colouring, by an artist of the school of Giovanni Bellini.

There are also sundry pieces of statuary and busts of a very high order of sculpture, and also the celebrated statue of Hypatia by Richard Belt, which was the subject of a celebrated law suit.

The original hall, destroyed in the Great Fire, was a very extensive place, and is shown on the sketch map of London by Ralph Aggas, published in the sixteenth century.

There was a three-storey castellated and turreted building in the front, under which the gateway passed leading to a courtyard, across which the visitor passed to the Great Hall building with a winding staircase up to the Banqueting Hall in the upper storey. The sides of the courtyard were probably enclosed with subsidiary buildings, thus forming a quadrangle. It will be seen, therefore, that these formed most commodious premises for the company, and were of the Baronial Hall type as befitted such a nobleman as the Earl of Essex, who built it in the first instance.

Previous to coming to the Throgmorton district, the Drapers were located (1477-1541) in St. Swithin's Lane nearer the centre of their trade, which at that time was practised in Candlewick (now Cannon) Street and Cheapside.

Attached to their hall and premises in Throgmorton Street was a large and beautiful garden which existed right up to the rebuilding in the seventies, and the present kind and genial beadle speaks with regret at its disappearance, as until the date of its being built upon he lived on the spot and enjoyed its pleasant seclusion. But City land is too valuable for horticultural purposes.

The Trade Guilds of Carpenters and Drapers.

These two organisations, like all the City guilds, were formed early on in the feudal times for the regulation of the practice of the art, mystery, or trade involved, and for the protection of the members using the craft. The Drapers must have been organised in this way very early on, because we find that Fitz-Alwyn, the first Lord Mayor of London, in 1189, was a draper, and left goods in trust with or for the benefit of his trade. The Charter of Incorporation is dated 1364. That of the Carpenters 1477.

These charters were confirmed and the rights, privileges, and duties conferred thereby enlarged or extended by other charters of later reigns. They gave powers which could be and were enforced by the civil authorities for the due, proper, and equitable practice of the trades, permitted the courts of the companies to make by-laws setting up standards of weight and measure, and enabled them to enforce these rules by fines and other forms of punishment. The charters further made it easy to provide for the continuity of the trade by the establishment of bound apprenticeship, and guarded against over-competition and maintained the closeness of their fellowship by duly limiting the number of such apprentices.

All this regulation was according to the charters permitted because "divers work or workmanship in the mystery have oftentimes heretofore been made and daily are made insufficiently which, if it should be suffered to be so done would redound not only to our prejudice, but also to the manifest deceit of our liege people."

Then it states that this proceeding is "for the praise, glory and honour of the omnipotent God and of the glorious and undefiled Virgin Mary."

Both companies' charters run on the same lines in respect to this dedication and also as to their rights and duties, and as in those days the outward profession of religion was more allied to the practice of everyday business than in these times, so we find that all the meetings of the courts and companies were preceded by a visit to church to hear Mass sung for those members passed away and for the living also, after which the business of the craft would proceed, followed by refreshment and jollification.

Drapery in these early days comprised clothmaking and tailoring, besides, as it was invented from time to time, the lighter kinds of merchandise we now know under the term, so that naturally the Drapers were one of the most important of the trade guilds. Similarly the Carpenters were very powerful as representing what we should call to-day the building trade, because houses in the eleventh to the sixteenth centuries were almost wholly of framed timber, the

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panels being filled in with wattles and daubs and later of brick. As building developed their monopoly ceased, brick and stone and tile being introduced, giving rise in due course to rival guilds in the form of the Bricklayers and Tilers', Masons' and Daubers' (or Plasterers') Companies. Further division also arose in the distinction between Carpenters and Joiners, and the latter craft presently formed themselves into a guild, so that the power of the Carpenters waned considerably towards the end of the seventeenth century, and we find that in that following their powers of regulation, if not of apprenticeship, had lapsed almost entirely.

Both guilds without a doubt exercised a wise and salutary influence in their day and served a most excellent purpose, but the progress of independence in thought and action and encouragement of individual effort left them in due course high and dry, and either from selfishness on the part of the management or carelessness on the part of the craftsmen of the day, the membership of the guilds gradually broadened, so that to-day it is by no means necessary for a Draper to be a draper or a Carpenter to be a carpenter. Hence many people have averred, and not without some justification, that funds which were evidently originally left for the benefit of craftsmen of the trades practised were being used for purposes far removed from such an end. This is only partly true, however, because both the Carpenters and the Drapers do a vast amount of educational and philanthropic good with the resources at their disposal, the Drapers maintaining up and down the country as many as five free schools, eight institutions of almshouses, one hospital, three sets of lectures and two University exhibitions. The Carpenters similarly maintain almshouses at Godalming and Twickenham, maintain evening schools for the theoretical and practical teaching of youths engaged in one or other branch of the building trade, and are liberal supporters in prizes at the annual examinations at Kensington of the City and Guilds Technical Institute, which I believe it contributes largely to maintain.

The funds belonging to the Companies have grown immensely with the growth of London and the increased wealth of the country generally, having arisen from judicious investments in freehold and other properties. Properties left in trust 400 or more years since for the benefit of the craft generally have increased in value manifold. Much was left also in trust for the saying of Masses for the greater comfort of deceased members, but this was all seized by the Crown in 1554, with the option to the Companies to redeem at twenty years' purchase, and the exercise of this no doubt proved in every case a most judicious outlay. In conclusion I have to tender my sincere thanks to the courteous clerks of both Companies for the kind assistance they rendered me in the preparation of the subject, and to the genial beadle of the Drapers' Company, Mr. Chipperfield.

HOW TO KNOW GOOD ARCHITECTURE.*

By MR. G. S. AITKEN.

WHEN asked to give a lecture to your Association, I thought a few remarks on the principles of architectural design would enable you to understand architecture better and to enjoy more the good examples which will necessarily come under your notice whether you stay at home or travel.

I propose confining your attention more immediately to Edinburgh examples, and those, for a very obvious reason, not the works of living architects. Naturally these will belong to the two great styles of Classic and Gothic, and we cannot do better than begin with the National Monument on the Calton Hill, as amplified in the Royal Institution, and Holyrood Abbey Chapel.

The National Monument was intended to be a copy in size and detail of the Parthenon at Athens, an example of pure Greek art of the date 438 B.C., and the result of much that had gone before.

Beginning with the west façade and completing it by reference to the smaller work at the Mound (excepting, of course, the statue of Her late Majesty, the wings and sculptured details), we note that it consists of eight columns resting on three steps, carrying an entablature and pediment: a beautiful building in three parts. Let us try to discover the source of this beauty.

One reason is that there is a commanding feature—the column—to which the other parts are secondary, and this principle of domination is always an element in good architecture. It is absent in the graceful building of the Life Association of Scotland on the opposite side of the street, and so far the pure Classic example has the advantage. On the other hand, the law of compensation is here well illustrated in the singular beauty in each of the two upper storeys, which with the rest of the façade are founded upon the Palazzo Pesaro at Venice.

The columns of the Parthenon are tree-like in form, wider below than above; this introduces a living sentiment into them and also prevents them appearing top-heavy, which they would have done if they had the form of parallel cylinders. They differ from the tree in that they are not straight-sided, having a slight swelling or entasis tending to correct the optical illusion of hollowness which the straight line would have given. They have no base, and in that are quite singular. It is only necessary to imagine the addition of a base to show that the Greek was quite right, and if anyone, for the sake of originality, introduced one, we may be sure that his example would find no followers.

The true base of the column is the stylobate, consisting of three steps which carry the outline of the columns to the ground, having their counterpart in the tree stem with its basal curve suggestive of stability.

The column has not a plain but a fluted surface. The only plain example is to be found in the Isle of Delos, but the intention to apply flutes there is evident, as the beginnings of them occur at the top and bottom. The reason for these flutes is threefold:—(1) They give variety to a surface which without them would be uninteresting; (2) they give the appearance of added strength; and (3) are a means of contrast between the plain lines of the stylobate below and of the architrave above. The flutes have very likely been suggested by some form of vegetable growth, such as the "heraclium" or "cow-parsnip," which is ribbed with a similar section of flute. It is interesting to note the exactitude of Nature's method of construction. If you cut through a large and small section of heraclium you will find the thickness of outer skin in proportion to the hollow precisely the same in both cases—viz., one-eighth of the diameter. The plant has twenty-five, the column twenty, flutes.

The column has a capital in three parts—viz., a ring of annulets immediately above the flutes which binds the neck and serves as a base to the echinus, a moulding of refined contour passing into the square block which crowns the shaft. There is in this no redundant detail; everything has a reason for its presence, the moulding apparently bending under the entablature and yet suggesting its ability to do the work. Or we may regard the annulets as calyces out of which the fluted shaft buds, which, though restrained from development by the square abacus above it, yet gives a sense of vitality to the column, just as in Pointed architecture the clustered shafts burst forth into foliage, flower and protecting abacus out of which spring the arch moulds.

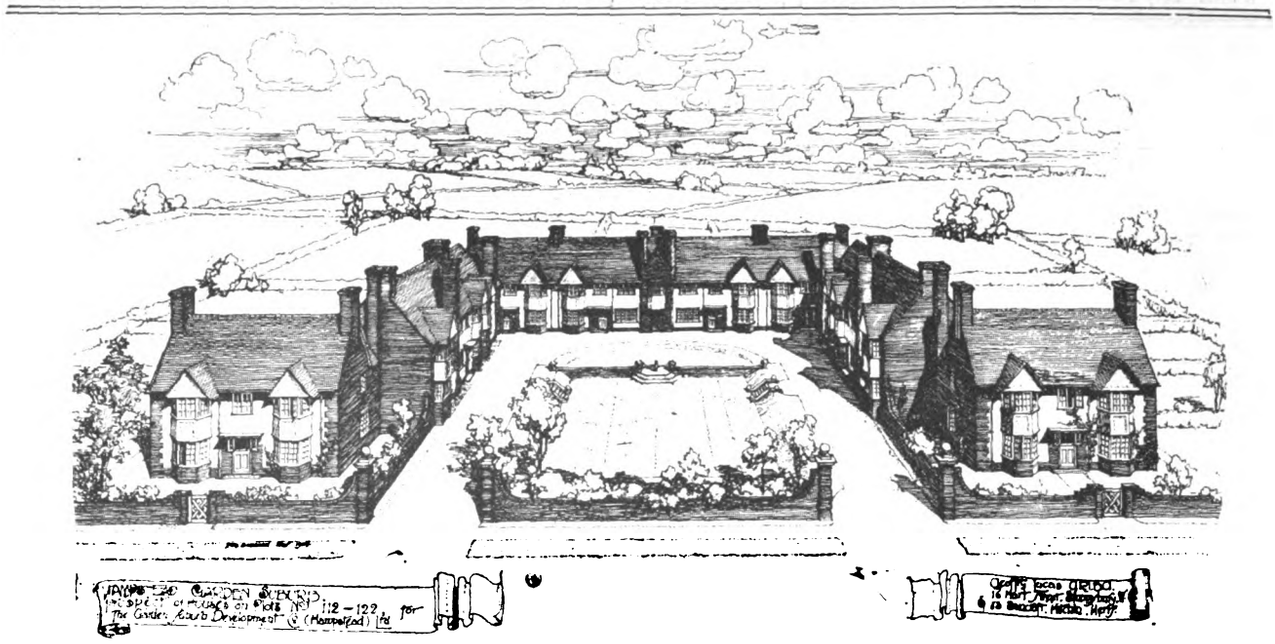
From what has been said we note how a law of three pervades the work; it is exemplified in the entablature, which is divided into architrave, frieze and cornice. The architrave, but for bronze inscriptions or other devices which have apparently been fixed to it, is plain and balances the stylobate. The triglyphs are difficult to account for; some say they represent the ends of wood beams which supported the roof of a prior wooden structure, but this is very unlikely, as they appear on the front where no beams would be, as well as on the sides where they would occur. They seem to be rather vertical lines in contrast with the horizontal lines of the entablature, and are connected with the architrave by little pyramidal drops which break the otherwise stiff line at the top of the architrave; by means of the mutules on the cornice soffit the triglyphs become with the drops a kind of bracelet uniting architrave, frieze and cornice. The interspaces or metopes are exactly square, filled in with sculpture so arranged by means of various angles as to unite the triglyphs together. The originals of this sculpture, known as the Elgin marbles, are now in the British Museum.

In the Royal Institution are wreaths instead of sculpture, which more economically fulfil the same purpose though not so effectively. The Parthenon pediment has sculpture symbolical of Greek mythology. In the Edinburgh example conventional floral forms take their place, and are sufficiently decorative without having, unfortunately, any meaning relative to the purpose to which the Institution was to be put.

The flatly inclined pediment fittingly crowns the front, harmonising with the prevailing horizontal lines. But if we ask if all this in the case of the Royal Institution be good architecture, we must give a qualified answer. The flat roof

* A lecture delivered to the Scottish Industrial Art Association.

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is not good for our humid climate, as it would allow of no other waterproof covering than such as lead, copper, or asphalte; we are shut out from slate. The carving is inappropriate, as it does not indicate by any symbolism the purpose of the building, and is simply a piece of excellent drawing.

It was a happy inspiration of Playfair's to place the statue of Her late Majesty on the summit. The outline of the building from Hanover Street is singularly fine. It would have been better, however, if the statue had been at the south end facing the sun. The southern façade would in this way have been a joy for ever.

Classic architecture for any modern purpose has this defect—that its heavy entablature casts a shadow on any windows there may be below and prevents the architect securing the full advantage of the interior. Indeed its use reverses the order in which buildings ought to be designed, which should be from the interior outwards; pure Classic compels study from the outside inwards.

As in the Parthenon, so we find the law of three prevailing in mediæval ecclesiastical architecture, and in Holyrood Abbey Church, when in its complete state, in the transverse division of nave and aisles, the longitudinal of choir crossing to nave, and the vertical of nave arches, triforium and clerestory.

As in the Parthenon, the base is an essential feature, and this is common to all ecclesiastical work on the exterior and to the columns of the interior.

The dominant feature of the chapel in a subordinate way is the nave arches, but more conspicuously the crossing arches and the vaulting which unites all parts of the interior. Other dominating parts in Pointed architecture are the spire, as at Salisbury, and the towers at Gloucester, Hereford and Worcester. Those at Canterbury and Lincoln, magnificent as they are, have their value lessened by the competition between them and the towers at the west ends of the cathedrals.

As a painter has one chief light or incident in his picture, so the architect should have in his Gothic composition some dominating centre, such as a spire or tower, or other commanding element. Its counterpart in Classic is the column, or tower, or dome. We notice how interestingly the pilaster redeems Sir Walter Scott's house in Castle Street from the commonplace; the column also has this effect in the house of Crosbie, in St. Andrew Square, the reputed original of Pleydell in "Guy Mannering," although the law of three has not been satisfactorily observed, inasmuch as the lower division is too shallow for the attic storey. The absence of a leading part is noticeable in some of the three-storey work at the Louvre, at a cloister in Venice, and the Colosseum at Rome.

Symmetry is an important element in good architecture in certain buildings. It occurs in all our banks and insurance offices; the Bank of Scotland is notable for that and good grouping; the various asylums with which Edinburgh is so richly endowed exemplify it; Fettes College and the High School cannot be overlooked in this respect.

Of course, when an important building occurs at the corner of a street, picturesqueness rather than symmetry should come into play, as in the excellent Prudential offices in St. Andrew Square. We see how symmetry would be out of place in the case of such a stately front as that of the Commercial Bank if a street were cut through at one end and it so became a corner building.

It is understood that the west front of Holyrood Chapel was symmetrical, having two towers before the erection of the Palace demanded the removal of the south-west tower; but the completed front could not be held as a good piece of composition. Like Wells Cathedral, its towers were outside the main structure, and they must have made the front ungainly. Wells was, however, much better proportioned, having its towers higher than those of Holyrood. A domed villa design of Palladio's with quadrant wings, shown on the screen, was explained to be of the old uncomfortable style of formal house, and thus a less symmetrical and ambitious house would have been more comfortable to live in.

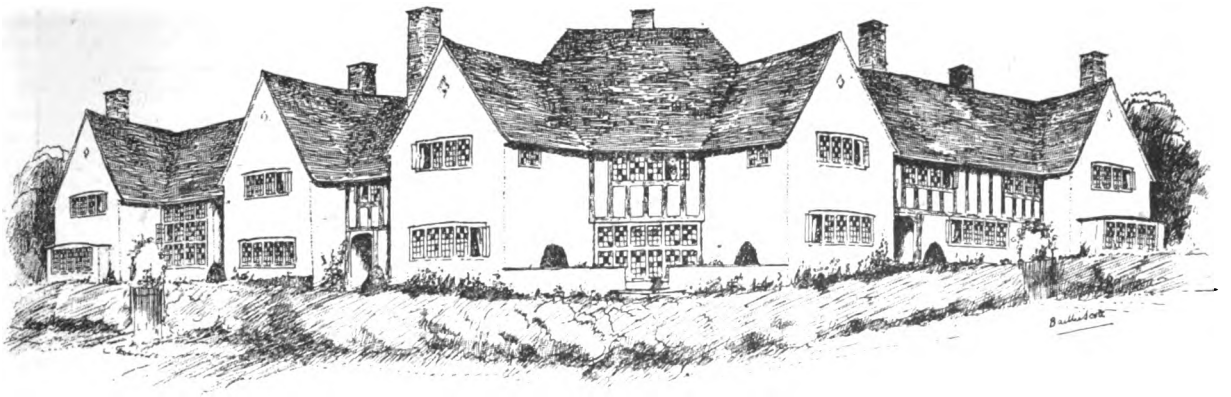
Dignity is another essential in architecture; even the smallest building may have some dignity about it, although it is most satisfactorily attained in a large building. It is an attribute of the Parthenon and of the Royal Institution also, which is two-thirds the scale of its original. The great windows of some of our cathedrals excel in this respect, such as those of Gloucester and Carlisle. I shall never forget the effect of Carlisle east window on a summer morning at six o'clock when the sun was shining brightly upon it; the impression made by its greatness and beauty remain a pleasant memory. The great internal arches and vaults of the French cathedrals and of Cologne, the towers of Durham and the central spire of Truro have all elements of dignity.

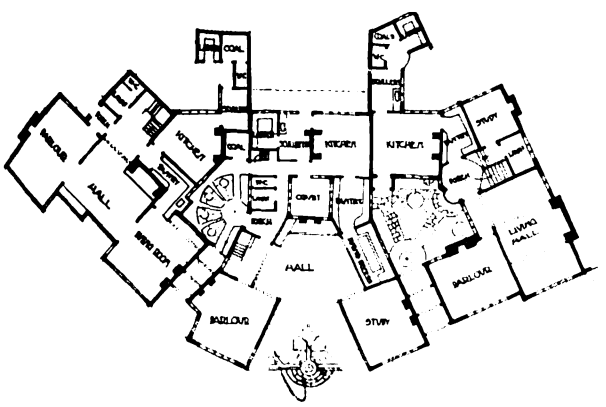
There is great dignity in the portal arches of Lincoln and Peterborough, but that is gained at the expense of other excellent qualities. They, for one thing, formed no structural part of the building, but were additions to the group by some persons of strong individuality, and we are very grateful to them for so great a departure from precedent, as the result has been much lovely work, though at the cost of the concealment of the tower bases at Lincoln.

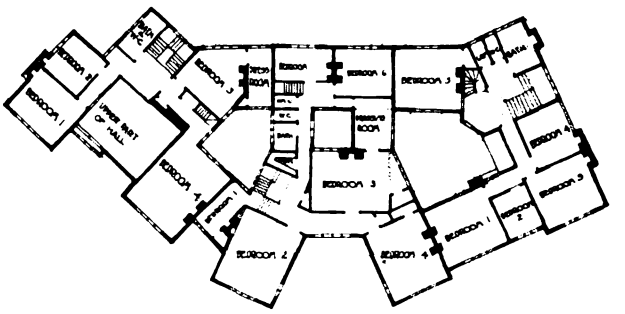
Rhythm is important—that is, the regular recurrence of certain portions of a design, such as the flank columns of the Parthenon. We have only to imagine the omission of one of these columns or their irregular spacing to show how this attribute might be lost. The sequence of buttresses in Pointed architecture, the continuous arcading of an interior, or the band of arcading at the summit of the Lincoln porch or the base of the Lichfield west front window, or on a smaller scale the row of graceful Decorated windows in the hall of Bothwell Castle, all show the value of this quality. We may add the repetition of parts in either of the charming upper storeys of the Life Association of Scotland's building.

Simplicity should be kept strictly in view—that is to say, nothing should be put decoratively on a building for which a plain reason cannot be given. There ought to be no "art for art's sake." We can understand why the capital of a column should be floriated, but to decorate the lower part, as is done in Indian architecture and in the Temple of Diana at Ephesus, is not a sign of wisdom. The cornice

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HOUSES IN MEADWAY, HAMPSTEAD GARDEN SUBURB.
THE GARDEN SUBURB DEVELOPMENT CO., LTD,
M. H. BAILLIE SCOTT, Architect.

of the Parthenon is consistently simple, but that of the exuberantly decorated one of Jupiter Tonans shows very little consideration for this quality.

Expression, or the impartation of the architect's personality, is a valuable part of architecture. We judge of a tree by its fruits, of a man by his works. It gives interesting variety to architecture when the architect, discarding precedent, puts himself into his design. He may be refined or vigorous, practical or æsthetic in temperament, or happily he may combine, as some have done, the best of these qualities together. Peterborough and Lincoln fronts are, as has been remarked, individual conceptions, although in aiming at one thing the designers have failed in another, but they have certainly avoided the trodden path and the commonplace.

A similar remark may be made concerning Holyrood front, but if one may be allowed to criticise—in these days when everything has to account for itself—we might say that the tower should have been loftier if the front was not to be squat, that its angles should have buttresses and not been tamely shafted, the lower storey having a window and the upper one of belfry character, the intermediate stages having smaller lights, the first-storey arcading omitted; the aisles should have had an end window, and the abutment of the nave arcade strengthened by an external buttress. Of course the reply to these suggestions may be that all the individuality of the front would be gone, and the force of this objection may be frankly admitted. Lichfield seems overdone in the matter of arcading, which shows the ostentatious personality of the designer,; if he had omitted some of the turret arcading he would have had the advantage of contrast, much to the enhancement of the rest.

The picturesque is largely noticeable in much of our great architecture, in Worms, Mayence and Peterborough, and furnishes an invaluable compensation for the loss of dignity which pertains to more formally designed buildings. But this is too wide a subject to be treated of at this time, as it involves the study of Scottish and English Domestic, French and Italian Renaissance, and so forth.

Function is of the first consequence, as we may at once understand by comparing a hospital such as that of Dundee, built half a century ago, with that in our city. Schools should express their purpose externally by showing that they have abundance of light and ventilation. Banks and insurance offices in Edinburgh are very happy in this respect by their suggestion of wealth within and security on the exterior, with a due amount of welcome suggested by their portals. Under this head should be considered the question how far we are justified in using the Mediæval form of church, which was originally designed to suit a processional and spectacular ritual in which the congregation took little part and where acoustics were a secondary consideration, to the need nowadays for good auditoria, where the preacher may be seen and heard. At the same time we cannot afford to forget the hold which so beautiful a phase of Pointed architecture, full of symbolism and hallowed by many fragrant memories, has on the Anglican Church, which has done so much to foster the highest class of ecclesiastical architecture, and which is the only evangelical body able to make full use of churches which resemble the Mediæval foundation.

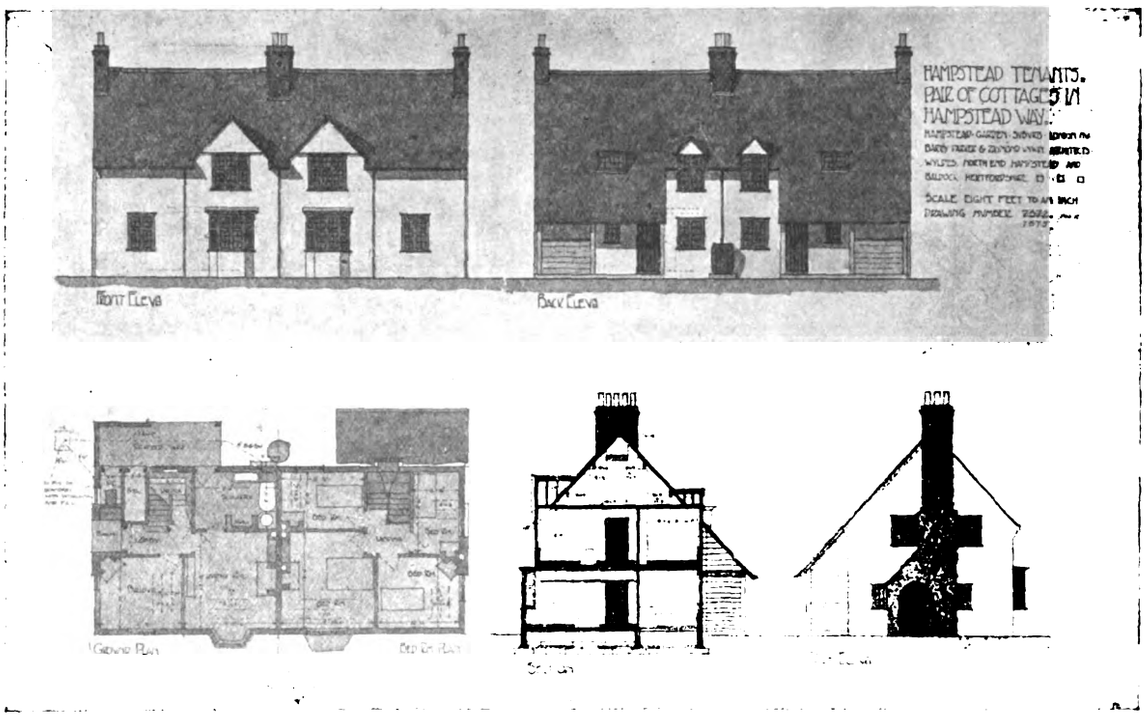
Under this head three Edinburgh monuments may be referred to—Sir Walter Scott's monument in Prince's Street, Dugald Stewart's and Burns's on the Calton Hill. Scott's, being Gothic, was in harmony with the character of his literary work. Stewart's, after the Choragic Monument of Lysicrates at Athens, is appropriate, inasmuch as his professorial works were related to Greek philosophy; but Burns's, modelled after the Temple at Tivoli, beautiful though it is, ought to have been more domestic in character and imbued with Scottish sentiment. The St. Bernard's Well is an excellent example of consonance with its purpose.

Grace we must not overlook, the more so as at the present time it is so common to design domes and turrets and buttress gables with a severity which will provoke a reaction in time, for this is a kind of simplicity due probably more to a desire for novelty than the application of any true æsthetic principle. The Parthenon, simple though it seems to be, was gracious in its roof terminals and acroteria. Salisbury spire is distinguished for grace as well as dignity.

Scale is exceedingly important, both in reference to the magnitude of the building in relation to its surroundings and the size of the detailed parts in comparison with the whole. There is a golden rule to be followed in this, for either a building may be so small as to be toy-like, wanting in dignity, or so big as to be clumsy and overpowering. The Bank of Scotland head office, to take one instance of several, is a successful example of attention to this. How easily the effect in the Old Town, as viewed from Prince's Street, might have been spoilt through inattention to this. The fine façade of the county buildings lately removed was an illustration of disproportion to the neighbouring buildings of St. Giles's Cathedral and Parliament Square. It is better away for this reason, and happily there is still another fine and better example of the same phase of Greek Ionic in the Surgeons' Hall, Nicolson Street. But it is to be regretted that the portico was not re-erected at one of the public parks, or put against the Calton Hill in the same way as one of the monuments at Athens.

It is perhaps well also that the National Monument was never finished. Had it been begun on a scale of three-

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fourths the original model it would have been more in scale with the Calton Hill, and the money devoted to its erection would then have gone further.

The dome and spire were finally referred to as the two greatest conceptions in architecture, the one all-embracing, altruistic, an echo of the expanse above; the other, heaven-aspiring and suggestive of another world.

LONDON MUNICIPAL HEAT SUPPLY.

By ALFRED E. WHEELER, C.E.

(Concluded from last week.)

FOR convenience of centralisation each Borough would be divided up into heating districts, each district having a central generating station, with feeder mains radiating from same, as described under the section "Distribution of Heat." The number of stations would depend upon the area of distribution decided upon, the division suggested being approximately one to each square mile. The following table shows the various London districts with the area of each in square miles, together with the total B.T.U. required per hour, number of stations, and number of boilers to each:—

Borough.	Population.	Millions B.T.U.	Area Square Miles.	Number of Stations.	Boilers per Station.	Total Boilers.
Battersea	168,907	563	3·40	3	10	30
Bermondsey	145,760	484	2·36	3	9	27
Bethnal Green	129,680	428	1·18	2	12	24
Camberwell	239,339	863	6·95	5	10	50
Chelsea	78,842	263	1·02	1	14	14
City of London	—	338	1·05	2	9	18
Deptford	160,398	535	2·46	3	10	30
Finsbury	121,463	405	0·92	2	11	22
Fulham	187,289	624	2·66	3	12	36
Greenwich	95,770	319	6·00	2	9	18
Hackney	229,272	763	5·16	5	8	40
Hammersmith	112,239	373	3·58	3	7	21
Hampstead	87,942	292	3·52	2	8	16
Holborn	59,405	195	0·64	1	10	10
Islington	334,991	1,115	4·86	5	12	60
Kensington	147,628	492	3·42	3	9	27
Lambeth	301,895	1,005	6·42	6	9	54
Lewisham	127,495	425	10·95	2	12	24
Paddington	143,976	478	2·19	3	9	27
Poplar	168,822	563	3·64	3	10	30
St. Marylebone	133,301	443	2·34	2	12	24
St. Pancras	235,517	782	4·17	4	10	40
Shoreditch	198,637	660	1·02	2	18	36
Southwark	206,180	685	1·75	2	19	38
Stepney	298,000	993	2·76	4	14	56
Stoke Newington	51,247	171	1·36	1	9	9
Wandsworth	232,032	772	14·25	4	10	40
Westminster	188,011	625	4·00	4	9	36
Woolwich	117,178	356	12·95	2	10	20
Total	4,721,216	16,010	116·98	84	—	877

A careful examination of this table will again demonstrate to advocates of the electrical method of distribution the unsuitability of that method. It is unnecessary to remind them that unlimited supplies of heat cannot be drawn from the present electric supply mains and generating plant without considerable extensions, and that the present plant and existing cables have their limits.

If a public supply of heat is determined upon, under whatever system adopted for the distribution of same, a complete new plant must inevitably be laid down. From the above table it will be seen that by the system suggested, the requirements would call for 877 boilers and 84 generating stations. This represents about 1.5 times the present number of boilers contained in all the electric lighting stations in London. To transmit the same heat electrically a comparison of previous figures will show that the addition of about 4,300 boilers to the present combined plant of some 580 boilers would be necessary for heat alone, assuming that the bulk of the heating might be done as a day load, and the lighting as a night load on the same plant.

And now I will proceed to a brief description of the plant comprised in one generating station which would be representative of them all. The boilers would be of the tubular type, with the usual steam and mud drums reduced to mere headers for the tubes, and provided with pipe connections. The tubes of the boilers would contain about 5,200 square feet of heating surface, and the fire grate surface would be in the ratio of one to ninety to the heating surface. The boiler would be provided with forced draught arranged to burn smokelessly not less than 30 lbs. of coal per square foot of grate per hour. The whole battery of boilers would be coupled together in the method known electrically as "parallel," and each boiler being so "bye-passed" that any one or more boilers could be "cut in" or "cut out" of the heating circuit, or isolated for cleaning or repairs if and when required.

The "flow" main leading away from the boilers would be connected to the suction connection of a high efficiency triple expansion, or compound pumping engine constructed for use with superheated steam, the steam for the steam pumps being generated in a separate steam boiler.

As the temperature of the circulating heat distributing water is somewhat high, the gases leaving the boilers would necessarily be of a high temperature. Economisers of the well-known tubular pattern would be erected in the main flues in which the high temperature flue gases would heat the feed water for the steam boilers to the point of evaporation, the duty of the steam boiler then merely being to evaporate the water into steam, which, passing through a super-heater situated in the path of the hot gases from the steam boiler, would impart some 100 degrees of superheat to the steam. The exhaust steam from the feed pumps and from the circulating pumps would be condensed in a good open type feed

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water heater, which would heat the feed water to near 212 degrees before passing on to the economisers. Such an arrangement it is calculated would make for the highest degree of thermal efficiency obtainable.

The pumps would be installed in duplicate and also connected in parallel, being bye-passed similarly to the boilers. The proportions of the cylinders, and the arrangements of the connections would be such that the pumps could by a suitable arrangement of valves and governors be used as pressure pumps or circulating pumps, as required. The pumps would be fixed in a distributing room adjacent to the boiler house, in which would also be fixed a pair of multiple circulation distributors, one of which would be connected to the delivery main from the pumps, the other collecting up the return mains and passing the returning water on to the boilers for re-heating.

A recording thermometer would be fixed upon each of the multiple distributors, and one of the principal duties of the engineer in charge of the station would be to maintain the 100 degree temperature head constant between the two distributors. This could be achieved in a variety of ways, notably by the regulation of the pumps, by the draught fans and stoking.

(3) *System of Distribution.*

The difference between any arrangement of distribution for a municipality as compared with that for a single institution, would be in the fact that the demand would never be constant at any specific time. Every effort therefore should be made in arranging the distributing system so that it may be as nearly as possible self-equalising.

From the multiple distributors already referred to in the distributing room would be taken flanged steel feeder mains through trenches constructed in the streets. Upon each out-going feeder main would be fixed a relief valve loaded to 275 lbs per square inch. At various points on the feeders, supply and return mains would be taken off, the combined sectional area of which being equal in cross-sectional area to the feeder main from which they are taken. From the latter supply mains, the services would be taken to the consumers' units. No cross-connection would exist between the supply and return mains except through the consumers' connections, and similarly no connection would exist between the flow and return feeder mains except through the supply and return mains by way of the consumer connections referred to. This arrangement of distribution would have the effect of equalising the delivery in each set of feeders. The velocity of water through the feeders and system generally would be about 10 feet per second, which figure is conditional upon a constant total cross sectional area (or corresponding friction head) being maintained. As the flow would tend to favour the circuit in which frictional resistance is least, the velocity would rise in this circuit until the frictional resistance (which it should be remembered increases about V^2), increased sufficiently to equalise the flow with the other circuits automatically.

The question of the total area of the consumer connections also demands judgment rather than calculation. It is, of course, improbable that all heat consuming devices would be open at the same time, but provision must be made for such a contingency. It is therefore suggested that a suitable number of connections should equal in area about 1.3 x sectional area of supply main.

The standard heating device would consist of a small battery of specially designed heating surface. These would be standardised at a pre-determined rated duty, and would be described by their capacity in B.T.U. The connections from the supply main to each heat consuming unit would be of such a size as to deliver to the heating unit a sufficient quantity of water per hour at standard velocity to contain the specified number of B.T.U. under the particular duty in heating apparatus or hot water supply for which the heating unit would be rated, *i.e.*, each heater would be capable of 50,000 B.T.U. per hour, as a maximum under heating or hot water service conditions as may be required. Each consumer's connection would be provided with a meter in circuit every 100 gallons, recorded upon the meter dial being the equivalent of 10,000 B.T.U., as described in the section, "Payment for Supplies." The amount of heat could be varied as required by merely regulating the quantity of water passing the meter by the simple process of turning the valve.

The feeders and supply mains would be laid in wood-lined trenches and packed with silicate cotton, as an insulator. The heat loss under these precautions would be negligeable. To provide for expansion suitable sliding expansion joints with packed glands and guard bolts would be fixed at frequent intervals in suitable access chambers, the pipes being firmly anchored in mid-position between joints to ensure equal movement on each joint.

As regards the sizes of the mains, each main should be standardised so that the friction head on each main should be as nearly as possible the same to ensure even flow throughout all circuits.

As a guide to the sizes, it may be mentioned that a 12-inch diameter feeder main would carry 4,580 standard heat consuming units, and a 3-inch supply main 284 such units, the connection to each unit being about ¼-inch diameter.

(4) *Payment for Supplies.*

Not the least detail of the municipal heat supply scheme would be the question of the method of measurement of, and payment for supplies on a basis at once satisfactory to the consumer, and remunerative to the vendors.

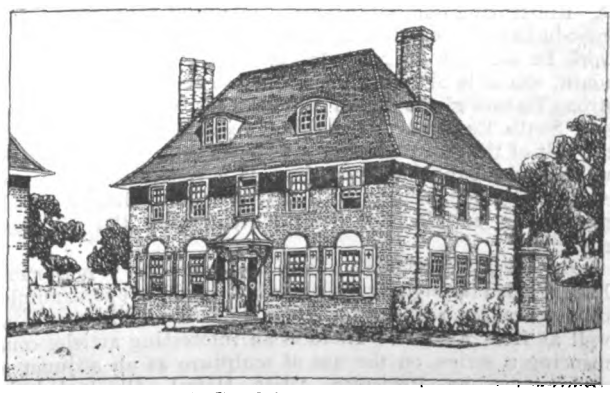
It is unnecessary to go into details of the apportionment of funds at present. I will, therefore, merely indicate the method of payment for heat supplies, and suggest a figure which should certainly cover all expenses of administration and depreciation of plant, leaving a substantial surplus for devotion to other necessary purposes.

To formulate a suitable unit of measurement is not a light task. The B.T.U., of course, is an unpractical quantity as a commercial unit, being far too small for anything but theoretical calculations. The practical unit of heat, which I shall propose to designate a "heat unit," would be the equivalent of 100,000 B.T.U., a quantity which lends itself in a strikingly useful manner for our purpose, as the following will show.

A standardised heat consuming battery having a maximum capacity of 50,000 B.T.U. per hour has been suggested. This, it will be seen, is equal to 0.5 "heat units" per hour at its full capacity, *i.e.*, the heat consumption of two of these batteries would be one "heat unit" at the maximum delivery through it of 100 gallons per hour. This quantity could be reduced when less heat is required by regulating the stop valve to the desired delivery.

Now let us see what the actual net value of our "heat unit" would be. Each boiler would be equal to a duty of about 18,000,000 B.T.U. per hour, and would be constructed to burn with forced draught 30 lbs. of coal per square foot per hour. The total B.T.U. utilised per 1 lb. of coal for heating purposes would be about 10,440 B.T.U., or equal to a thermal efficiency of 72 per cent. With coal at an average price of 20*s.* per ton, our "heat unit" would cost 1.026*d.* If the "heat unit" is charged out to consumers at 2*d.*, there is no doubt that the 98 per cent. surplus would considerably more than cover all the charges referred to, and at the same time remove all suspicion of bias in comparisons of cost with gas and electric heating. The annual earnings of Hampstead, for example, with its sixteen boilers, would thus run out at about 39,000*l.*, working at an eighteen-hour day with an average 50 per cent. load for the year after all coal had been paid for. The earnings of each boiler are thus seen to be about 2,400*l.* per annum, showing a gross estimated annual earning capacity for London of 2,100,000*l.* after deducting fuel cost. The suggested 2*d.* rate could no doubt be reduced to a much lower figure in the hands of expert financiers, and a surplus might even be obtained to be applied to the relief of the rates.

Coming to the question of measurement, each consumer's connection would be provided with a meter in circuit; the dial of the meter instead of being marked in "gallons," as is usual, would be marked "heat units," otherwise it would



HOUSE NEAR THE HEATH EXTENSION FOR THE GARDEN SUBURB DEVELOPMENT COMPANY (HAMPSTEAD) LIMITED.

Messrs. MICHAEL BUNNEY & C. C. MAKINS, Architects

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be unaltered. As a "heat unit" would be the equivalent of 100,000 B.T.U., the exact alteration in the marking of the dial would be as follows:—

The "hundreds" dial would be marked "heat units." The "tens" and "units" dials would be marked quantities below unity. The "thousands" and "ten thousands" dials, quantities above unity.

The meter on being installed would be proportioned to pass an hourly quantity of water at standard velocity, proportionate to the capacity of the heating battery installed. For example, each pair of "half unit" heaters would require as a maximum 100 gallons per hour, the meter would thus be termed a "1 unit" meter, and would be the minimum size.

With the flow-equalising method of connections already described, and the careful attention to the recording thermometers at the generating station, no difficulty whatever should be experienced in maintaining the 100 degree temperature head, and the amount of heat chargeable to the consumer would thus bo determined with a great degree of accuracy.

How would the cost of house heating by means of municipal supply compare with heating by gas or by electricity? Let us see. A hypothetical case may be taken of a house containing 320 square feet of radiation in eight radiators of 40 square feet each, with hot water radiation. Each square foot will give out under average conditions about 200 B.T.U. per hour, and allowing 33 per cent. for lost radiation from pipe connections, &c., as before, the total hourly consumption of heat would be 85,300 B.T.U. (= .85 heat units). In a week of eighty-four hours the heat consumption would total 71.65 "heat units," which at 2*d*. per unit costs 12*s*. To do the same work with gas radiators (making due reduction in the heating surface for the greater heating power per square foot) the eight radiators would consume 14 cubic feet per radiator per hour or 9,420 cubic feet for the eight radiators per week of eighty-four hours, the cost at 3*s*. per 1,000 cubic feet being 1*l*. 8*s*. 3*d*. An electrically heated plant would consume one Board of Trade unit per hour per radiator for an equal duty. The cost of an eighty-four-hour week for the eight radiators would thus be 2*l*. 16*s*. It is thus evident that at current prices the cost of heating by gas would be 135 per cent., and by electricity 366 per cent. more than by municipal supply. As to how the poorer classes would be affected by the change, it may be stated that with two radiators in constant use, having a total surface of 40 square feet or its heat equivalent, the weekly cost for heat for sixteen hours per day would be a fraction under 1*s*. 6*d*.

The question may arise, How would the new system affect existing heating plants? The answer is that it would affect them not at all. A special new heater would be installed to take the place of the boiler or calorifier, and whether the system were a steam or a hot water one its heat supplies could be drawn with equal facility from the municipal supply mains.

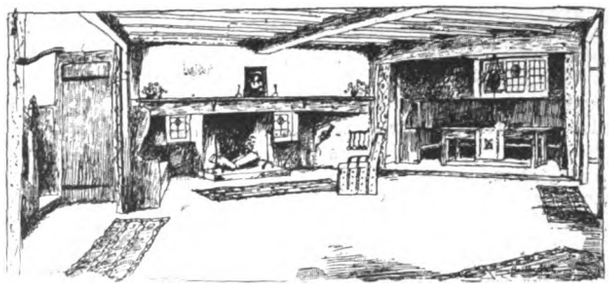
As a concluding remark, it only remains to be said that the writer has no desire to advocate any revolutionary changes, but merely to demonstrate that a scheme of heat supply for London, though ambitious, is not an impossibility and a worthy achievement of the twentieth century.

OUR CONTEMPORARIES FROM OVER-SEAS.

THE *American Architect* in its last two issues has been illustrating domestic architecture in the Southern States, introducing the series with an account of both old and new work in the city of Augusta, Georgia. Naturally in the south, shade is of importance, and we find the verandah a strong feature of the design of houses for Georgia, Alabama, and South Carolina. One thing we note with pleasure is the cult of the roof; whether the houses belong to the Italian villa or the bungalow type there is a goodly projection of eaves and verge, which, with the verandahs already noted, makes for satisfactory design even with the simplest elements.

Der Architekt shows us how the "new art" movement has extended throughout the whole of inland Europe, examples being given from Bucharest, from Luhacovic in Bohemia, as well as from Austria. There is an interesting article, commencing a series, on the use of sculpture as an adjunct of architecture by Professor Adolf Hölzel, illustrated by examples from both old and modern work.

A Construcçao Moderna illustrates a model of one of the premiated designs—that by Germano Salles, of Paris—in the recent competition for a monument commemorative of the Peninsular War, a remarkably expressive and powerful composition. In this number we are also interested to see an article on municipal housing in England and Germany, apropos of our Town-Planning Bill and with reference to the garden cities of Letchworth, Hampstead, Port Sunlight and Bournville, as well as the German development of Düsseldorf, Frankfort, Berlin, Munich and Strasburg.



HOUSE IN MEADWAY FOR THE GARDEN SUBURB DEVELOPMENT COMPANY (HAMPSTEAD), LTD.
M. H. BAILLIE SCOTT, Architect.

Deutsche Bauzeitung gives us views of the extensions and additions to the Schloss Vollrads in Rheingau, of which Herr Philip Kahm, of Eltville-on-Rhine, is the architect, who, without sacrificing individuality and originality, has preserved the character and feeling of the old work in his own designs.

La Construction Moderne honours our modern work with an article and full series of illustrations of the village of Bournville and its domestic architecture, giving full appreciation to the work of Mr. W. A. Harvey as the creative collaborator in the scheme conceived and initiated by Mr. George Cadbury.

GENERAL.

Mold Church, one of the most historic edifices in North Wales, is to be restored at a cost of about 5,000*l*.

The Chancellor of Winchester has granted an application for a faculty to demolish the old parish church of Bishopstoke, against which there had been opposition on the part of a number of parishioners.

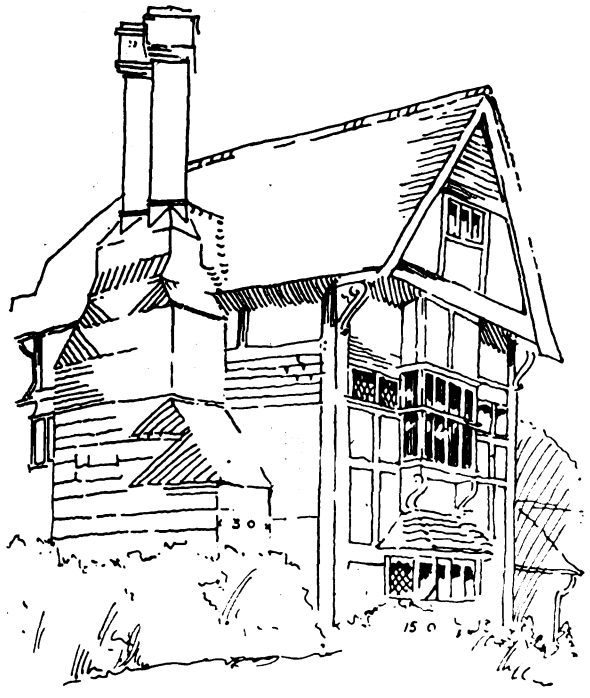
The Church of Kirkdale, near Kirby Moorside, is to be restored. The original building dates back some twelve hundred years, and the present edifice has two fine Saxon doorways. Over the south doorway is a quaint sundial, 7 feet long and 2 feet wide, and around it are Saxon inscriptions, cut in well-defined characters, dating from 1060.

Mr. John Tweed has received from the Clive Memorial Committee the commission for the bronze statue of Lord Clive to be erected on the steps at the end of Charles Street, Whitehall, and the marble statue to be placed in the Victoria Memorial Hall at Calcutta. The new stairway at the end of Charles Street, overlooking St. James's Park, will be so adapted as to provide a pedestal and base for the statue.

The Corner Stone of the new St. Saviour's Church House and Church Men's Club was laid by the Bishop of Kensington on Saturday, June 12. The building, which is in late fifteenth-century Gothic, fronts on the Grove Road, Ealing. A central feature of the design is the large doubled-arched entrance and passage way placed between the clergy house and the men's club, leading to the church enclosure. The gabled roof of the chapel rises on the third floor above the entrance. There is convenient accommodation for three clergy, and a fourth bedroom for visitors and a large common room for general purposes. Except for communication through the kitchen and by a single passage on the first floor, the servants' wing is entirely separated from the main building. Nearly the whole of the roof space is converted into a roof garden. The accommodation of the club consists of a billiard-room, a large reading-room, writing and committee-rooms, with caretaker's rooms on the third floor. The total cost of the Church House and club will be about 4,500*l*. The architect is Geo. H. Fellowes Prynne, F.R.I.B.A., of Westminster, from whose designs St. Saviour's Church was built some nine years ago, and the builder is Mr. W. J. Dickens, of Ealing.

The Southwell Diocesan Council at their last meeting considered a proposal to appoint a diocesan architect, to whom all plans and specifications relating to the building or restoration of churches, rectories, vicarages, parish buildings and schools should be submitted before any work was begun. A resolution was proposed that such appointment should be made. This was not seconded and the matter dropped.

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AT PENSHURST, KENT.
From a Sketch by BANISTER FLETCHER.

THE WEEK.

LONDON'S Fire Brigade is almost entirely manned by sailors, and it has of late been the custom, apparently, to consider that a naval officer is the most suitable individual to command the Brigade; but the Special Commission of the British Fire Prevention Committee seems to have learnt, as one of its lessons on its latest tour, that our practice is open to question; for in Berlin there has been a most marked improvement in the service since it has been officered by civil engineers and surveyors. There is, however, this to be said—that in Berlin these officers have almost, if not quite, all passed through the army and have learnt what discipline, command, and organisation mean in the handling of men to fight a common foe.

To the ordinary householder sanitation means drains and drains only, but Professor C. E. A. WINSLOW, we learn from the *Engineering Record*, in a recent discussion before the Sanitary Section of the Boston Society of Civil Engineers, put forward the view that a person inhaling drain air for twenty-four hours would ingest fewer intestinal bacteria than in drinking a quart of New York water. The Professor based his view on an examination of 200 samples of air from house drains, soil pipes, vents, and wastes. So it seems we have been riding to death the importance of plumbing and drainage work, and forgetting the need for pure water, pure milk, and other desiderata.

THE fine collection of Wedgwood ware that Mr. ISAAC FALCKE has presented to the British Museum is particularly notable for the copy of the famous Barberini vase, a work that occupied WEDGWOOD for three years, and of which only sixteen specimens are known to be extant. The original vase now, though broken and repaired, is in the British Museum, and was discovered in a sarcophagus bearing an inscription to the memory of the Emperor ALEXANDER SEVERUS and his mother, JULIA MAMMÆA.

IT was foretold some years ago by the late Professor KERR, at an Institute meeting, that architecture would descend from the level of a profession to that of commercial business, and it seems we are getting on apace in that descent, for there has recently been registered a limited liability company whose objects are "to acquire and deal with lands, woods, building estates, and waterways in the United Kingdom and elsewhere, and to carry on the business of land, house, and estate agents and dealers, builders, surveyors, *architects*, draughtsmen, &c." In face of such facts can it be doubted that the time is ripe for registration?

THE unveiling on Friday last of the monument at Reading "to the memory of HENRY BEAUCLERC, King of England, who founded Reading Abbey on June 18, 1121, and was buried before its high altar on January 4, 1136," belated as it is, even now is due entirely to the generosity of Dr. JAMIESON B. HURRY, M.A., who has thus still further increased the debt of gratitude owing to him by the people of Reading for his great work on the history of the Cluniac abbey which first gave their town its start as a township of any importance. The memorial takes the form of a cross, somewhat of Celtic form, constructed in Cornish granite, and was designed by Mr. W. RAVENSCROFT, F.S.A., of the firm of RAVENSCROFT, SON & MORRIS, architects.

THE celebration of the successful accomplishment by the Bishop of BATH and WELLS of his self-imposed task of rescuing the remains of the abbey of Glastonbury is an occasion for congratulation. Glastonbury is so closely connected with the history of Western England that its demolition would have been a national calamity, now averted by the vesting in the diocesan trustees of the See of Bath and Wells of the property of the abbey estate. More remains to be done in the work of restoration—or rather preservation—for Mr. W. D. CARÖE, to whose hands the operations are entrusted, is a conservative restorer, and with the object of raising funds for this purpose it has been decided to relet the estate for a further term of five years.

THE restoration of the so-called "Dutch House" preserves to Bristol a quaint and picturesque specimen of domestic architecture, and has been judiciously carried out by Mr. W. S. SKINNER. Whether or no there is any truth in the tradition that the Dutch House was brought over piecemeal from Holland—and we doubt the truth of the story—Bristol is fortunate in having preserved for its delight and instruction a characteristic piece of seventeenth-century domestic architecture. The house is now the property of the Town Council, and it seems that it was due to the influence exerted by the Bristol and Gloucestershire Archæological Society, the Bristol Society of Architects, the Bristol Kyrle Society, and the Society of Antiquaries that the Town Council were persuaded by a small majority to acquiesce in the preservation of this historic monument.

IN view of the durability of such structures as the Bristol "Dutch House," it is curious to note that at the Warwick Assizes one Coventry builder was mulcted in damages for slander against another Coventry builder, of which the substance was that oak beams had been used in the foundations of certain houses. The essence of the slander seems to have been that the use of the oak beams was presumed to be contrary to the by-laws of Coventry, and hence an improper and jerry-builder's method of construction. The curious part of the case was that anyone should suppose that oak beams—provided, of course, they were sound at first—would not last longer than steel joists.

WELLS Cathedral and "Boston Stump" have, during the past week, been celebrating—the former the millenary of the bishopric of Wells, the latter the sexcentenary of the laying of the foundations of the church of St. Botolph. One cannot but admire the persistency of the clergy in utilising pageants and centenaries to revive sympathy in the work of the Church; and whether the interest in the past that such functions usefully arouse results in adherence to the present order of things or not, the contemplation of the art and faith of our ancestors cannot be altogether without good.

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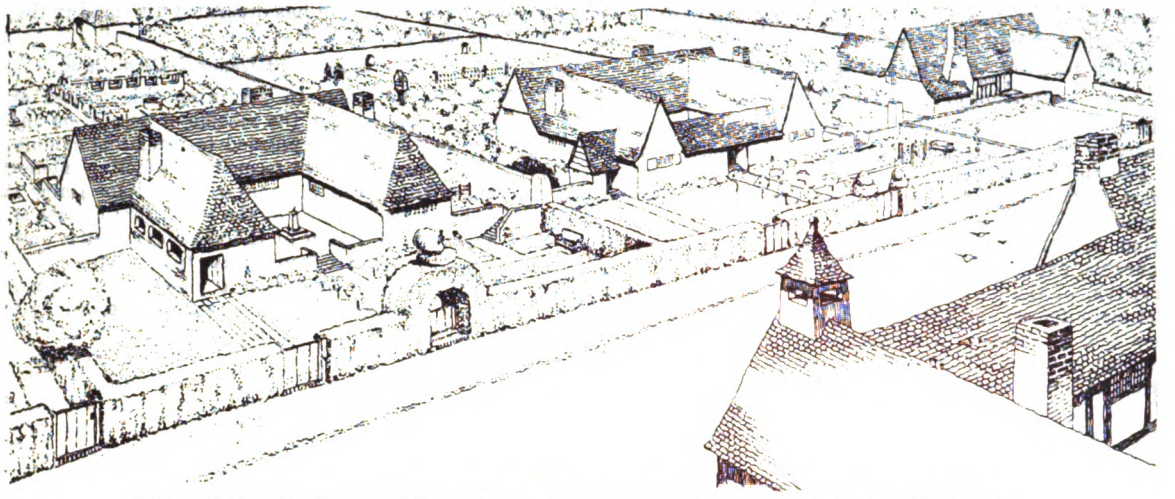
COMPETITION FOR MIDDLESBROUGH PUBLIC LIBRARY.

WE understand that those competitors who feel that the departures from the conditions of this competition, alleged by them to be found in the design of Messrs. RUSSELL & COOPER, are of so exceptionally grave a character as to justify their indignation at the unfair treatment they think they have received, have, as we suggested last week was their only course, addressed their remonstrance to the President of the Royal Institute of British Architects, and have tabulated their grounds of dissatisfaction as follows:—

Instructions. (Issued to Architects.)	Queries. (Asked by Competing Architects.)	Replies. (Sent to Competing Architects by Town Clerk.)	Selected Design.
1. The general lending and reference libraries are to be placed in the northern part of the block adjoining the dwelling-houses in Dunning Street. (Paragraph 3, page 4.)	100. Are the positions of lending library and news room absolutely unalterable?	100. Yes.	Lending and reference libraries separated about 37 feet from houses in Dunning Street by boys' and girls' reading rooms.
	106. Are the positions for the various rooms to be absolutely adhered to?	106. Paragraphs 3 and 4, page 4 of Instructions, must be adhered to.	
	72. Must the lending library and news room occupy the relative positions prescribed for them?	72. Yes.	
2. Secondary entrance from Grange Road East. (Paragraph 3.)	75. Whether entirely distinct entrances from the two roads, Dunning Street and Grange Road East, are desired for the lending library, &c., and news room?	75. See 2nd and 3rd paragraphs on page 4 of the Instructions issued to architects.	No secondary entrance in Grange Road, but one provided in Dunning Street.
	84. Should there be two entrances from Grange Road, viz. one for the general news room and one for secondary entrance to lending and reference libraries?	84. Yes: but secondary entrance not necessarily to lending and reference libraries.	
3. Boys' and girls' reading rooms to be divided by glazed partition running from the service counter.			Two counters and two partitions provided.
4. Juvenile book store to have steel gallery.	49. Would a gallery of sufficient width for one row of wall-cases be enough in the juvenile book store?	49. Yes.	None provided.
5. Catalogue room to be on ground floor.	53. May the repairing room be on first floor and separate from receiving and catalogue room?	53. No.	Catalogue room separate from repairing and receiving room and placed on first floor.
6. The general news room to have entrance from Grange Road East.	81. Must the direct communication asked for between Grange Road and Dunning Street be by means of corridor, or would it be sufficient to have a door in the general news room communicating with the main hall and stairs?	81. No communication other than for janitor between news room and other parts of building.	9-feet corridor shown with swing doors communicating between news room and main building.
	80. Should there be access for the public between the general news room and main buildings without going outside the buildings?	80. No.	
7. Patents library and extension lavatory and w.c.'s for male and female staffs, corridors, &c. Area, 1,739 square feet.	92. What is meant by "extension" in connection with the patents library?	92. A room for library extensions when required.	Area provided about 850 square feet. No provision for extension.
8. Furnace, boiler and coke store to be on ground floor.	55. May the repairing room be in the basement?	55. There is no basement, so must be on ground floor as set forth in the Instructions.	Placed in basement.
	61. May the furnace boiler and coke store be in the basement, as there is no basement mentioned in conditions?	61. No basement provided for.	
9. The general reference library should be entirely lighted from the roof direct: there must be no glass ceiling lights.	66. By the lighting of the general reference library from the roof direct, it is presumed that either skylights, a lantern light or dormer windows are suggested, and that the prohibition of glass ceiling lights refers to false lights below a skylight?	66. Refers to false lights.	Side windows provided. Not lighted from roof direct at all.
	69. Lighting of reference library—are skylights wanted and no side windows?	69. See Instructions.	

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HAMPSTEAD GARDEN SUBURB.



PROPOSED GROUP OF HOUSES.—Messrs. BARRY PARKER & RAYMOND UNWIN, Architects.

ARCHITECTURAL COPYRIGHT.

ARTISTIC copyright as affecting architects is a matter of very great importance, not only to architects, but also to architecture. The unauthorised copying of good designs is largely prevalent, and is frequently accompanied by such mutilation that the artistic character of the original is lost; hence the art of architecture suffers, the public taste is degraded by a mistaken reverence for what is supposed to be, but is not, the work of an artist; further travesties follow the first inadequate plagiarism, and both the representation of architecture and its appreciation fall further into the slough. Then, as regards architects, not only is the author deprived of the reward due to him for his original conception, but his reputation suffers by the unworthy copies that masquerade as his design.

The right of architects and architecture to participate in the protection proposed to be afforded to artistic productions by the Revised Convention of Berne, signed at Berlin last November, has been ably championed by Mr. JOHN W. SIMPSON before the Committee of the House of Commons appointed to examine and report upon the changes proposed in the law of artistic copyright. Mr. SIMPSON well emphasised the close analogy between the methods by which a work of architecture is produced and those employed in the art of sculpture. He emphasised the position of the architect as an "author," and hence on the same plane as any other author of intellectual property, whether literary or artistic. Objections that might be raised to the protection of an architect's work on the ground of its utilitarian character or its position as a subject of public view and enjoyment, were shown by Mr. SIMPSON to be equally applicable to the works of sculptors.

Mr. SIMPSON's advocacy before the Committee was supported by twenty-three definite complaints from members of the Royal Institute of British Architects, from the President downwards, of legitimate grievances which show most clearly how serious are the disadvantages under which architects labour from the want of protection for their artistic copyright. Thus there cannot be the slightest doubt as to the necessity of such protection.

Nor is there, as Mr. SIMPSON has shown, any question as to the desire of architects in all countries of the Union for legal protection. The International Conferences of Architects at Paris in 1878, 1889, and 1900, at Brussels in 1897, at Madrid in 1904, London in 1906, and Vienna in 1908 have each passed unanimous resolutions to this effect; and similar resolutions have been adopted by the Congresses of the International Association of Art and Letters held at Paris, Madrid, Neuchâtel, Milan, Barcelona, Antwerp, Berne, Monaco, Turin, Liège, Bucharest, Mayence, and elsewhere, from its foundation in 1878 to the present time.

Of the practicability of effective protection to architectural work there can also be no doubt. It has already been done in Denmark, France, and Belgium, and decided cases in these countries were cited by Mr. SIMPSON. The fear that the work of students, with regard to important monuments and public buildings, might be interfered with by the action of copyright, is declared by Mr. SIMPSON to be an error, as anyone would be free to sketch, measure, or otherwise study any work so long as he did not make reproductions of it for his own profit to the injury of the author.

The case, therefore, on behalf of the right of architects to benefit equally with painters and sculptors in the protection of artistic copyright is, we think, fully made out, and Mr. SIMPSON deserves the thanks of all architects for the able way in which he has presented the case, as the representative, with Mr. JOHN BELCHER, R.A., of the Royal Institute of British Architects. We shall be surprised if the claims of architects are not admitted by the Houses of Parliament, and incorporated in the Act which is to give effect to the Revised Convention of Berne. Then we should have an end to the disastrous result under which British architects are groaning of the decision in the leading case of *Gibbon* v. *Pease*.

BRUSSELS INTERNATIONAL AND UNIVERSAL EXHIBITION.

MANUFACTURERS all over the country are beginning to realise and appreciate the extraordinary amount of assistance offered to them by the British Government to enable them to make suitable exhibits at the Brussels International Exhibition next year. The Royal Commission appointed to take charge of the Exhibitions at Brussels in 1910, and at Rome and Turin in 1911, has studied exhaustive reports of executive work in other countries, and has also been at great pains in investigating the methods pursued at previous exhibitions in which Great Britain participated. The result of all this work is shown in the untiring energy now being displayed by the Board of Trade officials in securing the many favourable considerations which should influence the British exhibitor.

The Royal Commission, which is presided over by H.R.H. the Prince of Wales, has its offices in Queen Anne's Chambers, Westminster, and the active official is Mr. U. F. Wintour, Secretary and Commissioner-General and Director of the Exhibitions Branch of the Board of Trade. This branch is to be a permanent office for the consideration of future and revision of past international exhibitions in which Great Britain has been, or will be, concerned.

Every conceivable information required by proposed exhibitors can now be promptly given. Up to the present many instructive circulars and Press paragraph matter have been issued, and the willing interest attracted of chambers

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of commerce everywhere in the country; while from the chiefs of the great railroads, the steamship companies, and of every other important transport company, hearty assistance in the shape of cut-rates has been assured.

Position of the British Section.

The report of the committee of investigation showed most conclusively the many causes for the disinclination to exhibit and the general lack of enthusiasm in recent years on the part of the British manufacturer for international exhibitions. They complained of lack of organisation, of isolation of exhibits, of unsuitable surroundings, of unwarrantable expense, of the necessity of costly personal supervision, of the decrease in the value of awards, and of several more defects and shortcomings which the Royal Commission will do its best to obviate, curtail, or amend, as is suitable in each case. At Brussels next year the British Government has secured perhaps the most prominent position in all the Exhibition for its section. Hitherto, owing to carelessness or tardiness, Great Britain has seen in nearly every instance all the good positions secured prior to advancing her own claims; this time the British representatives were prompt to seize on a primary choice. The British section amounts to 203,140 square feet, of which 150,640 square feet are in the Industrial Hall and 52,500 square feet in the Machinery Hall. The amount of space covered, and certainly the positions secured, compare most favourably with the allotments to other countries. One great advantage lies in the fact that visitors must pass through the British galleries before reaching the French, German, Italian, American and other national sections, and the old proverb of "first impressions" holds good.

The main gallery running through the British section is 510 feet long by 98 feet wide, and there are four other parallel galleries 56 feet wide, which lend themselves to the formation of attractive courts for the display of the different classes of manufactures. At the end of the main gallery, furthest from the entrance, is a double staircase leading to a bridge which gives access to the French and other foreign sections.

The Isolation of British Exhibits.

In the Machinery Hall the portion allotted to Great Britain occupies the centre of the hall, and has easy access to the electric, steam, water and gas mains, from which power can be obtained for showing all classes of machinery in motion. It is also intersected by three lines of rails which communicate directly with the Belgian State Railway system.

There will be no isolation of British exhibits; all will be shown together appropriately grouped and arranged under the immediate supervision of officials of the Royal Commission. All the exhibitor has to do is to purchase the space he requires and see to the transportation, for which a variety of special facilities have been secured. The principal railway companies, for instance, have agreed to accord a reduction of 50 per cent. on the usual rates for the conveyance of all unsold exhibits returned after the close of the Exhibition.

The Royal Commission officials will undertake the entire handling of the exhibitors' goods within the Exhibition, not only unloading and displaying on the space reserved, but storing all empty packing cases and reloading at close of Exhibition. With the exception of machinery and rolling stock, the exhibits of Great Britain will be grouped so as to form a complete national display of the various manufactures and products; and, with a view to uniformity, the Royal Commission will undertake the entire decoration of the British section and provide all show cases, stands, platforms and screens required by each individual exhibitor without further charge.

The importance of this determination to provide free show cases, &c., can be readily appreciated by quoting a paragraph from the report of the Board of Trade Committee. It seems that other Governments at previous international exhibitions invariably insisted on a general scheme of decoration and uniformity of pattern in show cases. "In the British section," says the report, "no considered plan would as a rule appear to have been adopted in allotting the space to exhibitors of different classes of goods. Artistic pottery has been exhibited side by side with trouser stretchers, scientific instruments have been placed next to the exhibit of a theatrical wig-maker, and glassware of a highly decorative character has been surrounded by pyramids of empty bottles and syphons. In this manner the uneven quality of many of the exhibits has been accentuated and the general effect of the section spoilt. The decoration of the exhibits, moreover, appears to have been left almost entirely to the exhibitors themselves. Each exhibitor has provided his own show case, and has decorated his stand in the manner that pleased him best."

The Scheme of General Decoration.

In order to assist in attaining this desired and most necessary improvement the scheme of decoration and grouping will be carefully explained to intending exhibitors, and every endeavour made to reconcile conflicting interests. The internal fittings and the material used for lining must, of course, be at the expense of the exhibitor; but the attractive and harmonious design of the show cases, it is anticipated, will appeal most favourably alike to exhibitor and spectator.

Every care will be taken to prevent any deprivation of individual character from the exhibits, either by too close proximity or other unharmonising causes, and if an exhibitor prefers to use his own show cases no objection will be made provided such show cases are sympathetic to the general scheme of decoration and surroundings. Designs of show cases and the proposed decorations will be on view at the offices of the Exhibitions' Branch of the Board of Trade at an early date.

In view of the great efforts which it is stated will be made by France, Germany, Italy, the United States, and certainly by Belgium itself, to give a most effective display of the most up-to-date machinery, the Royal Commission are desirous of assisting in every way to make the British machinery exhibit unrivalled. With that view the Commission will defray 50 per cent. of the charges made by the Belgian Administration for the supply of steam, gas and electricity, when used for showing machinery producing finished articles, or illustrating a process of manufacture. This should be a most welcome reduction of expense, judging by the complaints of costs made by machinery exhibitors at previous World's Fairs.

Another great convenience and saving of time and expense to machinery exhibitors has also been most thoughtfully considered by the Royal Commission. Exhibitors requiring foundations or shafting for machinery must provide them at their own cost, but can, upon sending to the offices of the Royal Commission drawings with metric measurements, have estimates obtained for them from Belgian contractors, and the work carried out under the superintendence of a competent engineer employed by the Royal Commission. No charge will be made to exhibitors for assistance rendered in this connection. Hitherto machinery exhibitors have had to send their own constructors and engineers to superintend, frequently resulting in weeks of idle delay and unremunerative expense for expert artisans forced to await their turn. Estimates from a reliable contractor in Brussels, under the supervision of the Royal Commission, will be supplied on written request to the General Commissioner at Queen Anne's Chambers, and other estimates from equally reliable sources in Belgium can also be obtained. Crane power will be provided up to seven tons weight free of charge, and special facilities for handling heavier weights can also be secured if application be made.

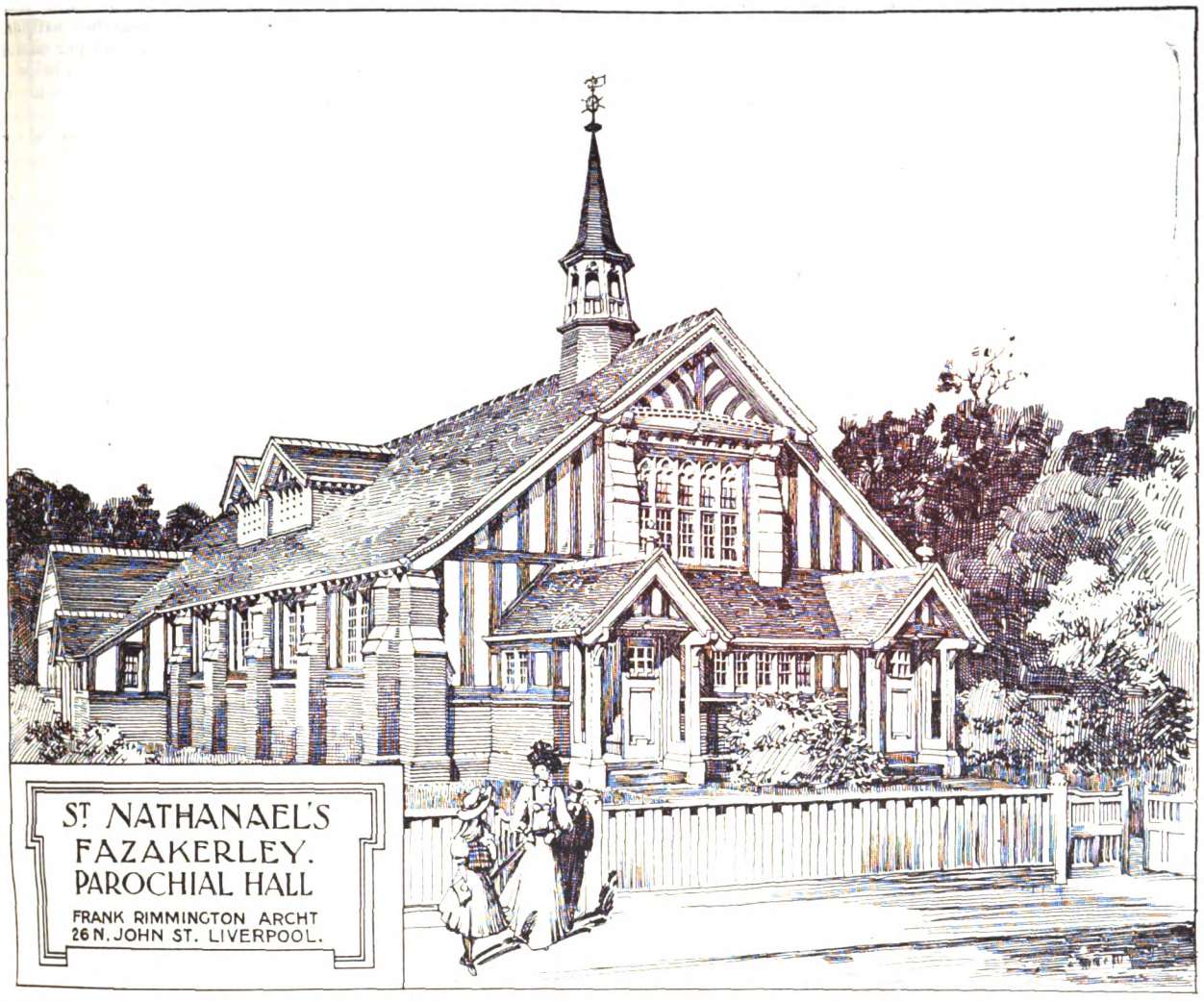
A special catalogue of the British section will be made in English and French without charge to the exhibitor either for translation or insertion, and all necessary steps will be taken by the Belgian Government for the protection in Belgium of inventions, industrial designs and trade marks shown at the Exhibition.

In regard to the question of dual language, the Royal Commission specially wishes to impress upon exhibitors the desirability of having their trade catalogues and price lists translated into French. Metric equivalents of the dimensions and weights of exhibits may often be given with advantage where such information is required, and the exhibitor's agent should be in a position to quote the purchase price in Belgian currency, inclusive of freight, Custom duties, and other charges. The Customs tariffs of the principal European countries will be filed in the exhibitors' reading room, together with the British commercial directories, a collection of technical dictionaries and telegraph codes.

The report of the committee on previous international exhibitions deplores the fact that in several cases the attendants in charge of stalls at an Exhibition were unable to describe the goods exhibited in a correct or intelligible manner; in other cases their technical knowledge was often thrown away owing to their inability to speak any language but their own.

This statement clearly shows the importance of an active and capable attendant being able to speak French, and other languages perhaps, fluently and technically. The Royal Commission, however, will assist matters to a great extent by providing a special apartment in which exhibitors or their

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agents may conduct business and deal with their correspondence. A staff of interpreters, acquainted with French, German and Italian, will also be available to afford any assistance and information that may be required.

In future articles the scope of the Exhibition will be described, the progress made in the buildings, the arrangements in regard to tariff, &c., the advantages of international exhibitions in the opinion of the Royal Commission, the chief exhibits expected, the proposed fêtes and sports, and other interesting matter given which will be regularly communicated by the General Commission.

ST. NATHANAEL'S PAROCHIAL HALL, FAZAKERLEY.

THIS building, of which the foundation-stone was laid on May 22, comprises a large hall 62 feet 6 inches long by 36 feet, providing accommodation for 500, and a small hall at the north end 34 feet long by 22 feet wide. The principal entrance is from Fazakerley Road, where two porches are arranged, the space between forming a recess for the font. As the hall will be used as a mission church until the permanent church is erected, the small hall will be divided into two rooms to form a chancel and vestry. Provision is made for future extension on the east side in the form of a kitchen and ladies' lavatory, together with stairs leading to a class-room to be arranged over present chancel if desired. The building is being built of brick with grey Ravenhead facing to the exterior to height of sill level, the upper portion of the walls being finished with half-timber work. The roof is of red tiles, and has an ornamental bell turret at south end, covered with split oak shingles. The heating is to be effected by means of gas radiators, and the ventilation by inlets in the walls and extractor on the ridge. The work is being executed from the designs of Mr. FRANK RIMMINGTON, architect, Harrington Chambers, 26 North John Street, Liverpool, at a cost of 1,400*l*. The contractors for the work are Messrs. WOODS, BENSON & Co., of Stanley Road, Liverpool.

LEWES VICTORIA HOSPITAL.

THE foundation-stone of the new building for this hospital was laid on June 9 by H.R.H. the Duchess of Albany in the presence of a distinguished company, including the Duke and Duchess of Norfolk, Viscount and Viscountess Gage, the Archdeacon of Lewes, and many of the notables of the county and the town of Lewes. The building is designed by Messrs. Ernest Rüntz & Ford, and will be in red brick, with quoins, &c., of a darker red than the main building. The porch will be in stone, having the coats of arms of the county and the town on either side of the carved lunette window over doorway. The eaves and gables will be finished with stone cornices, and the roof covered with sand-faced tiles, the treatment being appropriately in the Georgian style, as there are many fine old buildings of this type in the town and neighbourhood, which by their simplicity of design and accuracy of proportion are pleasing and restful, and retain that quiet refined dignity peculiar to our cathedral and county towns.

The building is being erected on the Downs at the back of the County Prison and facing Neville Road; it is on high ground, having an extensive view of the town.

There are two principal wards on either side of the main block, one being for males and the other for females. The wards are 32 feet long and 19 feet wide, with ample windows and fireplaces, besides being heated by hot water and well ventilated. Each ward will have at the back, along the whole length of wards, covered verandahs, so that the patients may be wheeled in their beds through French casement windows to enjoy the fresh air and sunlight without suffering the least inconvenience or fatigue; and for the purpose of obtaining all the sunlight possible, the wards have been placed obliquely on plan, but care has been taken to avoid the patients being inconvenienced through being unduly exposed to the glare and heat of the midday sun.

The two wards will be connected by a wide corridor running through the centre of the building, off which will be entered special wards, one adjoining the main ward for females and the other adjoining the main ward for males. At either side of the main entrance are placed the matron's room and waiting-room, and the main entrance corridor intersects the previously mentioned corridor and runs in

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direct line to the operating and anæsthetic room. The kitchen, &c., are placed on the north side of the building, and the nurses' sitting-room on the south side.

The patients' entrance is placed on the south side of the building, from which wide corridors connect the hospital and dispensary and out-patients' rooms, which are placed at the back of the building. There will be a small laundry adjoining the north side of the latter.

The anæsthetic room adjoins the operating-room, and patients to be operated upon will be first treated in the former and then wheeled through the connecting doorway to the adjoining room. The floor of these rooms will be of marble terazzo, and the walls and ceilings covered with patent tiling, and the room well lighted and ventilated.

From the centre of the main block there will be an oak staircase leading to the first floor, where provision is made for bedrooms and bathroom for the staff, and in the attic floor will be placed the servants' bedrooms, storeroom, &c.

As well as the wards, the principal corridors, anæsthetic and operating-room and out-patients' room will be heated with hot water, and it is proposed to light the building by electricity.

The floors to wards, corridors and lavatories and bathroom will be laid with a patent material warm to the feet and jointless to prevent dust accumulating, and to assist in this all angles at junctions of floors, ceilings, &c., will be rounded off throughout the building.

The walls to lavatory and bathroom will be lined with patent tile, and the sanitary fittings throughout will comprise the latest ideas in sanitary science.

There will be a small detached mortuary, and from a careful study of the plans provision appears to be made for all the necessary stores, cupboards, &c.

THE INSTITUTION OF GAS ENGINEERS.*

THE belief has recently become prevalent that the illuminating efficiency of a combustible gas used in conjunction with an incandescent mantle is proportional to its net calorific value. The basis of this belief seems to be the investigations carried out by Messrs. White, Russell and Travers in the United States in 1901-2, and more recently by M. Sainte-Claire Deville, of Paris, in 1907. The experiments of Messrs. White, Russell and Travers, which were embodied in a paper read before the Michigan Gas Association in 1902, consisted in a comparison between the net calorific values of various gases and their illuminating efficiencies in conjunction with the incandescent mantle when burnt in an ordinary atmospheric burner properly adjusted so as to give the maximum effect. They concluded:—

1. That no matter what gas was being used with the mantle—whether water gas, coal gas or natural gas—that the point of highest efficiency corresponded also with the point of maximum illumination.

2. That the illuminating efficiency was proportional to the calorific value of the gas approximately in the proportion of one-candle-power cubic foot for every four calories increase in the net heating value.

White, Russell and Travers's Table.

Gas.	Net Calorific Value.	Candles per Cubic Foot.	Calories per Candle.
Water	60·24	5·53	10·89
Water and coal	108·9	17·5	6·22
Decarburised coal	130·9	21·86	5·99
Coal	144·3	25·4	5·68
Coal and carburetted water	147·86	28·48	5·19
Coal gas and benzolated coal	153·83	27·4	5·61
Benzolated coal	156·1	29·75	5·25
Carburetted water	169·6	32·9	5·15
Carbon monoxide	67·03	5·54	12·10
Carbon monoxide and coal	112·11	20·69	5·42
Hydrogen	62·39	9·67	6·45
Pintsch	239·38	41·63	5·75
Natural	219·28	22·94	9·56
Coal and natural	162·96	25·43	6·41
Coal	140·55	25·60	5·49

* Abstract from a paper on "A Comparison Between the Illuminating Efficiencies of Carbon Monoxide and Hydrogen when used in Conjunction with the Incandescent Mantle." By Arthur Forshaw, M.Sc., Institution Research Fellow in the Department of Fuel and Gas Engineering, the University of Leeds.

An examination of the table of results published with their paper—the essential parts of which, together with an additional column showing the number of calories per candle per hour, which should be a constant, are reproduced below—shows that whereas out of fifteen different gases ten behaved in a manner consistent with the second of their conclusions and two others approximately so, three gases—viz. water gas, carbon monoxide and natural gas—were notable exceptions.

M. Sainte-Clair Deville investigated a number of different composite gases, comprising "blue" water gas, coal gas and various mixtures of the two, whose net calorific values varied between 76.8 and 208.8 calories per cubic foot (water gas to cannel gas). He employed an atmospheric burner specially constructed so that the relative proportions of air and gas in the mixture could be accurately measured. He found that the duty of a given gas (defined as candles per cubic foot per hour when the proportion of air admitted with the gas is so adjusted as to give the highest illuminating effect for the particular rate of gas consumption) invariably increased with the rate of consumption up to a certain maximum. Beyond this maximum an increase in the rate of consumption caused no further increase in the duty, which, after remaining constant within a certain limited range of consumption, depending upon the size of the mantle, at length fell off considerably. Taking in each case this maximum duty as the proper basis of comparison with the different gaseous mixtures examined, he concluded that:—

1. The duty obtained for the expenditure of a given number of units of heat per hour remains constant within 15 per cent. throughout the whole range of illuminating gas from neat water gas to neat cannel gas.

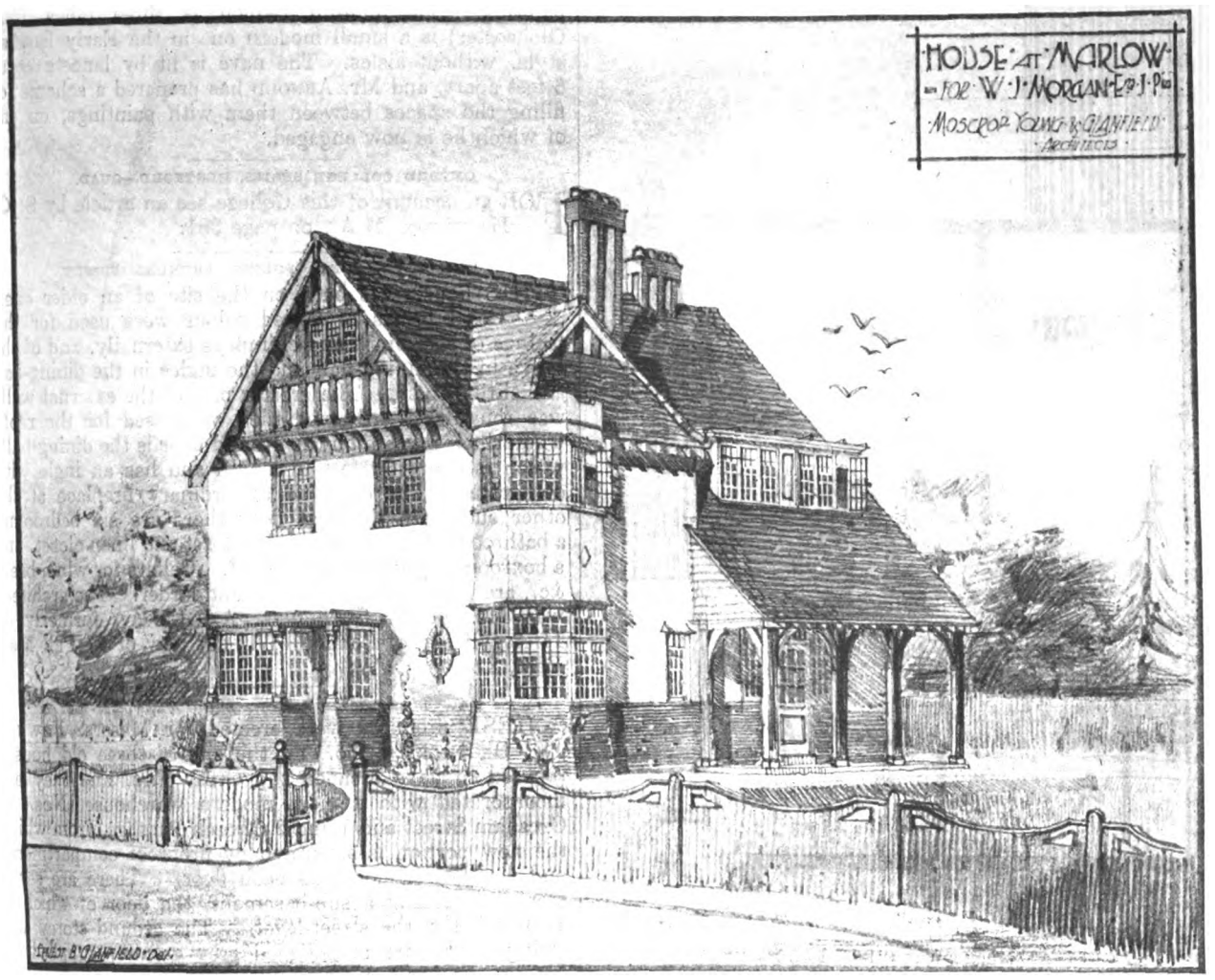
2. That, therefore, it must be granted that the specific or normal illuminating duty in the incandescent burner is proportional to the calorific value of the gas.

Without questioning the accuracy of M. Sainte-Claire Deville's observations, it seems difficult to attach any physical meaning to the supposed simple connection between the calorific value of a gas and its illuminating efficiency, whatever view is taken of the cause of luminosity of the mantle. For if it be supposed that the mantle is a "light heat-engine," which in some way emits intense luminous radiations as the result of its being heated in the flame to a high temperature, the proposition that the luminous effect is proportional to the calorific value of the gas (which probably would bear some simple relation to the flame temperature) hardly seems consistent with what is known concerning the relationship between the total amount of radiation emitted by an incandescent solid and its temperature. Or, on the other hand, if it be argued that the luminosity of the mantle is connected with a supposed power of inducing surface combustion—a cause which may at least in part be operative—it must be admitted that its action in this respect will probably be selective with regard to the constituents of a given combustible mixture, and that any such selective action will depend chiefly on chemical factors, and will have no necessary or even obvious connection with the total calorific value of the gas.

It may be observed that, with few exceptions, the comparisons so far made between the illuminating values of various gases and their calorific powers have had reference to more or less complex mixtures of gases, and that the results of such experiments as have been made with single gases, or with mixtures of two gases, are precisely those which do not conform to the conclusions drawn from the more complex cases. This is particularly so with regard to the results obtained by the American investigators. When, therefore, it was suggested to the author, at the time of his appointment to the Gas Fellowship at the University of Leeds, that he should, as part of his work, investigate the question de novo from a fundamental standpoint, it seemed desirable that a careful series of comparative experiments should be first of all made with one or two gases in a state of purity, and for this purpose hydrogen and carbon monoxide seemed to possess qualities which eminently fitted them for such a comparison.

In the first place these two gases are similar in having nearly the same net calorific values—namely, carbon monoxide = 85.9 kg. cent. units, and hydrogen = 72.8 kg. cent. units per cubic foot at 0° C. and 760 mm.—and also in requiring exactly the same proportion of oxygen (or air) for their complete combustion. But here their similarity ends. They differ in two important respects—namely, in density and in what may be termed, for want of a better phrase, their "combustion intensities." The density of carbon monoxide is fourteen times that of hydrogen (and therefore their

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relative diffusibilities are as 1 is to 3.74); and not only is the rate of combustion of hydrogen known to be very much higher than that of carbon monoxide, but also their rates are unequally accelerated by the influence of hot surfaces.

It was therefore decided to make a systematic investigation of the mantle efficiencies of these two gases and the conditions requisite for the attainment of the maximum illumination from each, with a view to determining whether, with two single gases having nearly the same calorific values, but exhibiting considerable differences in the character of their flames and their modes of combustion, the supposed dependence of illuminating effect upon the calorific values could be verified.

The principal conclusions arrived at during this investigation may be summarised as follows:—

1. When hydrogen is burnt in an ordinary atmospheric burner with a degree of aeration up to a ratio of $\frac{Air}{H_2}=0{\cdot}5$—i.e. the highest possible with such a burner—the duty afforded steadily decreases with a rising rate of gas consumption.

2. The distribution of luminosity over the mantle with such a burner is vastly different with hydrogen than with carbon monoxide under similar conditions.

3. With an ordinary burner carbon monoxide invariably gives a very much higher duty than hydrogen.

4. When, by suitable manipulation, hydrogen was made to burn in a well-aërated condition, the highest duty obtained was 11.7 candles per cubic foot, with a ratio of $\frac{Air}{H_2}$ = about 1.7. This, compared with the best results for carbon monoxide—viz. 17.3 candles per cubic foot with a ratio $\frac{Air}{CO}=1.9$—shows a 48 per cent. margin in favour of carbon monoxide. A comparison of their calorific values as used in the test shows only a 13 per cent. advantage in favour of carbon monoxide.

5. The use of cones inside the mantle causes a quickening of combustion and concentration of illumination.

HOUSE AT MARLOW.

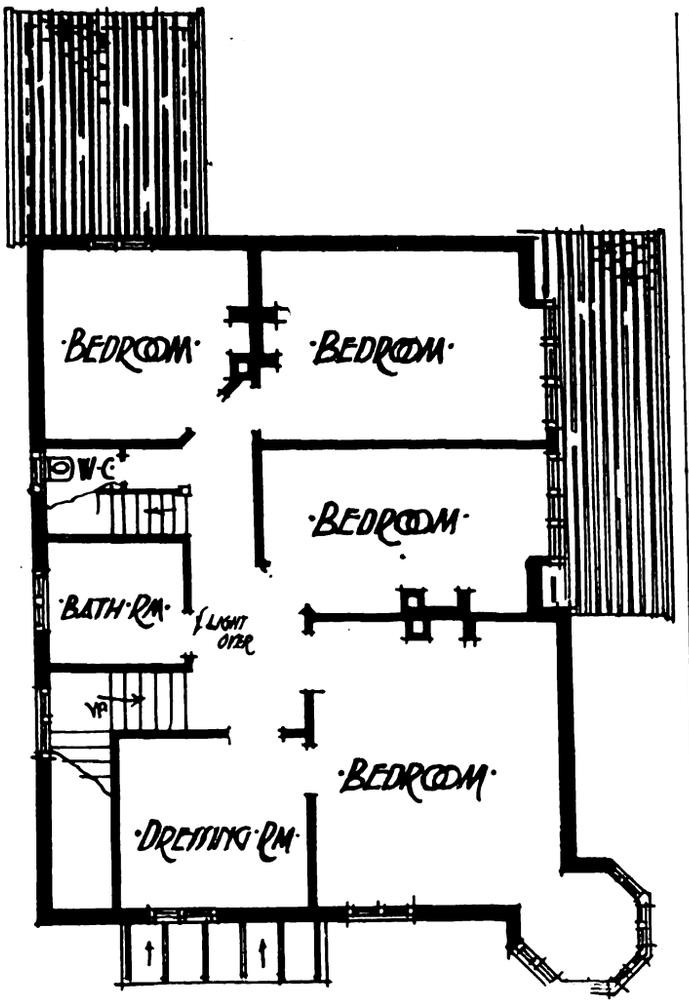
THIS house is erected at Great Marlow, Bucks. The accommodation is as follows:—Ground floor, large dining-room, opening out on to a verandah, with inglenook, drawing-room, sitting hall, kitchen, and the usual offices. First floor, five bedrooms, bath-room, and w.c., and in the roof large bedroom, servants' bath-room, box-room, and hot linen cupboard. Half-timber work of gables is treated with "Matsine," the roof tiled with sand-faced red and purple tiles, and the chimneys are red and purple brickwork, with rough-cast panels. The octagon in the drawing was designed in deference to the wishes of the client, as there is a good view of Quarry Woods therefrom. The contractors were Messrs. W. & T. SELLMAN, of Great Marlow, and the architects Messrs. MOSCROP-YOUNG & GLANFIELD, of 12 Buckingham Street, Strand, W.C.

ILLUSTRATIONS.

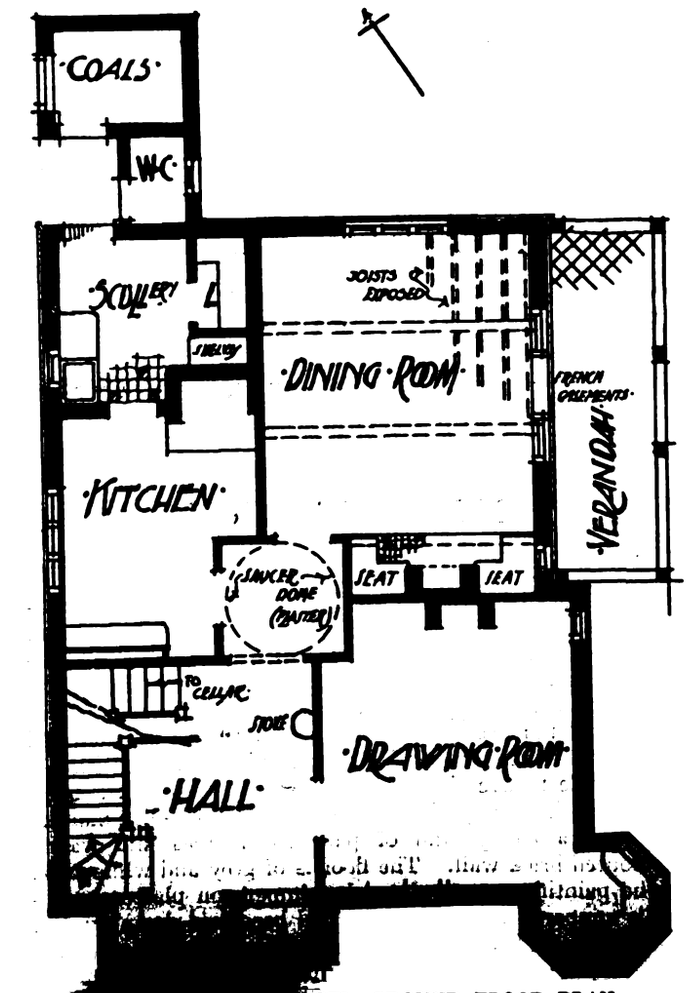
"THE ANNUNCIATION."—CARTOON FOR TEMPERA PAINTING IN MATSON CHURCH, GLOUCESTER.

THIS wall painting is by Mr. HUGH ARNOLD, stained-glass worker, Kensington, W. It is 6 feet wide, and occupies a space under the west window of the church on a level with the eye. The colour scheme has been kept rather quiet and delicate, with the colours in broad flat masses. The angel is in a rose-coloured dalmatic—the brightest bit of colour in the composition—with pale mauve-blue mantle; and the VIRGIN in creamy white with warm pink shadows and dark grey-blue mantle, against a background of pale green trees and warm-coloured brick wall. The floor is of grey and white tiles. The painting was executed in tempera on plaster, specially prepared from lime that had been laid down by Mr. J. D. BATTEN some years ago. The method of painting is simple, the colours being ground in water and mixed with a medium of yolk of egg and water in the act of

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HOUSE AT MARLOW: FIRST FLOOR PLAN.



GROUND FLOOR PLAN.

painting. The church (which is three miles from Gloucester) is a small modern one in the Early English style, without aisles. The nave is lit by lancets about 6 feet apart, and Mr. ARNOLD has prepared a scheme for filling the spaces between them with paintings, on one of which he is now engaged.

OXFORD COLLEGE SERIES, HERTFORD.—QUAD.

FOR an account of this College see an article by S. G. HAMILTON, M.A., on page 381.

THE DOVER, NEAR POLING, ARUNDEL, SUSSEX.

THIS house was built on the site of an older one. Local bricks of varied colour were used for the facings of the plinth and chimneys externally, and of the frieze in the dining-hall and the ingles in the dining-hall and sitting-room. The greater part of the external walls was rough-cast. Stained tiles were used for the roof. The principal room on the ground floor is the dining-hall, which is about 30 feet in length and has an ingle with dog-grate at one end and an ordinary fireplace at the other end. On the first floor there are six bedrooms, a bathroom, w.c., housemaid's closet and linen closet, and a boxroom is provided in the roof. Cellars for wine, beer, &c., are built under the pantry and larder. The architect was Mr. G. L. SUTCLIFFE, A.R.I.B.A., formerly of 11 Argyll Place, London, W., but now of 17 Pall Mall East, London, S.W.

NEW BUSINESS PREMISES, ALDERMANBURY, E.C.

THESE premises were erected for Messrs. FOWNES BROTHERS & Co., on the site of three old houses reputed to have escaped the Great Fire, and they are incorporated with a more modern warehouse, Nos. 75 Gresham Street and 1 and 2 Church Passage, from which the new portion is separated by fireproof compartments and double iron doors on each floor. There are seven storeys including a sub-basement, the floor of which is 18 feet below the street-level. The ground storey and string course are of polished grey granite, supplied by Messrs. FENNING & Co., and the elevations above are in Farnley salt glazed bricks and Portland stone. The window-frames are of oak and the casements of gunmetal, by Messrs. WILLIAM MORRIS & Co., glazed with polished plate. The constructional steelwork was supplied by Messrs. RICHARD MORELAND & SON, and the floors by the Kleine Floor Syndicate, all exposed girders and columns being encased in cement. The floor-boarding is 1¼-inch rebated, grooved and tongued oak in 4½-inch widths, and the flats are laid with Seyssel asphalte.

The pavement and stall-board lights and the iron doors The pavement and stall-board lights and the iron doors were supplied by Messrs. HAYWARD BROTHERS & ECKSTEIN, and the revolving entrance door by the Van Kannel Syndicate. The new and old premises are furnished throughout with a complete installation of electric fire alarms, internal "sprinklers," and external "drenchers." The whole of the brickwork was built in cement, and Sirapite plaster was used throughout. The stone carving was executed by Mr. GILBERT SEALE. A spiral iron parcel-transporter, supplied by Messrs. SAUVEE & Co., runs from the top floor to the basement. Messrs. F. & H. F. HIGGS, of Herne Hill, were the builders, and they also supplied the whole of the interior fittings, which were specially designed by the architect, Mr. HARVEY DYBALL. Mr. J. ARMSTRONG acted as clerk of works. Several interesting relics were unearthed in excavating the sub-basement, including some oak camp-sheeting along the bank of an old watercourse about 22 feet below street level, and a shallow well steined with rough ragstone on a massive oak cill, the timber in both cases being perfectly sound.

HOUSE AT EDGBASTON, BIRMINGHAM.

THE walls are faced with thin black country bricks with wide joints, and the roofs covered with hand-made tiles. All external woodwork painted white. The contract amounted to about 3,700*l*., and was carried out by Messrs. J. BARNSLEY & SONS, from the designs of Messrs. COSSINS, PEACOCK & BEWLAY, Birmingham.

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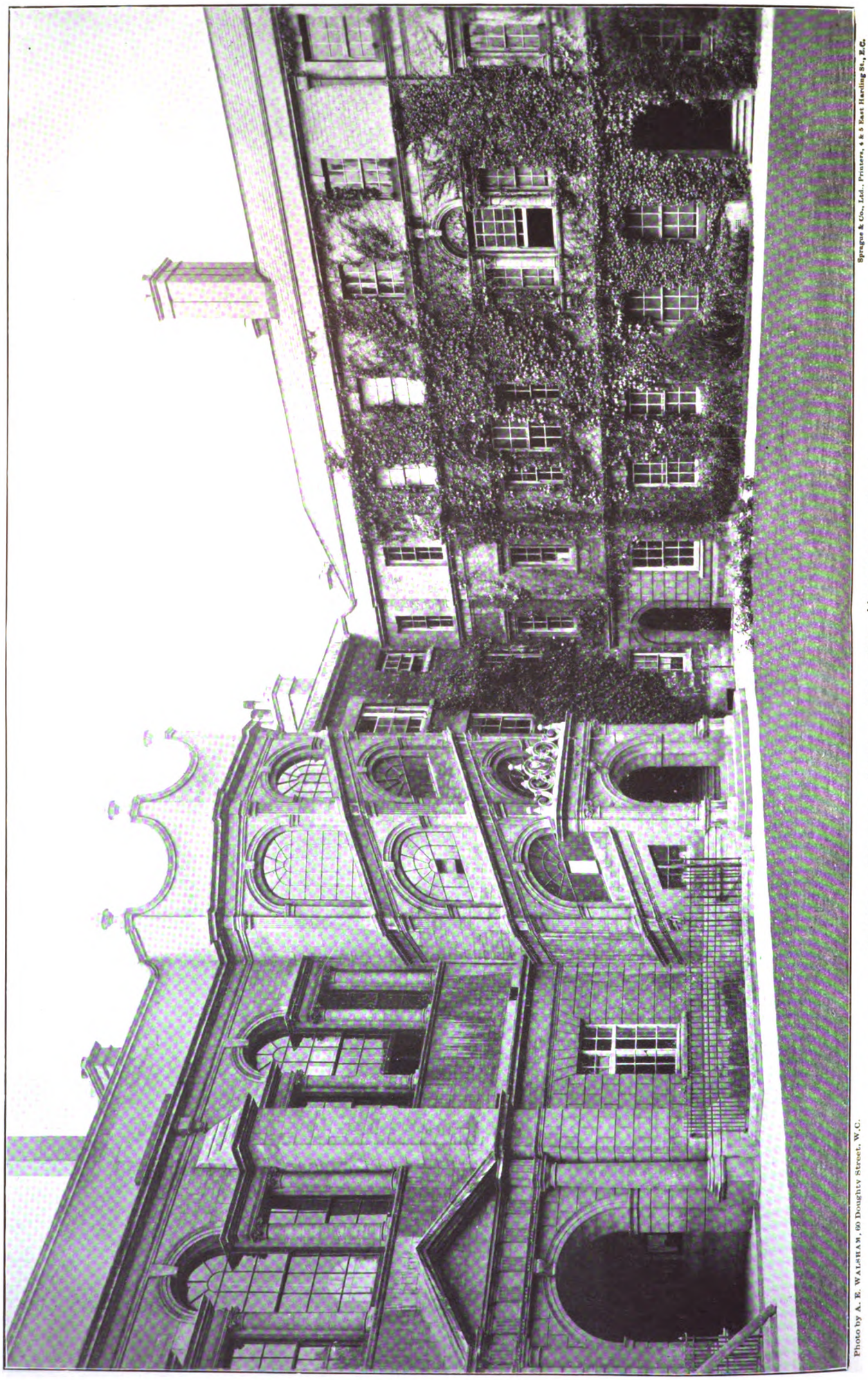
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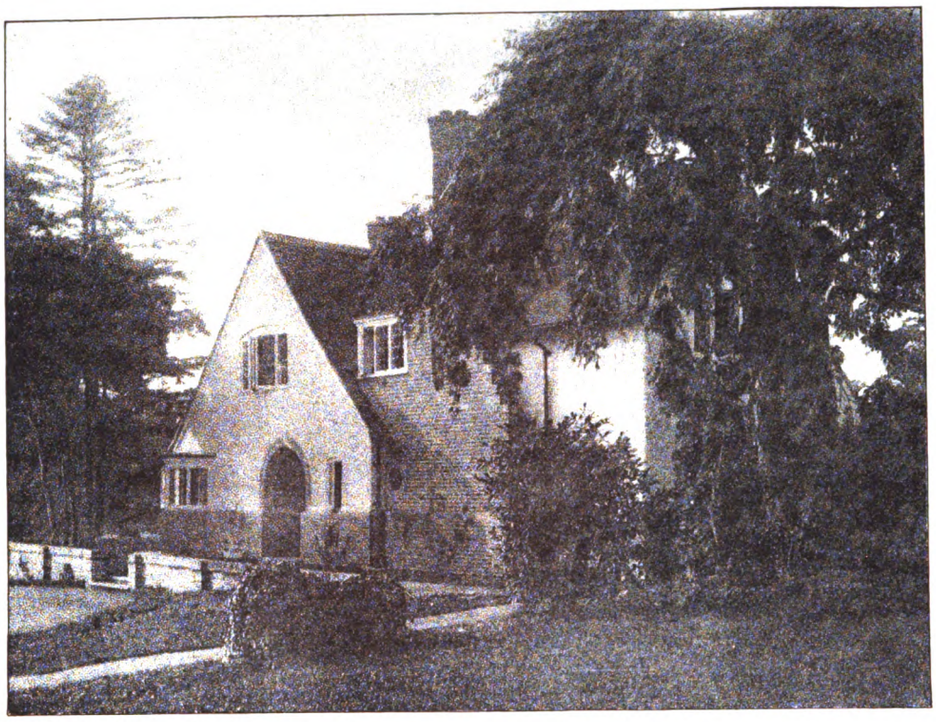
OXFORD COLLEGE SERIES No. 47.—HERTFORD: QUAD.

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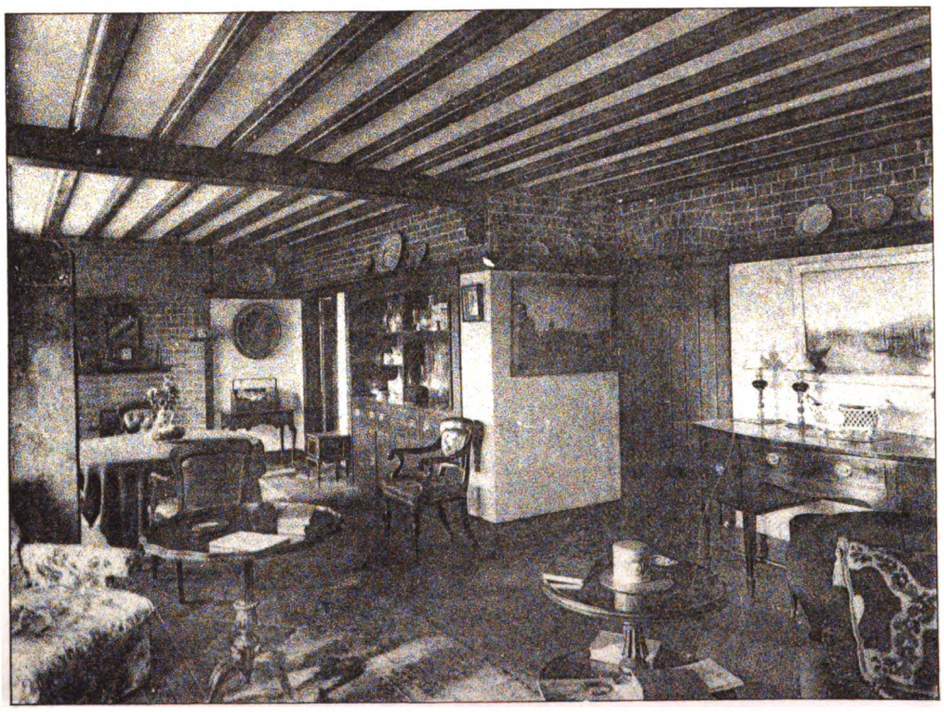
ENTRANCE FRONT.

"THE DOVER" NEAR POLING, ARUNDEL, SUSSEX.

G. L. SUTCLIFFE, A.R.I.B.A.
ARCHITECT.



GND FLOOR P

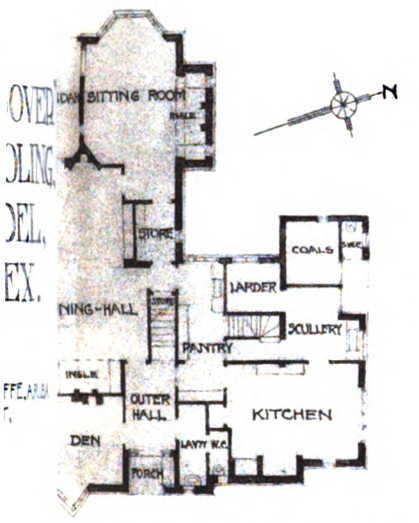


DINING HALL, LOOKING WEST.

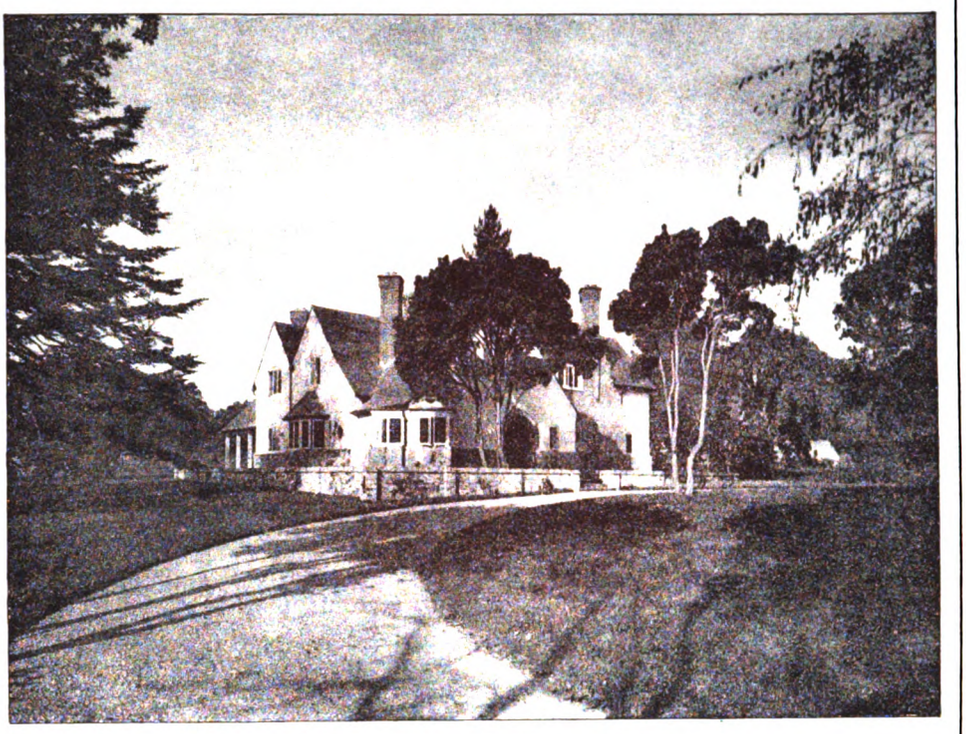


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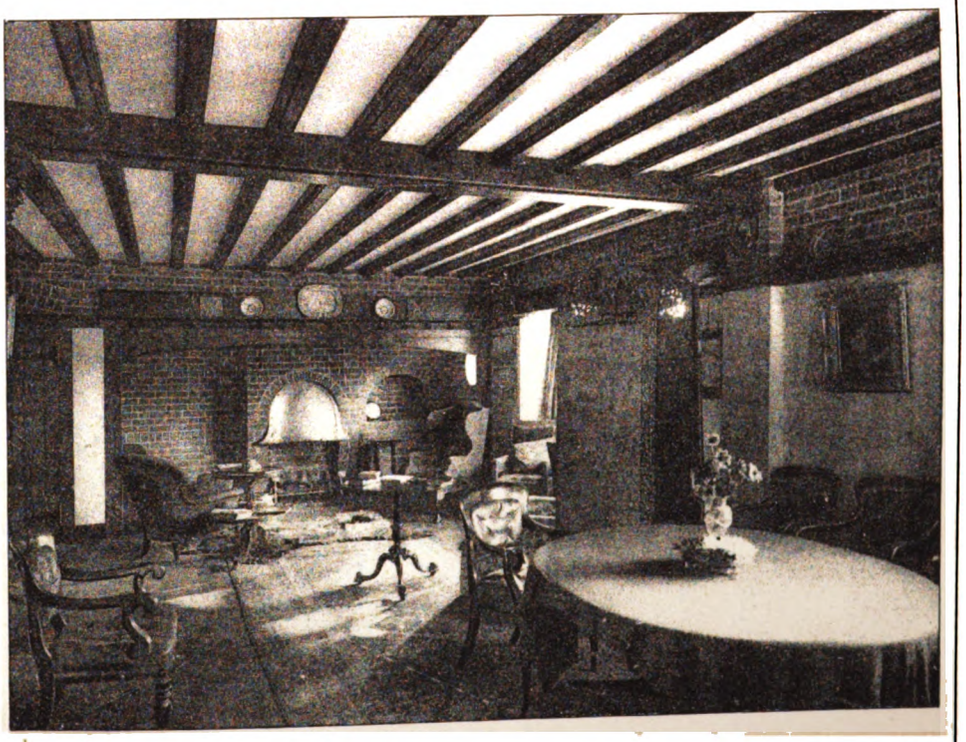
GROUND FLOOR PLAN



HOUSE, FROM THE DRIVE.



OOM.



DINING HALL, LOOKING EAST.

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"THE ANG

CARTOON FOR TEMPERA PAINTIN

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Dec 25th 1909.



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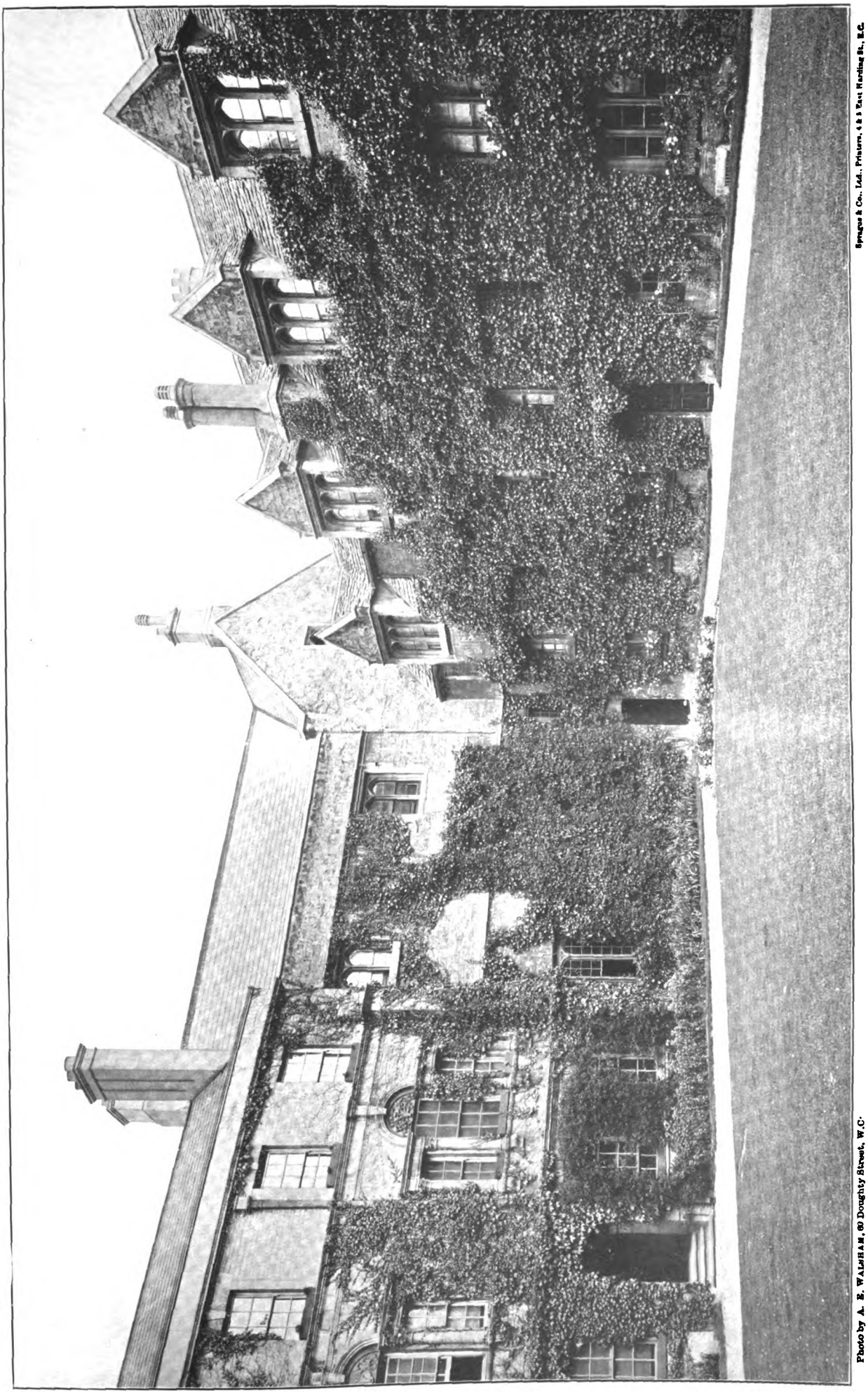
...IATION."

FOR TEMPERA ... MATSON CHURCH, GLOUCESTER.

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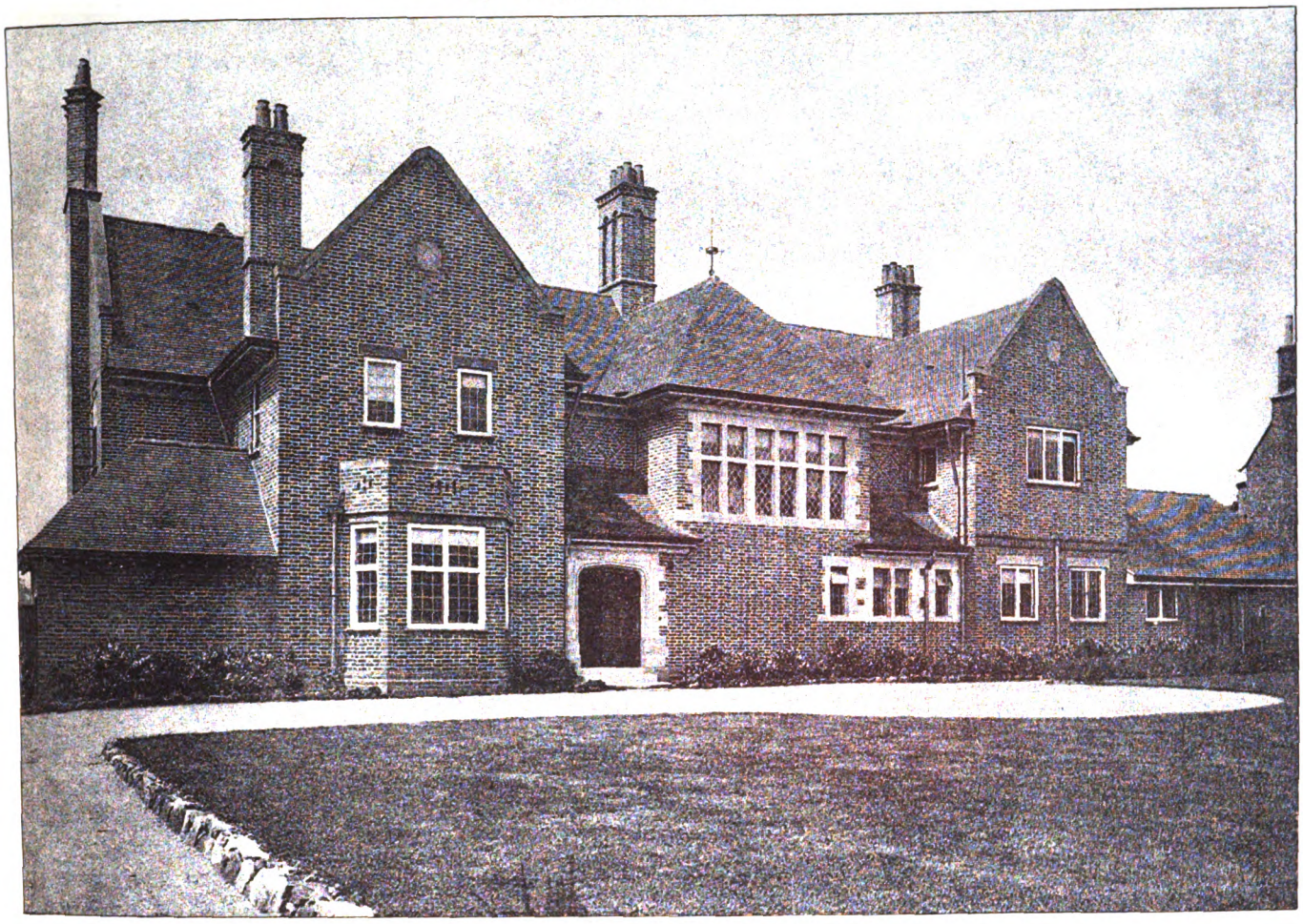
OXFORD COLLEGE SERIES. No. 48.—HERTFORD: QUAD.

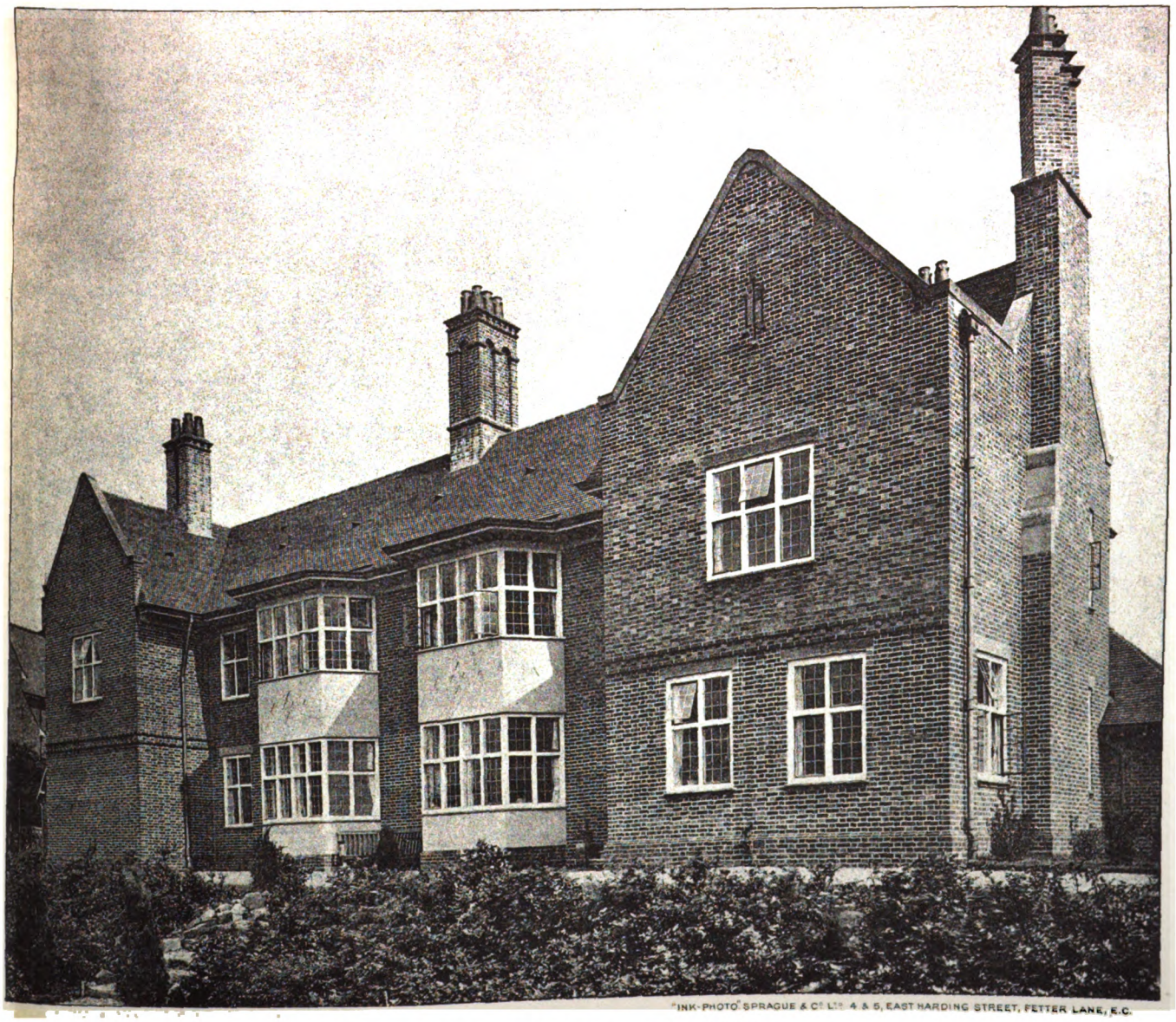
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Messrs. COSSINS, PEACOCK & BEWLAY, Architects.

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CASHEL.

ROCK OF CASHEL, TIPPERARY.

ON October 27, 1874, the Church Temporalities Commission, under the provisions of section 25 of the Irish Church Act, vested "the ruins of the ancient cathedral church on the 'Rock of Cashel' with the land adjacent thereto" in the Commissioners of Public Works, to be preserved as a national monument, and possession was given to the Board by the Dean and Chapter.

This vesting of the property in the Board, however, did not give them any control over the burials either inside the ruin or in the graveyard outside. The solid rock comes near the surface, and generally there is only about 2 feet in depth of earth. To make up for this deficiency, a large mound of earth is raised over each grave, as the coffins would come within a few inches of the surface. On representations made to the Local Government Board, after an inquiry held, interments inside the walls of the cathedral were prohibited except in the case of two families, but the interments outside continue as before, and seldom comply with the Burials Regulation Act as regards depth below the surface of the ground. In the adjoining ruins of St. Dominick's Abbey (a Dominican monastery of the thirteenth century) and at Hore Abbey (a twelfth-century Cistercian House), the interior is so taken up with graves and kept in such a neglected state that proper repairs can only be effected with difficulty. At Holycross Abbey, a few miles from Cashel, the whole of the nave, choir and transepts have been turned into a badly-kept graveyard, over the burials in which the Board have no control.

The Commissioners of Public Works in their last annual report give a detailed account of the building. The ruins at Cashel are in the townland of "St. Patrick's Rock" and the parish of the same name. The place was occupied about the beginning of the fifth century by the King of Munster, who fortified it, and thenceforward it took the name of Caiseal or Cashel from the stone fort then erected there.

The Round Tower.

The oldest building on this site is the round tower, now incorporated with the cathedral, and forming a picturesque addition at the N.E. angle of the north transept where there is a doorway into it from the triforium of the cathedral.

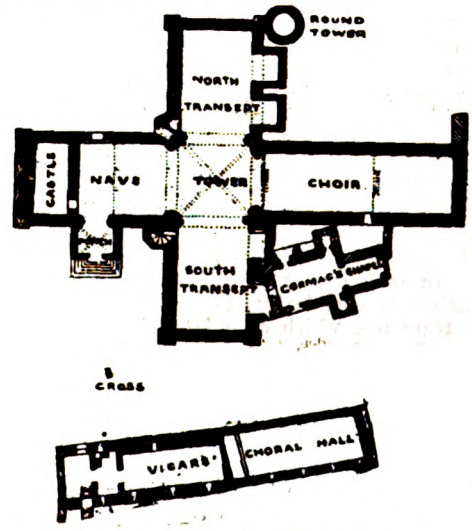
The round tower is formed of masonry varying in character, but generally composed of large stones, some of them of somewhat cyclopean character, and formed with articulated joints. It is probably of the tenth century; the height is about 85 feet, the walls are 4 feet in thickness at ground level, and the actual circumference is 51 feet. There is the usual round-headed doorway, which is 11 feet 8 inches above the ground, and 5 feet 6 inches high. The tower has four angle-headed openings at the top, the heads of two of which are peculiar as being cut each out of one solid stone.

There is now no trace of the early church to which the round tower formed an adjunct. The earliest ecclesiastical record here relates to Cormac, son of Cuilennain, a prince who was also a bishop, born A.D. 831, and slain 903.

Cormac's Chapel.

Next to the tower in chronological order is the beautiful little Romanesque church known as Cormac's chapel. The first historical record relating to it shows that it was founded in 1127 by Cormac M'Carthy, King of Desmond, who was also Bishop of Cashel. The dimensions of this church, which is the most perfect example of Romanesque work in Ireland, are as follows:—The nave spanned by a barrel vault is 29 feet 8 inches by 17 feet 8 inches. The groined chancel is 13 feet 8 inches by 10 feet 10 inches. The croft over nave 27 feet 2 inches by 16 feet 2 inches, and the croft over chancel 12 feet 6 inches by 11 feet 5 inches.

The nave and chancel are covered by steep-pitched stone roofs constructed on the corbel principle, each having a chamber between the external stone roof and the internal stone vault. The plans show both floors, and the elevations give a representation of the two square towers at the junction of the nave and chancel occupying the position in which the transepts of later churches are to be found and giving a cruciform character to the plan.



The south tower has an embattled coping, but this is a later addition. Formerly it had a conical cap like the north tower. The surfaces of the walls of the church are richly ornamented internally, as well as externally, the chief feature being the elaborate arcading, in the panels of which diaper work was painted, and the walls and ceiling of the chancel were ornamented with figure subjects. The two

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square-headed window openings in the south elevation are insertions of comparatively late date. The orientation of the building is peculiar, being sixteen degrees out of the due east and west line, and is different from the orientation of the cathedral; the axis of the chapel does not correspond with the centre line of the nave. The principal doorway is in the north side. It is round-headed and consists of five orders. Over the arch is a high pediment or gable termination. In the tympanum over the doorway is the carved figure of a centaur shooting with bow and arrow at a lion. There is a plainer doorway in the south wall of nave. There is a wonderful variety of sculptures in the capitals of the shafts, and double columns with grotesque heads, ornaments and terminating mouldings. Dr. Petrie gives illustrations of upwards of forty of these in his "Essay on the Ecclesiastical Architecture of Ireland," published in 1845.

The crofts were approached by the staircase in the south tower; there are traces of an upper croft which had timber flooring; the access to it was by means of ladders. The towers act as abutments against the thrust of the vaulting and the heavy stone roofs. The artistic beauty of this gem of Romanesque work is equalled by the boldness of its construction and the skilfulness of its execution. A monograph on this structure containing drawings and photographs, was published by Mr. Arthur Hill, F.R.I.B.A., in 1874, but it has been long out of print.

The Cathedral.

The next historical reference to these buildings is of the date of 1169, when Donald O'Brien, King of Limerick, is said to have founded a new church in which in 1172 Henry II. received the homage of the founder. This church occupied the site of the present cathedral; the latter building is of a date about a century later than Donald O'Brien's church. Its earliest portions belong to the end of the thirteenth century. The principal dimensions are:—Choir, 87 feet 9 inches by 27 feet 6 inches; nave, 36 feet 11 inches by 31 feet 6 inches; space under tower between nave and choir, 42 feet 1 inch by 42 feet 1 inch. Total internal length, 166 feet 9 inches.

The north transept measures 45 feet 4 inches by 31 feet 5 inches, and has two side chapels each 12 feet 10 inches by 11 feet 9 inches. The south transept is 45 feet 3 inches by 31 feet 5 inches, and has two side chapels also, one measuring 13 feet 3 inches by 8 feet 2 inches, and the other 11 feet 8½ inches by 8 feet 3½ inches. The total internal width north to south is 132 feet 8 inches.

The present cathedral occupies the whole of the space between the round tower and Cormac's chapel; the latter was connected with the east side of the south transept, thus forming a suitable chapter room, to which access was obtained by means of a doorway opened in the west gable of the chapel from the south transept, and by another doorway into the chapel through the north tower. The most remarkable feature of this cathedral is the very short nave compared with the length of the choir. The shortness of the nave has given rise to the surmise that the space occupied by the castellated residential structure at the west end of the church may have been taken off the length of the nave. There were no aisles in any portion of the cathedral. The canopied buttresses at the salient angles are interesting, and a peculiarity in construction rarely seen elsewhere is in the re-entrant angle towers at the junctions of nave and transept. Over the piers of the windows in the north and south walls of the choir are a range of small upper clerestory windows with quatrefoil openings externally, while internally they have segmental arches on jambs formed by small pillars, an arrangement not often seen elsewhere.

Another striking feature is the tall and stately windows of the transepts, which at a later date were shortened in height. The triforium is also remarkable. This passage is the thickness of the wall, as shown on the triforium plan, connects the castle at the west end with the two re-entrant towers at the junctions of nave and transept walls, and also with the central tower which crowns the intersection of the transept with the main building.

There seem to have been extensive alterations made in the structure about the end of the fourteenth century, when the central tower was raised, and the roofs were surmounted by embattled parapets. It was probably at this time that the castellated residence at west end of nave was erected—though some of its detail would appear to be somewhat earlier—and the whole appearance then was that of a strongly fortified structure calculated to stand a siege; at this time the enclosure was surrounded by a loopholed wall. The castle was adapted for the residence of the Archbishop, and in addition to the space it occupies 31 feet 7 inches by 14 feet 10 inches internally, the space over the southern porch for two storeys in height was used for residential purposes, and was approached directly from the castle.

There was a gallery, or floor, over the nave, and into this there was an opening from the castle. This space over the nave may have been used as an extension for residential purposes. There are pier and angle shafts sufficient to carry a wooden floor, but hardly indicative of having carried stone vaulting. The cathedral was burned in 1495 by Gerald, Earl of Kildare, who had a grudge against the Archbishop, and defended the act of burning when called to account for it before the King by saying that he thought the Archbishop was inside. The Rock of Cashel was taken by Cromwellian soldiers under Lord Inchiquin in 1647. The church was left in a ruinous condition for a time, was repaired in 1686, and restored as a cathedral in 1729. In 1749 it was unroofed, a new building having been erected.

The vicars choral buildings were erected apparently in the fifteenth century with alterations in the seventeenth. They occupy the southern portion of the enclosure; the architecture is of a domestic character. Houses of residence for vicars—who were those members of a cathedral corporation who did not belong to the chapter—were anciently attached to many cathedral churches. Vicars choral as a rule were laymen appointed to assist in chanting the service, and were sometimes minor canons attached to the cathedral. Originally the vicars were eight in number. They were endowed with lands and had a seal as a corporate body. The number was afterwards reduced to five, and a change was made appointing clergymen as honorary vicars, who appointed singing men at a salary as their deputies. This continued until 1836, when they were abolished and their rights and property vested in the Ecclesiastical Commissioners. The residential accommodation provided was on a liberal scale.

THE PRESERVATION OF IRON AND STEEL.*

(*Concluded from page* 388.)

THE preservation of iron is, of course, a problem which, in the ease of its solution, varies directly with the rust-resisting character of the metal to be preserved. For this reason a number of the progressive steel manufacturers in the United States, and presumably elsewhere, have been for some time past investigating methods of manufacturing rust-resistant steel. It is not the author's intention at this time to go deeply into this phase of the problem, but it seems to be a fact that carefully made, open-hearth metal, in which the ordinary impurities are cut down to mere traces, and in which the heat treatment has been carefully controlled, is much more resistant to corrosion than the ordinary types of metal with a comparatively high percentage of impurities. The author is well aware that reducing the content of impurities can only be achieved at the expense of tensile strength and perhaps other characteristics of steel as well, but for certain purposes great strength can be sacrificed to longevity.

There is now being manufactured in several rolling-mills in the United States an extremely pure metal which contains, according to analysis, about 99.95 per cent. iron. The only impurities which this metal contains are sulphur (0.019), phosphorus (0.004), and carbon (0.026). This pure iron is manufactured in basic, open-hearth, 50-ton converters, and is smelted from pure pig iron and carefully selected high-grade scrap. There is no mystery about its manufacture, everything depending from start to finish on the heat treatment which the metal receives.

In the opinion of the author resistance to corrosion is attained largely by a study of the proper heat treatment of the metal and of the amount of working which it has received, both in the hot and cold rolls. Up to the present time this pure iron manufactured by a steel process has been used for the preparation of sheet and plate only. It has been demonstrated, however, that wire can be made from it. The demand for this type of metal appears to be growing, and it has been largely used for the manufacture of road culverts. In the letter of transmittal accompanying the author's bulletin on "The Corrosion of Iron," it was stated that the development of a sheet-iron culvert, which shall be at the same time strong, light, and resistant to corrosion,

* A paper by Allerton S. Cushman, Assistant Director, Office of Public Roads, United States Department of Agriculture, presented to the Iron and Steel Institute.

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would be of great assistance to road builders. The fact that this new metal has been largely specified by culvert manufacturers, even at a somewhat added cost, is the best evidence that it is meeting a long felt want in this and allied industries. There would seem to be no reason why such a pure iron, if it receives the proper heat treatment and rolling, should not be found as resistant to corrosion as the pure iron made by the older processes.

Many metallurgists believe that the resistance to corrosion exhibited by some wrought irons is due to the slag and cinder inclusions which are always found in this type of metal. Microscopic examination does not, however, justify this conclusion, as the slag and cinder are found to lie in definite streaks or cleavage lines in the rolled iron. There is no evidence to show that the fibres of wrought iron are enclosed by cinder, as has been claimed by certain metallurgists. Impure wrought irons, which have been prepared by what is known as the "busheling process," also contain the full amount of cinder inclusion, and yet are not at all resistant to corrosion. While it is undoubtedly true that the tendency of iron to rust is an elementary characteristic of the metal itself, there is, nevertheless, abundant evidence to show that very pure iron does not exhibit a tendency to dangerous pitting, or localised corrosion, to the same extent as more impure and carelessly manufactured steel. Passing over the metallurgical and economic problems involved in the manufacture of rust-resistant steel, we will proceed to the discussion of the methods of preservation which depend upon covering iron with other metals.

Preservation with Zinc.

As is well known, zinc is applied to the surface of iron by several different processes which may be classified as the hot-dip method, which is misnamed galvanising; the cold electro-plating method; and the vapour or dry-heat process known as Sherardising. Zinc is electro-positive to iron, and when the two metals are in contact and wet with a corroding solution zinc will pass into solution and the iron will be protected. The sphere of influence of the zinc does not, however, extend far from the point of contact between the two metals, so that iron can begin to rust in places long before all the zinc is destroyed. This can easily be shown by soldering a button of zinc into the machined surface of a plate of steel and immersing the whole either in water or in the ferroxyl indicator. It is, of course, true that the more corrosive the action the larger will be the sphere of influence of the protecting zinc, and the faster the destruction of the zinc will proceed.

The function of the zinc coating in the ordinary galvanising process is a double one; first, to cover the iron so that water and oxygen cannot come in contact with it; and second, to protect the iron at its own expense if pinholes or cracks in the zinc surface exist. Generally speaking, the more zinc that can be put on, the more efficient the protection; but there are decided practical limits to the amount of zinc that can be carried by an iron surface. If the material must undergo bending in use, the heavier the coating the greater the danger of cracking. Thus wire which is to be used in single strands, as, for instance, in telegraphy, can be "double galvanised," and unwiped, whereas wire which is to be woven into fences must carry a thinner coating and be wiped smooth. So-called "double galvanised" wire is not dipped twice into the bath of molten zinc, but merely carries about twice as much zinc by weight as ordinary wire. In the hot-dip galvanising process it is customary in American practice to wet the iron with a soldering solution just before its immersion in the zinc bath. This soldering solution is generally an acid bath containing zinc chloride. The electro-chemical explanation of corrosion indicates that this is a dangerous practice for which metallurgists should find a substitute. That some of the electrolytes are included under the zinc coating can hardly be doubted. The system Fe—$FeCl_2$—$ZnCl_2$—Zn is a galvanic couple which, however well it may justify the name of "galvanised iron," would certainly tend to hasten corrosion.

The electro-chemical theory suggests the possibility of devising an inhibitive soldering solution as a substitute for the acid treatment. The author, in co-operation with Mr. A. H. Gardner, has found that zinc oxide dissolved in an alkaline bath gives promise of a successful solution of this problem. The cold galvanising or electro-plating method of coating iron with zinc is open to the same criticism as the hot-dip method, inasmuch as the deposition is made from an acid bath, with the inevitable inclusion of some of the electrolyte. The vapour deposition processes, such as that of Cowper-Coles, avoid this difficulty; but it is by no means certain that they do not introduce other dangerous factors. Although zinc is electro-positive to iron certain alloys of zinc and iron are electro-negative. If these alloys are formed in the Sherardising process, we defeat our main purpose in using zinc as a protective agent. At all events the superior protective effect of zinc deposited by a vapour-coating process may be said, as far as the United States is concerned, to be still on trial. In the Sherardising process the material to be coated is packed into air-tight iron drums together with zinc flue dust from the smelters. These drums are then heated for a certain length of time at a temperature below the melting-point of zinc. The drums are also in some cases made to revolve while the heating is going on. By this means a very efficient coating of zinc is applied to the surface of the metal. For certain purposes this process may prove to be of value.

At the request of the author, a number of interesting tests have recently been undertaken for the purpose of ascertaining the relative resistance to corrosion of steel wires of varying chemical compositions, and also to show the relative value of protective coatings.

With these ends in view, twelve samples of galvanised steel wire were manufactured by a prominent steel and wire manufacturing company. They have been put up in the form of fence and exposed to the action of the weather. These twelve samples fall into three groups, which will be described in the order in which they were made.

The first sample was a wire of the following composition:—

	Per cent.
Carbon	0.66
Manganese	0.84
Sulphur	0.028
Phosphorus	0.016

This was made in a prominent Western steel mill by the basic open-hearth method. The ingots were cast July 23, 1908, and were reheated and rolled into billets the same day. On the following day they were again heated to redness and rolled into $\frac{5}{8}$-inch rods. One billet was taken at random from the lot for the purpose of this test. The rod after cooling was cleaned by immersion in hot dilute sulphuric acid, then rinsed with water and dipped into milk of lime. After drying, the rod was drawn cold into 9-gauge wire. It was then galvanised by passing it through a furnace in which it was heated to dull redness, and then into a bath of hydrochloric acid containing zinc chloride, and lastly into a bath of molten zinc. This wire was not wiped—that is to say, it was allowed to retain as much zinc as would adhere to it. This sample was designated C 1, and it is purposed to test it against any of the low carbon, low manganese wires to be described later, and which may for this purpose be regarded as C 2.

The second group consists of six samples of "American" style, 8-strand fabricated fencing, 45 inches high. The object of this group is to determine the effect, if any, of segregation of the impurities in the iron. Therefore the six samples were taken from the same heat. The steel was made at the same mill and on the same day as sample C 1, but by the Bessemer process and was cast in six ingots. As these ingots were rolled, two billets were taken from the top of the first ingot, two billets from the middle of the first ingot, and two from the bottom of the first ingot. These three pairs of billets were marked respectively A 1, A 2 and A 3. Similarly, from the last ingot of the heat two billets were taken from the top, two from the middle, and two from the bottom. These three pairs of billets were marked respectively B 1, B 2 and B 3. These were all rolled hot into rods, and, after cooling and cleaning in the manner described above, were drawn into wire. The six samples were each divided into three portions. About half of each sample was drawn into 11-gauge wire, a quarter of each sample into 9-gauge wire, and the remaining quarter into 12-gauge wire. This was because these three sizes of wire are all used in making the standard "American" fence, the 9-gauge for the top and bottom horizontal strands, the 11-gauge for the intermediate strands, and the 12-gauge for the vertical connecting wires. Immediately after being drawn the wire was galvanised in the same manner as described for sample C 1, except that on emerging from the molten zinc it was wiped by a mechanical device which left only a thin, smooth coating of zinc on the steel. A separate piece of fencing about 300 feet in length was then woven from each of the samples. These six pieces of fencing then represented the top, middle and bottom of the first and last ingots of the heat respectively. The samples

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were not analysed separately, but an analysis of the heat as a whole showed the following composition:—

	Per cent.
Carbon	0.9
Manganese	0.55
Sulphur	0.045
Phosphorus	0.092

The third group consists of five samples of basic open-hearth steel, showing increasing amounts of manganese from 0.07 per cent. to 0.37 per cent. These were all made in one furnace between August 18 and August 22, 1908. The process of manufacture throughout was identical with that employed on the sample designated C 1, except that the wire was wiped during the process of galvanising. These five samples were all drawn to 11-gauge and are designated by their "heat numbers," which are given here, together with the analyses.

Analyses of Five Samples forming the Third Group.

Heat Numbers.	Carbon.	Manganese.	Sulphur.	Phosphorus.
	Per cent.	Per cent.	Per cent.	Per cent.
8118	0·05	0·12	0·014	0·014
8119	0·04	0·07	0·014	0·014
8120	0·05	0·16	0·010	0·010
8121	0·05	0·24	0·018	0·018
8122	0·06	0·37	0·013	0·016

All the wire described above was shipped to Pittsburg, Pa., and between September 23 and September 26, 1908, was put up in the grounds of the Carnegie Technical Schools. The site assigned for this purpose is a level strip of ground at the bottom of a deep and narrow natural depression to the north of the quadrangle of school buildings. Because of this location none of the wire will be exposed to the action of wind, but all will show the effects of fog and dampness, which are very prevalent in this hollow.

In addition to the test fences described above, a number of panels have been mounted on either side of the original rows in order to test different methods of providing protective coatings for ordinary steel-wire fences. The barbed wire was treated in the following way:—Ten 80-rod spools of 4-point galvanised wire were run through the spelter after fabrication and 96 lb. of spelter added to the total weight. They were then given one coat of regular barbed-wire dipping paint. One panel of American style woven-wire fence is galvanised by the cold or electro-plating process; another panel is made of double galvanised wire carrying about the same weight of zinc as is usually specified for telegraph wire. This galvanising has been done by a special adaptation and variation of the ordinary hot-dip process, and has not been subjected to the acid bath before galvanising. A third panel is coated with zinc by the Sherardising process. A number of panels, in part galvanised by the ordinary hot-dip process and in part ungalvanised, have been protected by painting with various protective paint coatings. All of these extra panels have been mounted in exactly the same manner and side by side with the samples already described in the foregoing, and the tests should in the course of time yield results of great value.

Preservation with Tin.

Roofing, cans and tinned utensils of all kinds depend for their preservation on a metal coating, which, though not electro-positive to iron, has such a low solution tension that it is known to be practically incorrodible. The difficulty with the use of this metal is that it seems impossible at the present time to apply it economically to the surface of steel so that pinholes shall not exist in the coating. Walker has shown this by an ingenious modification of the ferroxyl test.* A slightly acid solution of gelatin containing a small amount of potassium ferricyanide is flooded, while hot, upon the surface of the tinplate to be tested. The gelatin becomes hard upon cooling, and in a very short time every pinhole on the tin surface is marked by a spot of Turnbull's blue. After the number and position of the pinholes is known, it becomes possible to study ways and means of eradicating them. Hot rolling and ageing of the plates under pressure are among the solutions that have been suggested in the hope that the pinholes will disappear.

The passage of the Food and Drugs Act of 1906 has had a curious and interesting bearing on the tinplate industry in its application to canned goods. Artificial colouring-matter is debarred by this law, and it was found that the natural colour of preserved food-stuff is reduced and destroyed by the action of the tin. In the effort to meet this difficulty the can manufacturers sought to use less tin, and also to lacquer the tinplate so as to prevent its contact with the fruit and vegetable juices. The formation of pinholes has gone on rapidly, however, so that it is not an unusual occurrence to find tinned preserves discharging their juices in tiny streams through small holes resulting from rapid corrosion. Walker's method of examination should prove of great value to manufacturers who have to deal with a problem of this kind.

Preservation with Copper, Lead and other Metals.

It is possible to make a copper-coated steel wire, but this makes an efficient and rust-resistant wire material only when the coating is thorough and homogeneous. Methods are being developed to extend the use of copper for this purpose, and it is also applied now to sheet and plate metal. If the cost is not a prohibitive factor, there would seem to be no reason why steel protected in this way should not come into more general use. The expedient of dipping iron into copper chloride or sulphate baths to supply a preliminary coating of copper before covering with zinc has also been tried. Lead has to some extent been used for covering iron, and for certain purposes this material is useful. It is doubtful, however, whether the application of lead in this way will find a very wide field. Methods have also been tried of applying an alloy of lead and antimony, but the success of the processes is not at present assured. One company in America has already placed on the market steel-sheet coated with this alloy, the success of which will be watched with interest.

Alloys of tin, zinc, antimony and aluminium are also being experimented with and give some promise of success. In all these coatings, however, the use of acid, corrosive soldering fluxes should be avoided.

Preservation with Paint Coatings, Varnishes, Bitumens, Lacquers and Enamels.

The application of paint coatings of various kinds constitutes the method which is most generally depended upon for the preservation of iron and steel. It is along this line that the electro-chemical theories of corrosion appear to find the most important and interesting application. Two years ago, in a paper presented to the American Society for Testing Materials,* the author suggested that, owing to their inhibitive action against rusting, the slightly soluble chromates should be theoretically the best protectives for the first application to iron and steel surfaces. Subsequent investigations, however, showed very conclusively that if the chrome pigment had been precipitated in an acid medium, or for any other reason contained soluble impurities that tended to stimulate corrosion, the surface of the steel might still fare badly. The following account of some special experiments,† a report of which has previously been published, will probably be found interesting in this connection. Samples of bright steel wire were immersed in 100 cubic centimetres of a very dilute one-thousandth normal solution of potassium bichromate in a series of shallow dishes. The wire test-pieces were suspended in the solution so that they did not come in direct contact with the glass surfaces of the dishes. This precaution should never be omitted in experiments of this kind, as, owing to the absorption of air by glass, rusting is always stimulated at the point of contact between glass and iron. The first dish was left as a blank; the second received one drop, equal to $\frac{1}{20}$ cubic centimetre of a dilute tenth-normal copper sulphate solution. The third dish received two drops of the solution, and so on, each dish getting an increased amount of copper sulphate until twenty-five dishes had been prepared.

Now it is apparent that we have in this system two contending forces at work. Iron has a higher solution tension than copper, and therefore tends to pass into solution, the copper tending to plate out on the iron. Chromate ions, on the other hand, put the surface of iron in a condition in which it cannot pass into solution. In the solution system iron-chromate-copper we have an equilibrium to be decided between two contending forces acting in opposite directions. It was interesting and instructive to note the results of this struggle, which was known to be going on, although the actual conflict could not be watched. In the first dish, in which no copper was present, no corrosion took place; in the second also no action was visible. In the third, however, minute specks of iron rust appeared. These were larger and more frequent in the immediately succeeding dishes, the test-

* Paper read at Baltimore meeting of the American Chemical Society, December 1908.

* *Transactions of the American Society for Testing Materials*, 1907, vol. vii. p. 290.

† *Ibid.*, 1908, vol. viii. p. 605.

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pieces showing rust tuberculation with the well-known pitting effect. As the middle of the series of dishes was approached both iron rust and precipitated copper began to appear side by side on the surface of the iron, and from thereon in the series more and more copper separated, while less and less rust formed, until in the end dishes copper and iron were changing places evenly over the surface without apparent hindrance. These experiments and others of a similar nature were repeated many times with the same results, and there seems to be no escape from at least the following two conclusions to which they obviously lead:—

1. If the surface of iron is subjected to the action of two contending influences, one tending to stimulate corrosion and the other to inhibit it, the result will be a breaking down of the defensive action of the inhibitor at the weakest points, thus localising the action and leading to pitting effects.

2. While the concentration of an inhibitor may be strong enough to prevent the electrolytic exchange between atom and ion, it must be still stronger to prevent entirely the solution of iron and the subsequent oxidation which leads to the formation of rust spots.

If these principles are applied to the selection of inhibitive pigments, it is apparent that many paints may contain substances well adapted for carrying on just such a struggle on the surface of iron. It seems to be the consensus of opinion among experts that an ideal vehicle for spreading pigments does not exist. Linseed oil, well adapted as it is in some respects, not only undergoes complex changes, but absorbs and carries water. Therefore, even when covered with the best paints, the surface of iron is sooner or later subject to attack by the two factors which produce corrosion —viz. hydrogen ions and oxygen.

These considerations suggested that more study should be given to the action of the various pigments which are in general use for compounding paints to be used on steel. A modified form of a test first proposed by G. W. Thompson * was used in the laboratory investigation. A series of bottles, all of the same size, were arranged with two-hole stoppers, so that a current of air could be drawn rapidly through the whole series. Glass tubes connected one bottle to the next in line on the principle of a train of wash-bottles. About fifty typical samples of pigments were obtained in the open market for the test, and after careful sampling were distributed among five independent chemists for investigation.

From the results of their experiments a tentative classification of the pigments was made under the headings:—(1) Inhibitors; (2) indeterminates; (3) stimulators. No one of the fifty pigments tested was, however, admitted to any class except in the cases in which a majority of the investigators reached the same result. The classification reached by this method is shown in the following table:—

Classification of Pigments.

Inhibitors.	Indeterminates.	Stimulators.
Zinc lead chromate.	White lead (quick process; basic carbonate).	Lampblack.
Zinc oxide.	Sublimed lead (basic sulphate).	Precipitated barium sulphate (blanc fixe).
Zinc chromate.	Sublimed blue lead.	Ochre.
Zinc barium chromate.	Lithopone.	Bright red oxide.
Zinc lead, white.	Orange mineral (American).	Carbon black.
Prussian blue (inhibitive).	Red lead.	Graphite No. 2.
Chrome green (blue tone).	Litharge.	Barium sulphate (barytes).
White lead (Dutch process).	Venetian red.	Graphite No. 1.
Ultramarine, blue.	Prince's metallic brown.	Chinese blue (stimulative Prussian).
Willow charcoal.	Calcium carbonate (whiting).	
	Calcium carbonate (precipitated).	
	Calcium sulphate.	
	China clay.	
	Asbestine.	
	American vermilion.	
	Medium chrome yellow.	

It should be carefully noted at this point that well-known pigments, such, for instance, as red lead and litharge, which fall into the indeterminate class, are not thereby impliedly condemned, nor, indeed, are the results of the work given out as a proof of any contention whatsoever. The results should be considered only as a step in a comprehensive investigation, and as preliminary to further studies which are about to be described. It is justly claimed by men of practical experience that laboratory tests on a small scale should not be used to draw sweeping deductions which may not accord with the results of experience, and may indeed even introduce into practice methods of doubtful value. While admitting the general truth of this argument, it may be claimed that careful and systematic experiments based upon a sound theory are sure to yield fruitful results. It is interesting to note that in so far as they are comparable these results show a striking agreement with the English experiments carried out in 1899 and described by Smith.*

In order to extend these investigations into the field of practice, 600 large plates, representing three kinds of steel, were mounted in wooden frames facing the sea-shore near Atlantic City, N.J. These plates were painted under the strictest test conditions with the single paints as well as with formulæ made up from the three tentative classes of pigments. The following organisations co-operated to a greater or less extent in this work:—United States Department of Agriculture, American Society for Testing Materials, Paint Manufacturers' Association of the United States, Master Painters' Association of Pennsylvania, Carnegie Steel Company and American Rolling Mill Company. The test plates, which were completed and exposed to the weather and salt air in September 1908, are being watched with interest, and it is hoped and believed that they will yield results of much value to the metallurgist, the engineer and to all persons interested in paint technology. In view of the fact that these tests have been described in detail in a preliminary report † of the scientific section of the Paint Manufacturers' Association, it is unnecessary to describe them further at this time.

If we apply the auto-electrolytic theory of the cause of corrosion to the subject of protection by paint films, it follows that in general pigments that are good conductors of electricity should never be applied directly to the surface of iron or steel. A moment's thought will serve to show why this must be true, provided the theory is true. It has been shown that the surface of iron or steel, when brought into contact with an electrolyte, tends to throw itself into positive and negative nodes, so that spreading out a good conductor on the surface in the presence of moisture and oxygen will tend to stimulate corrosion at the positive nodes with the well-known pitting or tuberculation effect always noted when steel rusts under atmospheric conditions. Whether the conductor is of the first class, such as powdered aluminium or graphite, or of the second class, such as a soluble inorganic salt, makes little difference, as either will stimulate the solution pressure of iron at the positive points. In the light of this theory let us consider the probable effect of using three forms of carbon pigments—lampblack, graphite, and willow charcoal—in contact with moisture on the surface of steel.

Of these three pigments in the dry state, lampblack and graphite have a high conductivity, while willow charcoal is almost an insulator. In order to get an approximate measurement of their relative conductivities in the moist state, 10 cubic centimetres of each of the three pigments was shaken up with 100 cubic centimetres of very pure distilled water, and the conductivity of the resulting slimes quickly measured in a special type of conductivity cell. The results obtained are shown in the following table:—

Results of Conductivity Tests of Three Pigments.

Name of Pigment.	Comparative Resistance.	Comparative Conductivity.
	Per cent.	Per cent.
Lampblack . . .	0·44	2·28
Graphite	1·10	0·91
Charcoal	1·83	0·54

It will be noted that in three out of the five experiments the corrosive action of the three pigments falls in this same order. In every case the lampblack and graphite appeared high up in the "stimulator" class, while willow charcoal just qualified as an "inhibitor." If we inquire why willow charcoal exhibits a slight conductivity when damp, and yet is to some extent an inhibitor of rust, the answer is that all charcoals contain a slight amount of potash. It is admitted that the conductivity test could not be generally used in order to determine the corrosive effect of a given pigment, for every-

* *Transactions of the American Society for Testing Materials*, 1907, vol. vii. p. 493.

* *Journal of the Society of Chemical Industry*, 1899, vol. xviii. p. 1093.

† Preliminary *Report on Steel Test Fences*, Paint Manufacturers' Association, Philadelphia, Pa.

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thing must necessarily depend upon whether the material which passes into solution, and thereby increases the conductivity of water, is stimulative or inhibitive in action. Thus, alkaline electrolytes as well as chrome compounds inhibit, while acid and neutral salts generally stimulate corrosion.

Nevertheless, the test of the three carbon pigments as given above is of value, inasmuch as it indicates that good conductors should not be used in the first application to iron and steel, unless the conducting material is inhibitive in its nature. In order to determine whether or not this indication would be borne out by actual paint tests the following experiments were made:—The three carbon pigments were ground in the usual manner with a good grade of raw linseed oil and a small amount of a good drier. These three paints were then thinned slightly with pure turpentine and painted in neighbouring stripes on samples of very pure steel which had been machined and polished to a smooth surface. After the paint films were set the plates were laid flat and covered with damp blotting-paper, under which they were kept for three weeks. At the end of this time the paint films were removed with the usual paint solvents, and the surface carefully examined. The steel was deeply etched under the graphite, less so under the lampblack, and to a much less extent under the willow charcoal. During the course of this work it occurred to the writer that if an acceleration test could be devised to distinguish between inhibitive and stimulative pigments by a simple and easy method, and without the necessity of referring the matter to a chemist, it would be of great value to both manufacturers and consumers. To this end the following test has been devised:—

The pigments to be tested are rubbed up with sufficient water to make thick water-colour paints, and are then flowed or brushed upon the clean blades of steel table-knives. After the coatings are dry the knives are laid on a wet blotter and covered with a sheet of wet blotting-paper. At the end of forty-eight hours the surface is cleaned off with running water and a stiff brush. This acceleration test has been found to give results which agree with the oil-film tests. The following list indicates the pigments that were used:—

List of Pigments used in Acceleration Test.

No. of Knife.	Pigment.
Fig. 1 (1) . .	. Barium chromate.
„ (2) . .	. Zinc lead chromate.
„ (3) . .	. Zinc chromate.
„ (4) . .	. Lampblack.
„ (5) . .	. Graphite No. 2.
„ (6) . .	. Willow charcoal.
Fig. 2 (1) . .	. Zinc and barium chromate.
„ (2) . .	. Chrome green (blue tone).
„ (3) . .	. White lead (Dutch process).
„ (4) . .	. Red lead.
„ (5) . .	. Litharge.
„ (6) . .	. Ferro-ferric oxide.

These film corrosion tests usually agree with the results obtained in the Thompson test, and in the few cases in which differences have been noted reasonable explanations are forthcoming. For instance, in the cases of some of the very heavy pigments, such as the leads, barium compounds, &c., it was impossible in the air-bubbling test to keep them in suspension, with the consequence that the steel was in contact merely with the supernatant liquid. The damp film test is much easier and more rational than the bubbling test, and will probably come into very general use.

The fact has been brought out that some pigments which have been supposed to be excellent for protecting steel should in reality never be used, at least for the prime or contact coat, and that some pigments which theoretically should inhibit corrosion in reality appear to stimulate it. This is very well shown in the chrome pigments, some of which appear to be inhibitors and some stimulators, depending upon the technology of their preparation and whether or not they contain stimulating impurities.

As a result of a large number of these film-tests, the following conclusions appear to be justified, and are therefore advanced at this time:—

1. The name of a type of pigment does not necessarily guarantee its inhibitive value.

2. Pigments which are good conductors of the first class should not be applied as the prime or contact coating to iron and steel.

3. If pigments contain material which is even in the slightest degree soluble in water, they should not be used unless their inhibitive effect on corrosion has first been established by test.

The use of varnishes and bitumens on the surface of iron recommends itself on account of the well-known insulating properties of these materials. The author has succeeded in making a successful prohibitive lacquer by dissolving chromic acid crystals little by little in a filtered alcoholic solution of shellac. Many cases are on record in which pure refined coal-tar has given a good account of itself as a protective coating, and undoubtedly many of the proprietary bituminous paints and compounds are well adapted for application to iron. The reason that such materials are not in general use appears to be that they change their nature to some extent as they age, and are apt to become brittle, or to produce the effect known as "alligatoring" under the action of sunlight and the atmosphere.

Protection with Cements.

The question whether steel embedded in concrete is protected from corrosion is of the highest importance. If steel reinforcements rust away, it bodes ill for the future of many modern structures, owing to the impossibility of making inspections and repairs before the danger point is reached. The records of discussions before a number of engineering and scientific bodies show that there is conflicting evidence and opinion in regard to this subject. There can be no doubt that the reaction of unleached cement concrete is strongly alkaline owing to the separation of free lime at the time of set. If this alkaline reaction is maintained, steel embedded in the concrete should remain uncorroded. If, however, as is sometimes the case, percolating waters find their way through the concrete, the free lime will eventually be removed and dangerous rusting take place. Nails and other objects of steel will remain bright when immersed in lime water, and the author has found that the addition of about 5 per cent. of quicklime to soggy sour clays and soils will have a very decidedly protective effect on steel embedded in them. It is curious that this simple expedient has not been resorted to in order to prolong the life of steel pipe lines trenched in soggy clay soils where there is but little movement of soil and subsoil water. Cement paints and grouts have also been used to protect steel but have not come into general use owing to the difficulty in making them adhere without cracking and peeling off.

Processing after Manufacture to form a Coating of Oxide, Phosphide, Silicide, &c.

A number of metallurgical processes, such as the Bower-Barff * and others, have been from time to time proposed, and exploited for producing an oxidised surface on steel. As far as the writer is aware, none of these have as yet been found practically successful, except for certain special purposes.

The Coslet process is said to consist in immersing the iron in a hot, phosphorised solution containing an iron compound. The surface, it is claimed, is converted into a ferroso-ferric phosphate, which is to some extent resistant to corrosion. Joule † has called attention to the fact that iron containing 20 per cent. of silicon is not attacked by acids, and therefore such material should theoretically be unrustible. The author has confirmed this deduction by experiment, and found that iron containing 10 per cent. of silicon is almost incorrodible. Unfortunately, such a metal is not easily workable and has peculiar properties. Since silicon is much like carbon, chemically speaking, it would seem as if it might be worked into the surface of steel by modifications of some of the processes used for case-hardening with carbon. If anyone should discover a method for applying a skin of high silicon metal on worked steel it would be a contribution of the highest value to the art of metallurgy and to the world at large.

Unprotected Steel.

A very large proportion of the iron and steel which is in use cannot, from the very nature of the service to which it is put, be protected from corrosion. To this class belong rails, heavy chains, implements, boiler tubes, &c. The only hope of meeting this particular phase of the problem consists in the improvement of metallurgical processes, to the end that perfectly homogeneous metal, as free as possible from segregation, may be manufactured. It is well known that some of the alloyed steels, such as nickel steel, are very highly resistant to corrosion. The same thing is probably true of the chromium and chromium-vanadium steels. Unfortunately, such materials are too costly to be used on a large

* M. P. Wood, *Rustless Coatings*, 1905, p. 166.
† *Engineer*, 1908, vol. cvi. p. 397.

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scale, although there is always the possibility that some alloy or combination will be discovered which will be at the same time comparatively inexpensive and incorrodible. It appears to be the opinion of a number of metallurgists with whom the author has corresponded that carefully made open-hearth steels, in which the ordinary impurities have been worked down to a minimum, with especial care in the heat treatment, are much more resistant to corrosion than the ordinary run of merchant steel. One well-known example of this type of steel which is on the market, and has already been referred to in a previous paragraph, has the following composition:—

	Per cent.
Sulphur	0.019
Phosphorus	0.004
Carbon	0.026
Manganese	trace.

This metal is therefore, practically speaking, 99.95 per cent. pure. Although it is apparent that a metal of this character could not be used where a tensile strength in excess of 40,000 lb. to 50,000 lb. per square inch is required, there are certain purposes for which it is well adapted, such, for instance, as roofing, sheathing, culverts, pipes, &c.

It has been found that this pure steel (or iron) resists the attack of acids to a high degree, and an acid test has been proposed to predetermine the resistance to corrosion of various types of metal. This proposal has, however, met with decided opposition from some metallurgists, who believe that the test is not a rational one. The need of a quick preliminary test for determining the resistance of steel and iron to corrosion is universally conceded. It is, however, in the opinion of the author, extremely doubtful whether such a test is possible, in view of the fact that the auto-electrolysis which is slowly but continually at work in the natural process of rusting, does not proceed in the same way in any short-time test. This criticism applies to all the various tests which have been proposed, such as immersion in corrosive liquids while air is being bubbled over the test-pieces. A considerable amount of work has already been done in investigating this particular problem, and the results have already been in part published.* More work is being done and will soon be published. Up to the present time there would seem to be but one perfectly sure criterion, and that is the test of service.

Electrolytic processes for protecting steel have also from time to time been proposed. As far as the author is aware, none of them have come into general use. It should of course be possible, by making the steel to be preserved the anode in an electric circuit against a scrap-iron cathode, to check, if not entirely stop, corrosion. It is, however, extremely doubtful if such a method could be made to work economically. Engineers are much disturbed by the damage to certain steel structures which is caused by electrolysis due to vagabond currents from high potential circuits used in lighting, trolley lines, &c. This undoubtedly constitutes a very serious engineering problem, but it should be remembered that extraneous currents may be made to protect as well as to attack steel through electrolysis. Laboratory experiments indicate, however, that a considerable voltage is necessary to prevent a steel anode in an electrolytic circuit from suffering from corrosion. The action which has been described in this paper as autogenous electrolysis, or auto-electrolysis, may be truly said to be the underlying and active cause of all forms of corrosion.

Conclusion and Summary.

It has been shown in this paper that the preservation of iron and steel has a direct and important bearing on the conservation of the natural resources of the world. The controlling factors which influence the more or less rapid corrosion of iron and steel are discussed in the light of the electrolytic or auto-electrolytic theory of rust formation. The various methods which are in common use, or which have been proposed for the protection of iron and steel, are then considered, with special reference to the results of recent investigations, and certain new principles are announced to serve as a guide in the selection of paints for the prime or contact coatings for steel. With regard to the protection of metal which, from the nature of its service, cannot be treated with a protective coating, it is pointed out that this is purely a metallurgical problem, dependent upon the manufacture of a perfectly homogeneous and carefully worked material.

* *Transactions of the American Society for Testing Materials*, 1908, vol. viii. p. 231.

LONDON COUNTY COUNCIL.

THE parliamentary committee report as follows:—

In Part V. of its General Powers Bill of the present session the Council is seeking powers, inter alia, to amend the London Building Acts with regard to buildings of metal skeleton framework. In this connection we have had before us a report by the Secretary of State for the Home Department on the Bill containing the following observations on Part V. of the Bill:—

Clause 30.—Provisions with respect to buildings of iron and steel skeleton construction.

"The Secretary of State observes that it is proposed, in paragraphs (31) and (32) of this clause, not only that buildings shall be constructed in accordance with the preceding provisions of the clause, but also that they shall be so constructed to the satisfaction of the district surveyor, and further, that any person dissatisfied with any requirement of the surveyor may appeal to the Council, whose decision is to be final. This procedure appears to the Secretary of State to be of very doubtful propriety.

"He would point out that by clause 32 the provisions of this part of the Bill and any regulations made thereunder are to be incorporated with Part VI. of the London Building Act of 1894, and that under section 200 of that Act every person who fails to comply with any of the provisions of Part VI. is made liable on summary conviction to a maximum daily penalty of 20*l.* during every day on which he fails to comply with the Order of the Court. Any failure, therefore, to comply with the provisions of the present clause would render the defaulter liable to a heavy penalty enforceable by criminal proceedings, and it would appear that the effect of paragraphs (31) and (32) would be to make the district surveyor in the first instance, and, secondly, the Council, the judges whether or not such failure had taken place, so that the only function of the Court before whom the defaulter was summoned would be to fix the amount of the penalty. The Court would, apparently, have no power of adjudicating on the case.

"It appears to the Secretary of State that in the case of summary proceedings for a criminal offence the question whether or not the offence has been committed ought to be decided by the Court. If on the other hand the committee are of opinion that the questions that may be raised under the present clause are of such a technical character that they cannot properly be dealt with by the ordinary Courts, he suggests that the proper course would be to give a direct appeal to a strong expert tribunal such as e.g. the Tribunal of Appeal under the Act of 1894, with special powers."

The Local Government Board also refers to this matter in its report on the Bill, stating that "it appears to the Board to be doubtful whether the appeal to the County Council proposed in this paragraph (i.e. (32)) is the proper method of dealing with differences between the district surveyor and persons affected by the clause."

We have had before us a deputation from representatives of the following societies, viz., the Institution of Civil Engineers, the Royal Institute of British Architects, the Surveyors' Institution, the Institution of Mechanical Engineers, the Concrete Institute and the Institute of Builders, urging that an appeal from the decision of the district surveyor to the Tribunal of Appeal should be allowed in such cases. We understand that the Building Act committee are in favour of an amendment of the Bill to provide for an appeal, but consider that the appeal should be to a Divisional Court. We feel, however, that such an appeal would involve great delay and expense, and the question to be decided would often be of such a character as could be most appropriately decided by experts. Moreover, technical difficulties might be raised against giving this jurisdiction to a Divisional Court, particularly if, as has been proposed, the Court were to sit with expert assesors in hearing cases of this class. Under the circumstances we have come to the conclusion that the best tribunal to appeal to would be the Tribunal of Appeal, which is already specially constituted by the Act of 1894 to deal with questions relating to buildings. The Tribunal consists of a barrister, an architect and a surveyor. It has been suggested that an engineer should sit with the Tribunal when appeals under this part of the Bill are heard, but we think it is unnecessary to provide for this as the Tribunal has already power to obtain such professional advice and assistance as it may find necessary. We regret that we have not been able to confer again with the Building Act committee before reporting to the Council, but there was no time to do so as the Bill was fixed for hearing before the select committee on June 21, 1909. We therefore recommend—

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"That Part V. of the L.C.C. (General Powers) Bill, 1909, relating to buildings of metal skeleton framework, be amended to provide that there shall be an appeal from the decision of the district surveyor to the Tribunal of Appeal constituted under the London Building Act, 1894."

The Building Act committee report as follows:—

General line of buildings on the south-eastern side of Euston Road, between Duke's Road and Mabledon Place.

On November 17, 1908, the Council decided to take an appeal against the decision of the Divisional Court in the matter of the case stated by the Tribunal of Appeal with regard to the certificate of the superintending architect of metropolitan buildings defining the general line of buildings on the south-eastern side of Euston Road, between Duke's Road and Mabledon Place. The appeal was heard on April 22, 1909, and on May 14, 1909, the Court decided that the Council's appeal should be allowed, with costs in that court and the courts below. As stated in the report referred to above, the question at issue was whether the superintending architect of metropolitan buildings and the Tribunal of Appeal should take into consideration certain one-storey shops erected with the consent of the Metropolitan Board of Works, and others which appeared to have been erected unlawfully. In giving the decision of the Court of Appeal Lord Justice Fletcher Moulton stated that it was not competent for the superintending architect or the Tribunal of Appeal to take into consideration buildings which had been erected with the consent of the Metropolitan Board of Works or the Council under section 75 of the Metropolis Management Amendment Act, 1862, or by the Council under the London Building Act, 1894, and Lord Justice Farwell in support added that, in his opinion, the true presumption of law was that all the buildings erected in that part of Euston Road, which was the subject of the appeal, in regard to which no evidence could be found as to whether there had been a consent or not must be presumed to have been erected with the consent of the Metropolitan Board. The respondents have not yet decided whether they will appeal to the House of Lords.

OUR CONTEMPORARIES FROM OVER-SEAS.

THE *American Architect*, continuing its review of architecture in the Southern States, deals with Birmingham, Alabama, the Pittsburg of the South, of which city and its architecture there is a descriptive account with illustrations, principally of domestic work. An interesting feature of some of the Alabama homes depicted is the use of out-of-doors sleeping rooms, a feature that even in our own changeable climate is of some importance to architects, not only in the designing of sanatoria but of private residences, seeing that we have already amongst us some enthusiasts for fresh air who sleep without other roof than that of heaven—till a shower comes.

Der Profanbau should be of interest to competitors for the recently awarded Tite prize of the Royal Institute, as it is mainly occupied with an account and copious illustrations of an arcade of shops—Friedrichstrassen-Pazage—in Berlin, of which Kaiserlicher Baurat Ahrens is the architect. The detail would hardly do for the Tite prize, as it is far removed from "the principles of Palladio, Vignola, Wren, or Chambers," but the design is a virile and effective piece of architecture. An effective feature in the plan is a domed central hall, which greatly assists in overcoming the difficulty of a change of line necessitated by the want of parallelism in the two streets that the arcade connects.

Stone in its present issue changes its form, and we congratulate our contemporary on the improvement. It contains some excellent illustrations of stone buildings and workmanship, notably one of the entrance to the University of Toronto, built in 1859 from the design of Mr. W. G. Storm, which, based on French Romanesque work, is quite remarkable both as a piece of architecture and an example of well-preserved masonry.

The Engineering Record (New York) has an interesting article by Mr. Henry S. Spackman on the effect of calcium aluminate on mortars, in which he points out the possibility of giving to natural cements and limes slow-setting and quick-hardening properties resembling those of Portland cement, with the advantages of low cost, ease of manufacture and inexpensive works.

Het Huis has an article, fully illustrated, on old buildings in the island of Texel, the farm houses and cottages of which appear to be simple but eminently picturesque, almost entirely pan-tile roofed over a ground storey, with one or two storeys in the roof. There is in this number also a description of some of the Indian art work in the Batavian Museum.

Moderne Bauformen this month maintains its high standard, and in addition to views of modern German architecture deals with the work of Herr G. A. Bredow, of Stuttgart, a sculptor of the "new art" school, and also in an appreciative article, fully illustrated, with that of Mr. E. Guy Dawber.

Deutsche Bauzeitung continues its account of the work of Herr Philipp Kahm at the Schloss Vollrads, in Rheingau, to which it devotes all its illustrations.

NOTABILIA.

THE *Pall Mall Magazine* contains an article on Birmingham and its University, which in a rather sketchy fashion gives some particulars of the history of the University, and illustrates some of the features of working Birmingham by means of impressionist or "pictorial" photography. Of topical interest is an article on "Six Famous Holbeins," which are depicted, of course including the "Duchess of Milan." "Treasure-hunting in Egypt," by Arthur E. P. Weigall, Chief Inspector of Upper Egypt, Department of Antiquities, gives a vivid account of the difficulties of Egyptian exploration and, on the other hand, of the excitement of a fortunate find.

Correspondence.

[The Editor will not be responsible for the opinions expressed by Correspondents.]

How to Know Good Architecture.

SIR,—Kindly allow me to correct a printer's error which occurs in *The Architect's* report of my lecture on "How to Know Good Architecture" in the paragraph describing the entablature of the Parthenon, which should read "the triglyphs become with the drops a kind of *bracket*" not *bracelet*.—Yours faithfully,

G. S. AITKEN.

33 Castle Street, Edinburgh:
June 22, 1909.

GENERAL.

A General Meeting of the Concrete Institute was held on Thursday evening, the 17th inst., at the Royal United Service Institution, Whitehall, for the further discussion of the paper read by Mr. H. K. G. Bamber on May 27 on "The Setting Time of Portland Cement and Methods adopted for Regulating the Same." Mr. F. E. Wentworth-Sheilds, M.Inst.C.E., presided, and the proceedings were opened by Mr. Bamber reading a contribution to the discussion received from Professor Le Chatelier. The discussion was then continued by Messrs. W. F. Reid, F.I.C., W. Gilbert, M.Inst.C.E., A. O. Trechmann, G. Blyth, J. W. Plaister, J. W. Davis and Geo. F. Fenwick.

In the Art Section of the National Eisteddfod of Wales (sculpture) Miss Margaret T. Wedmore, of Oakland Road, Redland, has won the first prize for plaster model of a study of a head in relief, life-size. The competition was an open one, and the adjudicator was Mr. J. Havard Thomas.

The Purchase of Lord Leighton's early picture, "The Death of Brunelleschi," painted when he was twenty, and measuring 104 inches by 76 inches, has been concluded, and the work is now added to the permanent collection at Leighton House, 12 Holland Park Road, Kensington, W.

A Meeting of the general preliminary committee of the Scottish Exhibition of National History, Art and Industry was held in the Trades Hall, Glasgow. Mr. R. J. Walker, architect, submitted plans showing how the western portion of the West End Park, Kelvingrove, could be utilised without disturbing the trees. The plans met with general approval, and it was agreed to submit the scheme to the Corporation and ask them to grant the use of that portion of the park. The plans submitted show a large industrial hall for Scottish art industries, a large fireproof building for pictures and historical exhibits, a concert and pageant hall, and for representing a street in ancient Glasgow and a Highland village, in addition to sites for restaurants, &c.

The Wood Green District Council have decided to erect public baths at a cost not exceeding 8,000*l*. Architects experienced in this class of work are to be invited to submit competitive designs, and the Council is offering premiums of 50, 25 and 15 guineas for the first three placed in order of merit by the consulting architect of the Council.

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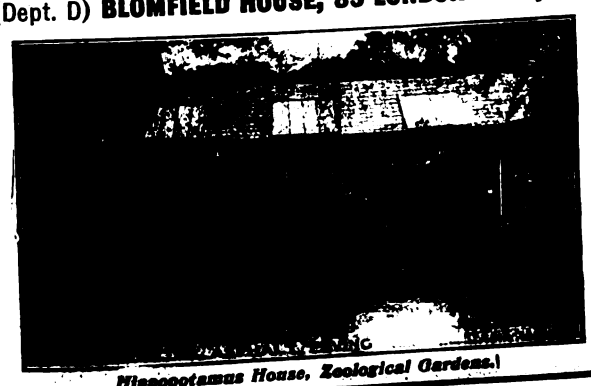
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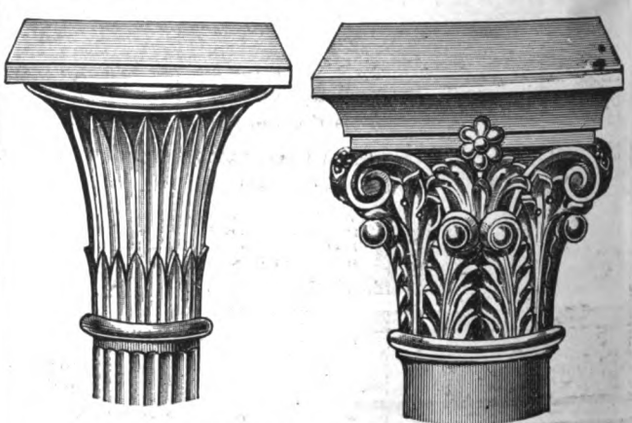
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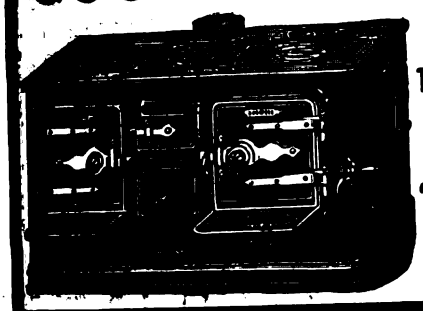
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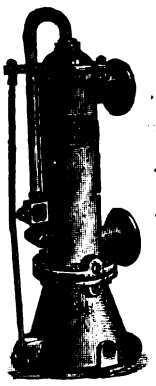
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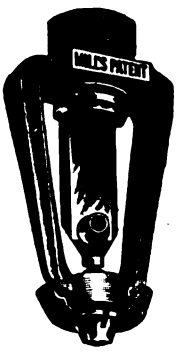
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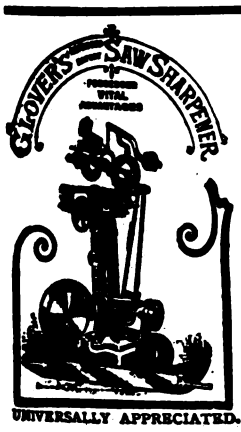
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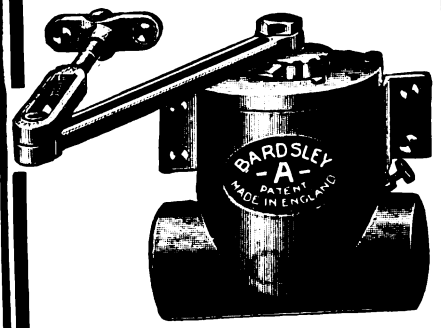
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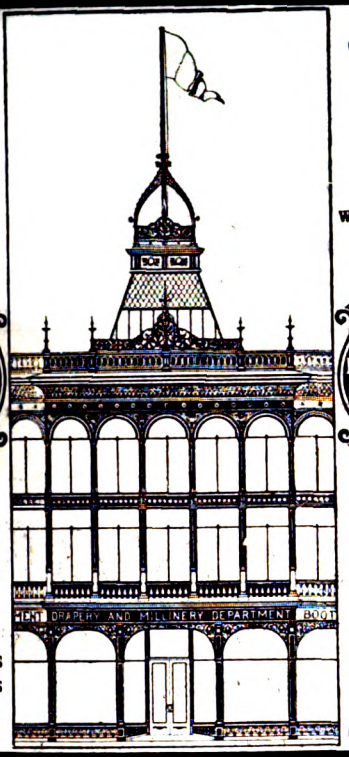
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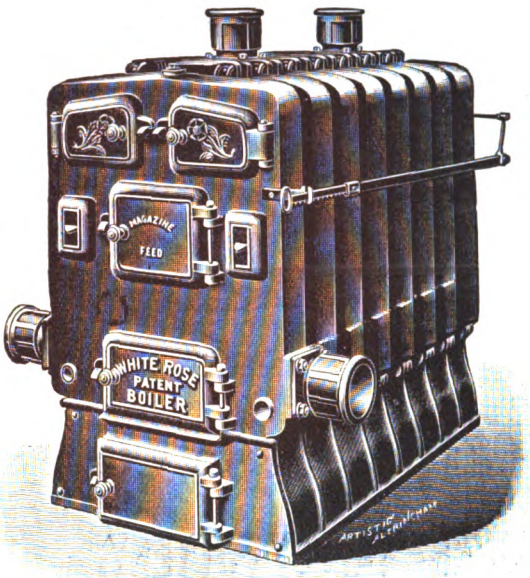
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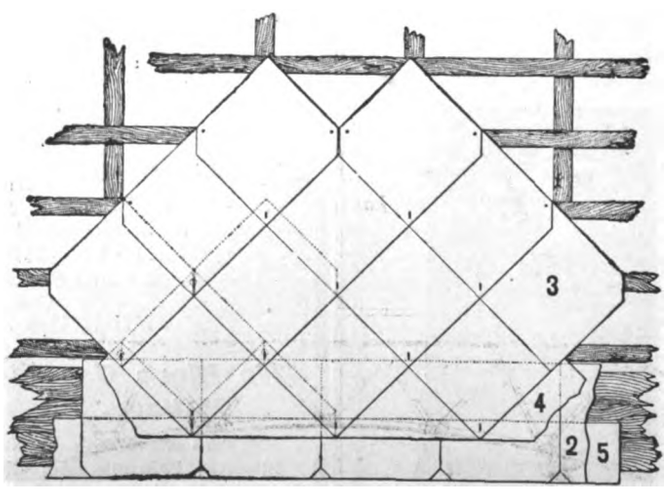
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Architect and Contract Reporter.

FRIDAY, JANUARY 1, 1909.

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P. A. GILBERT WOOD,

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AGENTS FOR CANADA:

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Under no circumstances whatever can the Proprietors of this Journal guarantee alteration of copy if received after the first post on Tuesday mornings, and no proofs can be submitted if copy arrives later than first post on Saturday mornings.

EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

**** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITION OPEN.

LYNTON (DEVON).—Jan. 30, 1909.—Sketch plans to scale and sketch designs, with approximate cost for Wesleyan church and additional buildings, on land near the town hall. Design placed first will be appointed to carry out the work; 2nd premium, 7*l.* 7*s.*; 3rd premium, 5*l.* 5*s.* Deposit 10*s.*, returnable to competitors. Plans and further particulars from Mr. K. Jutsum, Clarence Terrace, Lynton.

CONTRACTS OPEN.

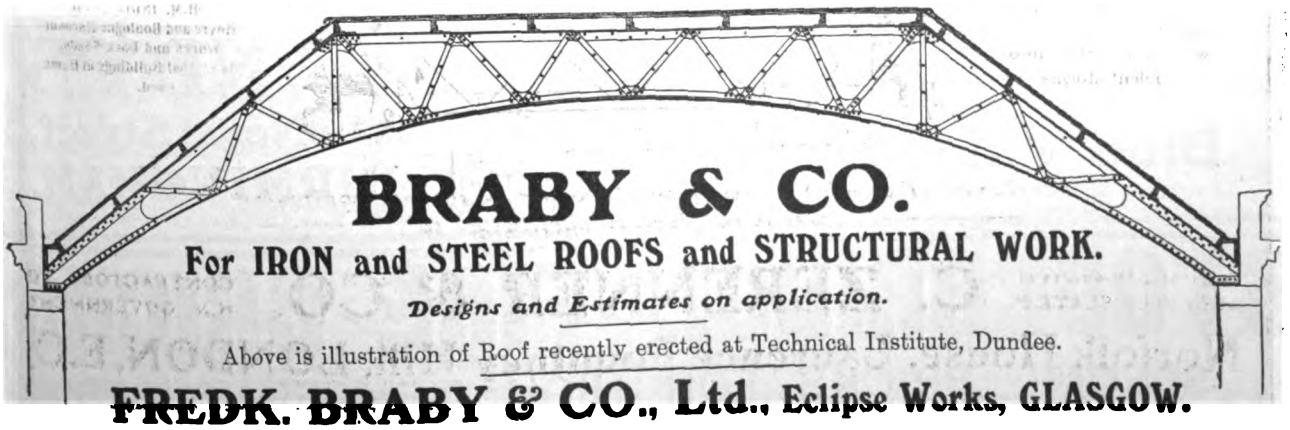
ABINGDON.—Jan. 12.—For erection of station buildings. The Engineer, the Great Western Railway Co., Paddington Station, W.

BISHOP AUCKLAND.—Jan. 20.—For alterations and additions to workhouse. Deposit 5*l.* Mr. F. H. Livesay, architect, Bishop Auckland.

BRIDLINGTON.—Jan. 7.—For heating Burlington schools with hot water (low pressure). Mr. J. Earnshaw, architect and surveyor, Carlton House, Bridlington.

BRIDLINGTON.—Jan. 7.—For erection and completion of Burlington schools and caretaker's residence. Deposit 2*l.* 2*s.* Mr. J. Earnshaw, M.S.A., architect and surveyor, Bridlington.

BROWNHILLS.—Jan. 5.—For works for Brownhills Urban District Council:—(1) Erection of stables and conversion of old building into cartsheds, &c., at Norton Canes; (2) supplying and fixing one 14 b.h.p. gas engine and gas suction plant and pumps at the Mosspits pumping station. Mr. J. H. Shaw, surveyor, Public Offices, Brownhills, Staffs.



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CHESTER.—Jan. 14.—For building battery room and other extensions at Electricity Works in New Crane Street. Deposit 1*l.* The City Surveyor, Town Hall, Chester.

DARTMOUTH.—Jan. 2.—For construction of retaining wall, steps, filling-in to basements of old buildings and other works at Southtown. Mr. Thos. W. Joyce, borough surveyor.

EVENWOOD.—Jan. 5.—For alterations to cellar at workmen's club and institute, Evenwood, Durham. Mr. C. Johnston, architect and surveyor, Bishop Auckland.

GREAT BERKHAMPSTEAD.—Jan. 4.—For removal of existing iron superstructure, carrying King's Road over the Grand Junction Canal, and erection of a new steel bridge. Mr. Edward H. Adey, surveyor to the Urban District Council, 177 High Street, Berkhampstead, Herts; or Messrs. Thomas & Thomas, civil engineers, 191 Edgware Road, Paddington, W.

HEALING.—Jan. 14.—For elementary school and teacher's house at Healing. Deposit 2*l.* 2*s.* Messrs. Scorer & Gamble, architects, Bank Street Chambers, Lincoln.

HEBDEN BRIDGE.—Jan. 2.—For erection of a house, Birchcliffe Road, Hebden Bridge, Yorks. Messrs. Sutcliffe & Sutcliffe, F.S.I., architects, Hebden Bridge.

HEXHAM (NORTHUMBERLAND).—Jan. 6.—For erecting a secondary school. Deposit 2*l.* 2*s.* by December 12, to Mr. C. Williams, secretary, The Moothall, Newcastle-on-Tyne.

HUNSLET.—Jan. 18.—For bricklayer, joiner, plumber, plasterer, slater and painter's work required in erection of Council's new offices in Leek Street, Hunslet, Leeds. Deposit 10*s.* 6*d.* Mr. B. Wood Higgins, architect, Oulton, near Leeds.

ILFORD.—Jan. 16.—For erection of caretaker's house at South Park school, Water Lane. Deposit 2*l.* 2*s.* Mr. C. J. Dawson, F.R.I.B.A., 11 Cranbrook Road, Ilford.

IRELAND.—Jan. 8.—For erection of schoolhouse at Murlog, parish of Clonleigh. Rev. John Doherty, P.P., the Parochial House, Strabane.

KENDAL.—For works required in building "The Parkside Lodge," on the Parkside Road. Mr. John Hutton, M.R.S.I., architect, Kendal.

LINCOLN.—Jan. 7.—For construction of brick tower 106 feet high to T. W. L., to support a spherical bottomed steel tank containing 300,000 gallons of water, and subsidiary works at Westgate. Deposit 5*l.* 5*s.* Mr. Neil McK. Barron, waterworks engineer, Bank Street, Lincoln.

LITTLE COATES.—Jan. 14.—For building elementary school at Little Coates, for the Lindsey County Council. Deposit 2*l.* 2*s.* Messrs. Scorer & Gamble, architects, Bank Street Chambers, Lincoln.

LITTLE HULTON.—Jan. 5.—For erection of central premises at junction of Clegg's Lane and Manchester Road, Little Hulton, near Bolton. Deposit 1*l.* Mr. J. T. Proffitt, architect and surveyor, 9 Longley Road, Walkden.

LONDON.—Jan. 4.—For alterations and additions to existing underground convenience at Royal Exchange, and construction of new underground convenience at Eastcheap. Deposit 5*l.* The Town Clerk, Public Health Department, Guildhall, E.C.

LONDON.—Jan. 6.—For provision of subway between new administrative block and pavilion "D" of the infirmary, High Street, Homerton, N.E. Deposit 1*l.* 1*s.* Mr. Frank R. Coles, clerk, Sidney Road, Homerton.

LONDON.—Jan. 5.—For supplying and erecting necessary iron and steel work and galvanised iron roofing to cart sheds at the Council's depot, at Old Road, Lee, S.E. The Town Hall, Catford (Surveyor's Department).

LONDON.—Jan. 21.—For provision of improved receiving ward accommodation at St. John's Road Workhouse, Upper Holloway, N. Deposit 5*l.* 5*s.* Mr. William Lockwood, architect, 12 Sherwood Street, Piccadilly Circus, London, W.

LONG EATON.—Jan. 9.—For erection of Council schools at Long Eaton, Derbyshire, to accommodate 960 children in three blocks for boys, girls and infants, with cookery and manual instruction rooms. Deposit 1*l.* 1*s.* Mr. George H. Widdows, A.R.I.B.A., architect to the committee, St. Mary's Gate, Derby.

MACCLESFIELD.—Jan. 4.—For alterations to infirm wards of workhouse. Messrs. Whittaker & Bradburn, architects, 19 King Edward Street, Macclesfield.

MACCLESFIELD.—Jan. 18.—For erection of two detached blocks for forty-three patients each, at Parkside Asylum, Macclesfield. Deposit 1*l.* Mr. H. Beswick, F.R.I.B.A., county architect, Chester.

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MORPETH.—Jan. 12.—For erecting Council school to accommodate 520 scholars at Morpeth, Northumberland. Deposit 2*l.* 2*s.* Mr. C. Williams, secretary, The Moot Hall, Newcastle-on-Tyne.

NORTH SHIELDS.—Jan. 5.—For pulling down existing buildings on Union Quay and erecting stores, offices and conveniences. Deposit 2*l.* 2*s.* Mr. John F. Smillie, borough surveyor.

OLD FLETTON.—Jan. 16.—For erection of commercial and technical school at Old Fletton, Hunts. Deposit 2*l.* 2*s.* The County Surveyor, High Street, Huntingdon.

RICHMOND (SURREY).—Jan. 4.—For erection of a convenience (for women) in Old Deer Park Recreation Ground. Deposit 1*l.* 1*s.* The Borough Surveyor, Town Hall, Richmond.

SALISBURY.—Jan. 8.—For construction of brick-built water tower and tank and works on the Bishops Down Estate, for the Ecclesiastical Commissioners for England. Deposit 2*l.* 2*s.* Messrs. Lemon & Blizard, MM.I.C.E., 29 Market Place, Salisbury.

SALISBURY.—Jan. 6.—For erection of a workshop, stores, &c., in Friary Lane, in connection with Waterworks Department. Mr. W. J. Goodwin, A.M.I.C.E., city engineer and surveyor, Salisbury.

SCOTLAND.—Jan. 4.—For mason, carpenter, plumber, slater, plaster and painter's work of a cottage at Granary Street, Burghead. Mr. John Wittet, architect, Elgin.

SEAHAM HARBOUR, &C.—Jan. 19.—For erection of temporary Council school at Seaham Harbour. Alterations and improvements at Middlestone Moor, South Frosterley, Easington Lane and Hedley Hill Council schools. Mr. F. E. Coates, A.R.I.B.A., Shire Hall, Durham.

SNEATON.—Jan. 14.—For alterations in chancel, re-seating and other works at parish church of Sneaton, near Whitby. Mr. Edward H. Smales, A.R.I.B.A., architect, 5 Flowergate, Whitby.

STAINLAND.—Jan. 5.—For various trades required in erection of nine houses at Stainland, Yorks. Messrs. Chas. F. L. Horsfall & Son, architects, Lord Street Chambers, Halifax.

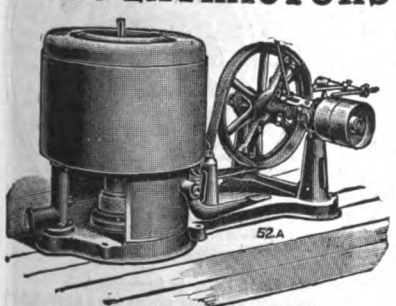
USWORTH.—Jan. 6.—For erection of fifty workmen's dwellings at Usworth, in rural district of Chester-le-Street, Durham. Messrs. Brown & Spain, architects, 51 Fawcett Street, Sunderland.

WATFORD.—Jan. 7.—For erection of new manual instruction centre at Watford. Deposit 2*l.* 2*s.* The County Surveyor's Office, Hatfield.

CALENDARS, &c., FOR 1909.

WE have received calendars from the Federated Employers' Insurance Association, 30 Cross Street, Manchester, who insure for contractors' risks and workmen's compensation. The Empire Typewriting Company.—The machines are made in Canada but the picture on the calendar is of a lady typist working at a window facing the Royal Exchange. Messrs. Merryweather & Sons, Ltd., have inserted photographs of the motor engines at Windsor Great Park and Aldershot Command, and a motor fire-escape built for Shanghai. Messrs. Harrison, Jehring & Co., printers, &c., give the remaining eleven months in small type on the page devoted to each particular month. Messrs. Arthur L. Gibson, Tower Street, W.C., have made their calendar a thing of beauty by devoting the greater part of the space to a broad panel painting, "The Country Road," by an American artist, Mr. E. Lamasure; its value is increased by the explanatory leaflet attached. The City of Winnipeg have issued a calendar for the purpose of attracting business men with capital; marginal notes are given concerning the progress of the city. The block calendar of Messrs. Douglas Young & Co., surveyors and auctioneers, Coleman Street, E.C., is fitted with a support so that it can stand on any desk or table, and each day has its own proverb. The Practical Electrician's Pocket-book and Diary has for twelve years pursued an eminently useful career. Its size really is such that it can be placed in the pocket, while its pages contain enough condensed information to last the student and practical man many months. It is intended primarily for the wireman, jointer, dynamo and arc lamp attendant and electrical workers of all grades. The latest edition contains additional useful matter.

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TENDERS.

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For the erection of public offices at Acton, W. Messrs. W. H. RAFFLES & J. B. GRIDLEY, architects, 10 Gray's Inn Square, W.C. Quantities prepared by Messrs. MATTHEWS & COLEMAN, 11 Old Queen Street, S.W.

Main building.

Wheeler	£17,982	0	0
Thompson & Beveridge	16,385	0	0
J. & M. Patrick	16,339	0	0
Sheffield Bros.	16,229	0	0
Barker & Co.	16,039	0	0
Cracknell	16,025	0	0
Higgs & Hill	15,984	0	0
Willcock & Co.	15,919	10	9
Hunt & Son	15,871	0	0
Spencer, Santo & Co.	15,811	0	0
F. & G. Foster	15,797	0	0
Bollom	15,759	0	0
Patman & Fotheringham	15,697	0	0
Kingerlee & Sons	15,687	0	0
Maddison	15,646	0	0
Lawrence & Son	15,584	0	0
Kirk & Randall	15,545	0	0
Jarman & Co.	15,500	0	0
Leslie & Co.	15,487	0	0
Colborne	15,473	12	11
Gibson	15,384	0	0
Dickens	15,343	0	0
Perry Bros.	15,297	0	0
Flint	15,284	10	0
Galbraith Bros.	15,260	10	0
Coles	15,193	13	1
Sabey & Son	15,173	0	0
Monk	15,158	0	0
Carmichael	15,120	0	0
Hawkins & Co.	15,105	12	0
Patman & Co.	15,080	0	0
Henson & Son	15,055	0	1
Dorey & Co.	15,026	0	0
Nightingale	14,924	0	0
Hyde & Co.	14,875	0	0

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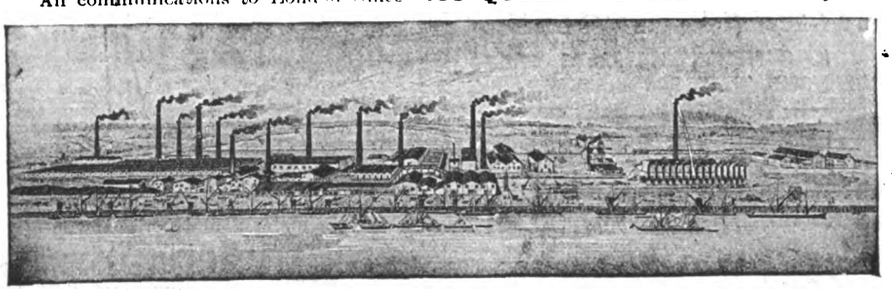
Chessum & Sons	14,809	0	0
Lowe & Co.	14,790	0	0
MINTER, Putney (*accepted*)	14,740	0	0

Front boundary walls and railings.

Wheeler	815	0	0
Barker & Co.	781	0	0
F. & G. Foster	780	0	0
Thompson & Beveridge	774	0	0
Hunt & Son	770	0	0
Patman & Co.	760	0	0
Kirk & Randall	758	0	0
Colborne	757	6	1
Spencer, Santo & Co.	753	0	0
Dickens	750	0	0
Kingerlee & Sons	745	0	0
Coles	744	17	11
Flint	744	0	0
Higgs & Hill	744	0	0
Lawrence & Son	744	0	0
Leslie & Co.	741	0	0
Cracknell	740	0	0
Gibson	739	0	0
Chessum & Sons	738	0	0
Sabey & Son	737	0	0
Henson & Son	736	4	0
Patman & Fotheringham	736	0	0
Bollom	735	0	0
Maddison	732	0	0
Willcock & Co.	727	10	6
Hyde & Co.	727	0	0
Monk	724	0	0
Perry Bros.	723	0	0
MINTER, Putney (*accepted*)	720	0	0
Dorey & Co.	720	0	0
Jarman & Co.	720	0	0
Sheffield Bros.	718	0	0
Nightingale	717	0	0
Lowe & Co.	715	0	0
Carmichael	713	0	0
Hawkins & Co.	712	16	2
Galbraith Bros.	710	14	5
J. & M. Patrick	675	0	0

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ACTON—*continued.*

Outside paving work.

F. & G. Foster	159	0	0
Wheeler	155	0	0
Cracknell	153	0	0
Patman & Co.	144	0	0
Patman & Fotheringham	139	0	0
Bollom	137	0	0
Kingerlee & Sons	136	0	0
Barker & Co.	136	0	0
Hunt & Son	133	0	0
Thompson & Beveridge	132	0	0
Sheffield Bros.	131	0	0
Jarman & Co.	129	0	0
Lowe & Co.	128	0	0
Willcock & Co.	127	6	8
Coles	127	5	11
Lawrence & Son	127	0	0
Sabey & Son.	126	0	0
Leslie & Co.	126	0	0
Gibson	126	0	0
Colborne	126	0	0
Chessum & Sons	125	0	0
Carmichael	124	0	0
Higgs & Hill	124	0	0
Maddison	123	0	0
J. & M. Patrick	122	0	0
Monk	120	0	0
Galbraith Bros	119	11	4
MINTER, Putney (*accepted*)	118	0	0
Nightingale	117	0	0
Hawkins & Co.	116	17	5
Dorey & Co.	115	0	0
Kirk & Randall	113	0	0
Dickens	113	0	0
Spencer, Santo & Co.	109	0	0
Flint	108	0	0
Hyde & Co.	108	0	0
Henson & Son	105	9	8
Perry Bros.	104	0	0

BECKENHAM.

For making-up the following roads for the Beckenham Urban District Council:—Perth Road, 200 yards long; Piquet Road, 200 yards long; Witham Road, 80 yards long.

Perth Road.

Woodham & Sons (*recommended*)	£362	0	0

Piquet Road.

Mowlem & Co. (*recommended*)	400	0	0

Witham Road.

Mowlem & Co. (*recommended*)	184	0	0

BLEDLOW RIDGE.

For erection of a detached house at Bledlow Ridge, Bucks. Mr. S. C. HART, architect, 26 Bush Lane, E.C.

Webster & Hawkes	£1,390	0	0
Webster & Cannon	1,288	0	0
Kingerlee & Co.	1,195	0	0
Hunt & Sons	1,113	0	0
Walis & Co.	1,004	18	10
Shellard & Co.	987	0	0
THOMPSON & Co. (*accepted*)	958	0	0

BRENTWOOD.

For the conversion of the swimming-bath at the schools at Brentwood, Essex, into a separate infants' school, for the Guardians of Hackney Union.

Lawrence	£700	0	0
Hubbard	599	0	0
Houghton	595	0	0
Dowling & Davis	440	0	0
JARVIS, Brentwood (*accepted*)	399	0	0

BRIDLINGTON.

For erection of a pumping station at the Higher Water-works, Bridlington, for the Town Council. Mr. E. R. MATTHEWS, A.M.I.C.E., borough surveyor.

KNEESHAW, Bridlington (*accepted*)	£2,505	17	9

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CARDIFF.

For installation of electric light in the Museum. Mr. ARTHUR ELLIS, city electrical engineer.

Waring & Gillow	£124 12 9
Blackburn, Starling & Co.	110 0 0
Baker & Co.	104 0 0
Saunders & Co.	103 0 0
Perman	95 11 6
Price, Friend & Co.	94 0 0
Beavan & Sons	84 0 0
Matthews & Co.	82 10 0
Arnold & Son	78 15 0
Pullan (*recommended*)	76 0 0

CARSHALTON.

For making-up of Salisbury Road and Bernard Road. Mr. W. WILLIS GALE, surveyor.

	Salisbury Road.	Bernard Road.
Champniss & Co.	£2,109 13 6	£275 2 4
Mowlem & Co.	2,095 0 0	269 0 0
Blaker	2,067 0 8	277 5 3
Swaker	1,990 0 0	316 0 0
Potter & Co.	1,941 15 2	267 17 9
E. & E. Iles	1,937 0 0	248 9 0
Chittenden & Simmons	1,905 2 9	300 5 6
Free & Sons	1,897 3 2	254 15 10
Rayner	1,873 15 10	257 9 1
May	1,742 2 2	258 14 1
POTTER, Sutton (*accepted*)	1,648 0 0	231 0 0

CASTLE CARY (SOMERSET).

For the construction of engine-house and reservoir, &c., for the Water Co. Mr. W. PHELPS, C.E., engineer.

Walters & Son	£3,021 6 4
Pollard & Co.	2,722 15 10
Osenton	2,689 0 0
Wort & Way	2,518 9 0
Rowell & Sons	2,121 13 11
Allen	1,961 18 10
Ambrose	1,897 15 2
Wright & Son	1,847 4 0
Smith & Marchant	1,787 0 0
BIRD & PIPPARD, Yeovil (*accepted*)	1,732 0 0

CHELTENHAM.

For hospital extension, for the Governors of the Cheltenham General Hospital.

Skemp	£3,645 0 0
Channon & Sons	3,385 0 0
Saunders & Son	3,325 0 0
W. T. & R. A. Hunt	3,150 0 0
Billings & Sons	3,077 0 0
COLLINS & GODFREY (*accepted*)	2,994 0 0

DUNHAM MASSEY.

For isolation hospital, Sinderland Road. Mr. WM. OWEN, A.R.I.B.A., Manchester.

Stone & Sons	£8,700 0 0

GOODMAYES.

For the erection of parish hall and boundary wall, All Saints. Mr. K. ALLEN, architect, Tunbridge Wells.

Grover & Son	£2,734 0 0
Hosking	2,631 0 0
Luton	2,629 0 0
Lawrance & Sons	2,557 0 0
Symes	2,550 0 0
Jarvis	2,525 0 0
Miskin & Sons	2,525 0 0
Jarvis & Son	2,468 0 0
Hammond & Son	2,430 0 0
Jerram	2,399 0 0
Dowsing & Davis	2,274 0 0
F. & A. WILLMOTT (*accepted*)	2,162 0 0

HANDSWORTH.

For 3,000 yards of wrought-iron unclimbable fencing, &c., Leveretts Cemetery. Mr. H. RICHARDSON, A.M.I.C.E., surveyor.

Lockerbie & Wilkinson	£4,413 3 6
Bayliss, Jones & Bayliss	1,941 2 0
Miller & Sons	1,715 19 7
Hayward & Sons	1,583 0 0
Hill & Smith	1,509 7 7
ELWELL, Birmingham (*accepted*)	1,500 18 0

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GOLDER'S GREEN.

For Golder's Green Parish Room. Messrs. WILLS & ANDERSON, architects, 24 Bloomsbury Square, W.C.

Reynolds	£2,023 0 0
Tribe & Co.	1,993 0 0
Wilkins & Sons	1,964 0 0
Strange & Sons	1,950 0 0
Bowman & Sons	1,940 0 0
Patman & Fotheringham	1,910 0 0
King	1,894 0 0
McCormack & Son	1,883 0 0
Coles	1,861 0 0
Streatner	1,860 0 0
Allen & Sons	1,859 0 0
King & Son	1,851 0 0
Smith & Sons	1,845 0 0
Chessum	1,844 0 0
Spencer, Santo & Co.	1,842 0 0
Porter	1,836 0 0
Fitt	1,832 0 0
Gibson & Co.	1,804 0 0
Gough & Co.	1,792 0 0
Maddison	1,787 0 0
F. & E. Davy	1,785 0 0
Renshaw	1,783 0 0
Goddard & Sons	1,775 0 0
Appleby & Sons	1,764 0 0
Roberts & Co.	1,763 0 0
Cock & Sons	1,759 0 0
Perry Bros.	1,757 0 0
Fairhead & Son	1,748 0 0
Barker	1,744 0 0
Nightingale	1,742 0 0
Hunt & Sons	1,723 0 0
Henson & Son	1,700 0 0
Bush	1,669 0 0
Percy	1,629 0 0
F. & G. Forster (*conditionally accepted*)	1,625 0 0

HASLEMERE.

For alterations and additions to bank premises. Messrs. HODGSON & SYMMONDS, architects, Guildford and Haslemere.

Smith	£419 0 0
Daughter	376 16 0
Holden	376 0 0
AUSTIN (*accepted*)	320 0 0

HUNGERFORD (BERKS).

For drainage works.

Wort & Way	£10,387 0 0
Ash	10,157 0 0
Macdonald	10,000 0 0
Collier & Catley (*conditionally accepted*)	9,543 0 0

IPSWICH.

For public lavatories, King Street. Mr. E. BUCKHAM, borough surveyor.

Death	£789 0 0
Cubitt & Gott	620 0 0
Kenny	564 0 0
Stearn & Son	545 0 0
Green	540 0 0
Linzall	496 0 0
Parkington & Son	495 0 0

IRCHESTER.

For erecting a Carnegie Free Library. Messrs. SHARMAN & ARCHER, architects, Wellingborough.

Stevens	£994 0 0
Swannell & Turlington	989 10 0
Archer & Sons	985 0 0
Marriott	985 0 0
Bayes	979 0 0
Hacksley Bros.	975 0 0
Goodman & Murkett	967 0 0
Hickman	966 11 0
Henson & Son	950 0 0
BROWN & SON, Wellingborough (*accepted*)	941 5 0
Phillips & Slow	880 0 0
Packwood (*withdrawn*)	850 0 0

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ITCHEN.

For constructing a storm-water sewer in the Bridge and Vicarage Roads. Mr. T. A. COLLINGWOOD, surveyor, Woolston, Hants.

Stevens & Co.	£1,490 0 0
Richards	1,166 4 7
Douglas	1,074 0 0
Osman	1,043 0 0
GROUNDS & NEWTON, Bournemouth (*accepted*)	993 2 9

LEEK (STAFFS).

For erection of an underground convenience at the corner of Brook and Compton Streets. Mr. W. E. BEACHAM, C.E., surveyor, Leek.

Mellowes & Co.	£232 15 2
Grace	215 11 6
SALT, Leek (*accepted*)	204 0 0

LONDON.

For supply of materials and execution of work for the Metropolitan Water Board.

Repairs to cottages, &c., at Molesey and Surbiton.

Bull & Esdaile	£476 5 6
Chapman & Sons	464 7 6
Newson & Hawkins	464 1 4
Johnson	451 5 11
Oldridge & Sons	377 15 0
GAZE & SONS (*accepted*)	359 5 0

Provision of 24-inch steel tube for laying over Stanley Bridge, Fulham.

Mechan & Sons	257 0 0
Piggott & Co.	235 0 0
FRASER & SON (*accepted*)	188 0 0

Provision of 12-inch and 4-inch steel tubes for laying over Acton Station Bridge.

12-inch tube.

STEWARTS & LLOYDS (*accepted*)	78 12 6

4-inch tube.

STEWARTS & LLOYDS (*accepted*)	22 18 6

LONDON—*continued.*

For enclosing ends of covered yard with iron framing and corrugated iron, &c., building shelter for petrol-tank and other works at the Mead Ambulance Station, Fulham, S.W. Mr. W. T. HATCH, engineer-in-chief.

Walker Bros.	£1,184 0 0
Humphreys	717 0 0
A. & F. Polden	681 0 0
Hussey	675 0 0
Roberts & Co.	650 0 0
Windsor & Co.	595 0 0
Gardner & Hazell	549 0 0
Jarman & Co.	538 0 0
Wall	469 8 0
GENERAL IRON FOUNDRY Co., Upper Thames Street (*accepted*)	450 0 0

For supply of granite setts for the London County Council.

Griffiths & Co.	£3,166 13 4
A. & F. Manuelle	3,150 0 0
Fry Bros.	3,100 0 0
Timms (*recommended*)	3,066 13 4

For relaying the sub-floor of the laundry at the Buckingham Palace Road establishment with asphalte, for the Westminster City Council.

Skudder & Co.	£235 9 2
Love & Co.	200 0 0
Sims	183 0 0
French Asphalte Co.	168 15 0
Val de Travers Asphalte Co.	163 13 6
Busby & Co.	159 0 0
Coulthard	110 15 0
Pilkington (*recommended*)	108 0 0

NEWBURY.

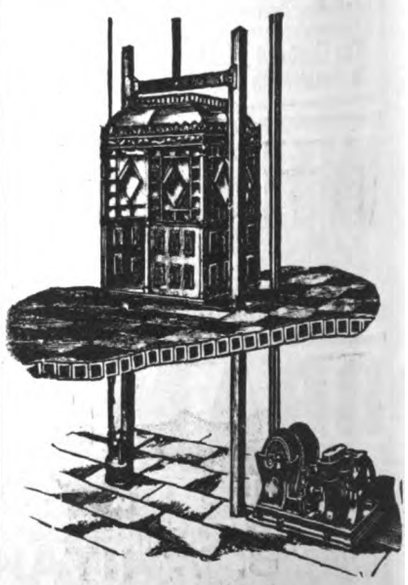
For new purifiers for the gasworks.

Whessoe Foundry	£1,739 0 0
Cutler & Sons	1,708 0 0
Deakes	1,685 0 0
Holmes & Co.	1,685 0 0
Midland Ironworks	1,647 0 0
Ashmore & Co.	1,562 0 0
Rosemount Ironworks	1,490 0 0
Frome Ironworks	1,475 0 0

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PARR.

For the construction of surface and foul water pipe sewers for the drainage of the estate, on the Orrell Estate, Parr, near St. Helens. Messrs. CHASE & BROOM, engineers, Liverpool.

Hutton & Co.	£5,087 0 0
Jowett Bros.	4,322 14 9
Holme & King	4,234 14 2
Williams & Farley	4,105 4 8
Marr & Son	3,947 0 0
Brebner & Co.	3,947 0 0
Heaton & Son	3,829 13 0
Macdonald	3,795 0 0
Meikle	3,499 18 0
EDMONDSON & WYATT, Oldham (*accepted*)	3,294 0 0

PETERBOROUGH.

For erection of the Queen's Drive and West Town proposed schools.

Queen's Drive.

Hicks	£2,856 16 0
Gray	2,826 12 0
Brown	2,753 3 11
Measures	2,752 12 6
Lucas	2,600 0 0
Cracknell	2,594 0 0
Hawkins & Son	2,565 0 0
Guttridge	2,549 0 0
Bridgefoot & Son (*recommended*)	2,415 3 8

West Town.

Cracknell	1,789 0 0
Furnis	1,783 0 0
Hicks	1,774 8 0
Measures	1,750 0 0
Bridgefoot & Son	1,736 8 0
Gray	1,734 7 0
Watson	1,725 0 0
Crane	1,725 0 0
Lucas	1,690 0 0
Brown	1,632 11 5
Guttridge (*recommended*)	1,595 0 0

PORTSMOUTH.

For erection of a branch police-station, &c., at the corner of Eastney Road and Essex Road, Milton.

Durrant	£1,755 0 0
Davis	1,687 0 0
South-Western Joinery Co.	1,651 0 0
Jones	1,618 0 0
Quick	1,600 0 0
Corke	1,586 0 0
Privett	1,530 0 0
Crockerell	1,493 0 0
Tanner	1,490 0 0
Coltherup (*recommended*)	1,470 0 0

RAMMEY MARSH.

For additions and alterations necessary to the pumping station for the installation of the engines, pumping machinery, &c., for the Metropolitan Water Board.

Playfair & Toole	£2,367 0 0
Shurmur & Sons	2,223 0 0
Kirk & Randall	2,053 0 0
FITCH & COX (*accepted*)	1,695 0 0
Lawrence & Son (*informal*)	—

ROCHESTER.

For building offices in High Street, adjoining the Guildhall, for the Medway Conservators. Mr. G. E. BOND, architect, Rochester.

Elmore & Sons	£5,070 0 0
Gates & Son	4,775 0 0
Wallis & Sons	4,674 0 0
Baker	4,639 0 0
Miskin	4,600 0 0
Phillips	4,395 0 0
West Bros.	4,247 0 0
SEAGER, Sittingbourne (*accepted*)	3,999 0 0

SOUTHAMPTON.

For constructing a soil sewer for the sewerage of the Terrace House Estate. Mr. J. A. CROWTHER, borough engineer.

Richards	£671 13 3
Douglas	566 0 0
Osman	562 10 0
STEVENS & Co., Southampton (*accepted*)	559 0 0

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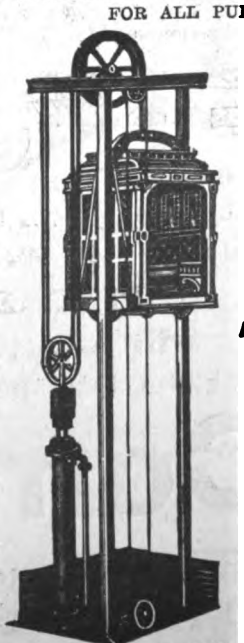
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For private streets. Mr. ELFORD, borough engineer, Southend-on-Sea.

Eastwood Lane.

ILES (*accepted*)	1,655	0	0

Pier Hill.

FRY BROS. (*accepted*)	868	0	0

Ronald Park Avenue.

PARSONS & PARSONS (*accepted*)	455	0	0

Tintern Avenue.

BUXTON (*accepted*)	758	0	0

SOLIHULL.

For new isolation hospital, for the Solihull and Meriden Joint Council. Messrs. W. H. WARD, architects, Paradise Street, Birmingham.

Tilt Bros.	£9,999	0	0
Bloxham	9,742	0	0
Jackson	9,400	0	0
Rowbotham	9,337	0	0
W. & J. Webb	9,309	0	0
Robinson	9,286	0	0
Dorse	9,175	0	0
Webb & Son	9,138	0	0
Horton	9,138	0	0
Smith	8,997	0	0
Swift	8,990	0	0
Bragg Bros.	8,850	0	0
Sapcote & Sons	8,838	0	0
Bishop	8,739	0	0
Hickman	8,729	0	0
Gibbs	8,700	0	0
Pattinson & Sons	8,596	0	0
Dallow & Sons	8,530	0	0
T. & W. Thompson	8,499	0	0
GREGORY, Olton (*accepted*)	8,240	0	0

WALES.

For the provision of a new burial ground at Tran Farm, Tonyrefail, for the Llantrisant Parish Council. Mr. GOMER MORGAN, surveyor, Pontyclun.

Davies & Sons	£3,100	0	0
Evans Bros.	2,728	7	2
Murray	2,689	13	5
Rankin	2,675	5	10
Brown	2,618	12	7
Sutherland	2,516	2	11
Pomeroy & Co.	2,395	12	1
Osmond & Sons	2,291	3	4
Barnes, Chaplin & Co.	2,218	2	2
Morgan	2,213	4	9
John & West	2,160	8	9
COLBORNE, Swindon (*accepted*)	2,032	12	10

For the construction of new stoneware and iron pipe sewers, Dortmund tank, filter-beds and all appurtenant works at Mold, Flintshire, for the Mold Urban District Council.

Underwood & Bros.	£5,270	1	11
Allen	5,252	13	5
Peters	4,295	18	6
Harrison & Co.	4,123	7	0
Merritt	3,653	10	11
P. R. Williams	3,326	9	4
Lester	3,300	0	0
Hutton & Co.	3,257	16	0
Jones	3,205	5	9
R. Williams	3,155	15	9
Graham & Sons	3,142	0	0
Cottle	3,088	18	0
Bower Bros.	2,899	0	0
Cunliffe	2,896	0	0
Harris	2,888	0	0
Hill	2,824	0	0
Buckley	2,590	15	8
Waring & Sons	2,580	0	0
Sykes	2,529	11	4
Firth & Co.	2,421	11	10
BARRY, Nottingham (*accepted*)	2,400	0	0

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THE BRANCH HOTEL, BRIGHTON.

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WALES—*continued.*

For house at King's Head, Capel Hendre. Messrs. J. DAVIES & SON, architects, Llanelly.

Hughes	£583 10 0
Anthony	578 0 0
THOMAS & SON, Pantyffynnon (*accepted*)	458 10 0

For raising and draining part of College Road, Cardiff. Mr. J. HOLDEN, A.M.I.C.E., surveyor, Cardiff.

Lewis-Meredith	£209 0 0
Cox	162 7 6
Evans	147 2 6
T. R. Williams	143 19 0
Rees	139 12 6
Davies	137 3 6
E. Williams	125 0 8
WATKINS, Dinas Powis (*accepted*)	112 19 0

WILLINGTON (BEDS).

For detached cottage. Messrs. UNDERWOOD & KENT, architects.

Haynes	£487 0 0
Wrycroft & Sons	415 0 0
Norman	409 9 0
Nichols	408 0 0
Pryor	369 10 0
MELCOMBE & SON, Bedford (*accepted*)	363 0 0

WOLVERHAMPTON.

For alterations at the late School Board offices, Stafford Street. Mr. T. H. FLEMING, architect, Wolverhampton.

HERBERT, Wolverhampton (*accepted*)	£528 0 0

WOOLWICH.

For the erection of a police station. Mr. J. DIXON BUTLER, F.R.I.B.A., New Scotland Yard, S.W. Quantities by Messrs. THURGOOD, SON & CHIDGEY, 8 Adelphi Terrace, W.C.

Ansell	£13,944 0 0
Graham & Co.	12,540 0 0
Blay	12,060 0 0
Minter	11,992 0 0
Gunning & Sons	11,933 10 0
Higgs & Hill	11,844 0 0
Appleby & Sons	11,727 0 0
Thomas & Edge	11,717 0 0
Holland & Hannen	11,666 0 0
Holloway Bros. (London)	11,652 0 0
F. & H. F. Higgs	11,555 0 0
Mowlem & Co.	11,547 0 0
Kent	11,470 0 0
Grover & Son	11,363 0 0

YIEWSLEY.

For new Council school for the Middlesex County Council. Mr. H. G. CROTHALL, architect to the Middlesex education committee.

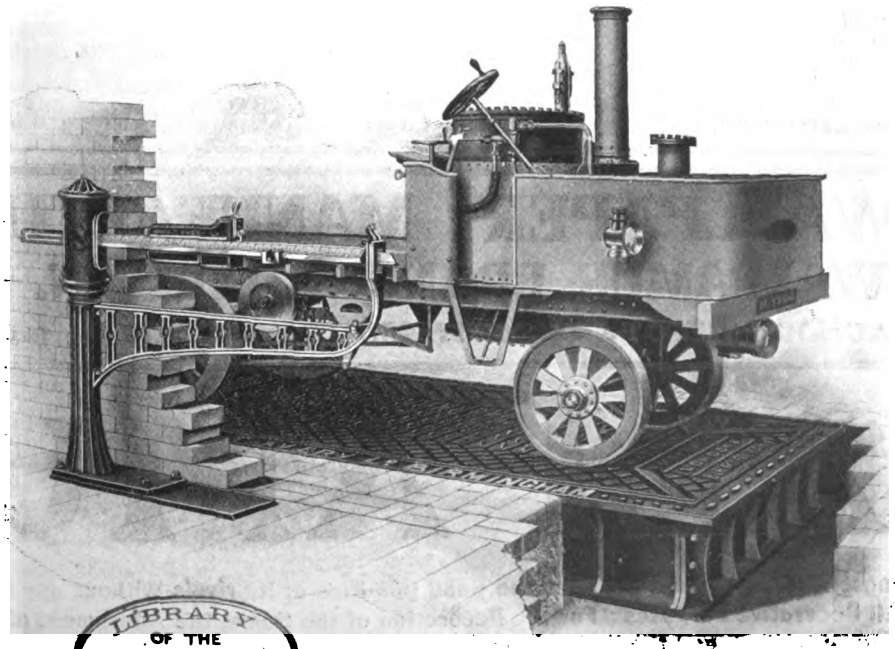
Lawrance & Son	£5,648 0 0
Renshaw	5,491 0 0
Tribe & Co.	5,353 0 0
Lawrence & Son	5,280 0 0
Stewart	5,236 0 0
Minter	5,215 0 0
Knight & Son	5,200 0 0
A. & B. Hanson	5,185 13 4
Fassnidge & Son	5,109 0 0
Dorey & Co.	5,100 0 0
Hawkins & Co.	5,058 0 0
Kearley	4,986 0 0
Lacey	4,975 0 0
Dickens (*recommended*)	4,928 0 0

A SITE, at a cost of 5,000*l.*, for a new secondary school has been secured at Woking. It is proposed to erect a secondary school for boys, with a technical institute.

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WOOLSTON (HANTS).

For road-making and drainage works for the development in Roselands Building Estate. Mr. W. B. HILL, surveyor, Southampton.

Grounds & Newton	£550	0	0
Richards	467	0	0
Jupe	455	0	0
Trueman	444	0	0
Watson	415	0	0
Osman	396	0	0
Douglas	374	0	0
BUTT, Southampton (*accepted*)	369	3	4

TRADE NOTES.

THE directors of the London and Lancashire Fire Insurance Company have, in consequence of their enlarged business arrangements, decided to make their Cardiff office a separate branch, working direct to head office. Mr. A. D. Goodwin will continue to have charge, with the title of "local manager."

MR. E. J. MCDONALD has been appointed branch manager of the Law Accident Insurance Society in Hull, in succession to Mr. Nicholson, who has resigned the position.

THE Wrexham Town Council have instructed the borough surveyor to prepare a new scheme for municipal slaughter-houses.

THE tender of Messrs. Jackaman & Sons, Slough, amounting to 6,500*l.*, for the construction in reinforced concrete of Section No. 3 of the Eastern Wharf, has been accepted by the works committee of Dundee Harbour Trust. Operations will be carried out on the Hennebique system.

MR. W. P. R. WILLOUGHBY, M.I.C.E., engineer to the Pontypridd District Council, and architect to the Pontypridd education committee, has received the appointment of Director of Public Works to the Government of Jamaica, at a salary commencing at 1,000*l.* per annum.

VARIETIES.

FIRE-RESISTING construction was required for only 39 per cent. of the building permits issued in 1907 by forty-nine leading American cities, the remaining permits being for wood structures.

THE West Riding education committee have adopted grants in respect of the erection and equipment of secondary schools as follows:—Doncaster secondary school, 17,556*l.* (including 4,356*l.* for site); Normanton secondary school, 8,250*l.*; and Penistone grammar school, 7,708*l.*

THE annual exhibition of the work of members of the Architectural Association of Ireland is now open at 15 South Frederick Lane, Dublin. There are about seventy-five exhibits, and these include water-colour and oil paintings, photographs and sketches in black and white.

THE house committee of Darnley Hospital recommend the joint hospital committee to construct the new smallpox hospital of brick and rough-cast, similar to the existing pavilions at Darnley, but with lighter walls, at an estimated cost, exclusive of sanitary appliances, heating, and furnishing, of 1,303*l.*

MESSRS. C. BRIGHTMAN & SONS, of Watford, have secured the contract for the erection of the new station at Watford in connection with the Watford and Euston Electric Railway. The work will be commenced at once, so as to be completed by January 1910.

THE estimated expenditure for which it is proposed to seek powers in the Oldham Corporation Parliamentary Bill is 568,350*l.*, made up of the following items:—Waterworks, 130,000*l.*; tramways, 22,150*l.*; motor-omnibuses and motor-cars, 16,200*l.*; street improvements, 200,000*l.*; and gas-works, 200,000*l.*

DUMBARTON public library committee have accepted estimates for the new Carnegie assisted library to be erected in Strathleven Place, where a fine site was procured from the Town Council. The total cost of the building, without equipment, will be 3,971*l.* 18*s.* 2*d.*, and all the tradesmen are local.

MR. JOHN GREENWOOD, of Overstrand, Mansfield, Notts, retired builder and contractor, who left estate valued at

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31,430*l.*, gave six houses in Chaucer Street, Mansfield, for use as almshouses for the benefit of deserving aged or infirm persons in the town connected with the building trade.

AN adjourned meeting of the Council of the Northumberland Miners' Association was held recently, Mr. Joseph English presiding. It was decided that the resolution adopted last year with the object of preventing hewers from doing stone work should not be generally applicable. Hewers may be employed to remove stone in places where a greater height is required, and also in drifts and bargains.

THE Chester Race Company have informed the improvement committee that on a fourteen years' extension of the present lease they are prepared to carry out a reconstruction of the Dee stands, Roodee keeper's lodge, new private dining-room, store-room, &c., on the plan submitted to the committee, and arrange all the financial obligations in connection with the scheme.

PROSPECTS in the Transvaal have slightly improved, but much depression still exists, and there is no opening for more labour. An agreement has just been entered into between the Master Builders' Association and the various trade unions connected with building, fixing for two years the rates of wages, conditions of labour and the method of settling disputes.

THE contract for alterations and additions to the Central Post Office at Dudley has been given to Messrs. John Barnsley & Son, Birmingham, and the work will be commenced forthwith. The Dudley Town Council have agreed to contribute 400*l.* towards the cost of the undertaking, which is estimated at about 6,000*l.* The building is to be heightened by the addition of a storey and extended to Priory Street.

SIR ACHESON M'CULLOUGH, medical inspector, and Mr. P. C. Cowan, chief engineering inspector of the Local Government Board, have concluded the inquiry directed to be held by the Local Government Board into the application by the Belfast Corporation for a loan of 112,300*l.*, for the purpose of carrying out a scheme of better purification of the sewage of the city, and completing the Sydenham and Knock drainage scheme. Mr. R. I. Caldwell was the last witness.

THE Local Government Board has sanctioned an expenditure of over 11,000*l.* for the improvement of the Bridlington water scheme and waterworks. The committee have considered nine tenders for the necessary building work in connection with it. The tender of Mr. F. Kneeshaw, Bridlington, 2,505*l.* 17*s.* 9*d.*, is recommended for acceptance. The surveyor's estimate was 2,656*l.*, and the highest tender is 2,994*l.*

PLANS have been passed by the Great Western Railway Company for extensions at Exeter, which will practically involve the rebuilding of St. David's Station. The roof is to be removed and replaced by verandahs, and the station widened for additional up and down through lines. The two central platforms, 800 feet long, are to be widened, and new waiting and refreshment rooms are to be built on the island platform. The work will commence next month. Over 200 trains pass through the station every day.

THE Marylebone Borough Council at its last meeting discussed at great length a proposal of the electric supply committee that the main streets of the borough be lighted by electricity instead of incandescent gas as at present, and that application be made to the London County Council for a loan of 10,000*l.* to defray the cost of the alteration. Strong opposition was raised to the proposal, and further discussion on the subject was adjourned until the next meeting of the Council.

AT the Penistone district education committee meeting Mr. Stewart, from the West Riding architect's office, attended, and stated that the county education authority had decided to erect a school for Silkstone township at Conn Lane. They requested the committee to determine whether the school should be of corrugated iron or of stone and brick. The committee decided by six votes to four in favour of the county committee's proposals, and recommended that the school should be built of stone and brick.

THE Edinburgh Corporation and the Exhibition Executive have arrived at a settlement in connection with the restoration of the ground at Saughton. The Corporation are to be entrusted with the work of restoration on the payment of a lump sum by the executive. The sum agreed upon is 4,000*l.*, and in addition a sum of 400*l.* is to be allowed for a band-stand, the city retaining in addition the conservatory or



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winter garden. All the erections on the ground at present will be removed by the exhibition authorities, and after this is done the work of restoration will be begun.

MR. ALLAN STEVENSON, district surveyor, has submitted to the sub-committee on the Loch Braden water scheme a detailed report as to the distribution of the 500,000 gallons of water to be supplied from the Loch Braden scheme to eighteen small towns and villages, as well as mansions and farms in the district. Assuming that Auchinleck and Ochiltree were included, the daily quantity required for towns and villages would be 385,180 gallons. The total cost for piping, including Auchinleck and Ochiltree, was estimated to be 17,229*l.* 18*s.*, and excluding Auchinleck and Ochiltree 12,172*l.*

THE Westminster City Council a year or two ago discussed the advisability of trying Sir Oliver Lodge's system of dissipating fog by means of electricity, but did not carry out the experiment, as they did not feel justified in expending the ratepayers' money. The Council has received a letter from Mr. E. L. Walford, of 47 Hamilton Terrace, N.W., stating that he proposes to get a small syndicate to subscribe money to try the experiment on a practical scale, and asks whether, if he is successful in obtaining the required sum, the Council will allow him to try the experiment in Westminster upon land the property of the Council.

NEGOTIATIONS are proceeding between the Stretford Urban Council, Lancs., and the trustees of the late Mrs. Rylands's estate for the purchase by the former of the town hall and baths at Stretford. The building was erected over twenty years ago by the late Mr. John Rylands and given over to the Urban Council on lease at a rent of 5*s.* a year. It had been hoped that the premises would be left unconditionally to the township on Mrs. Rylands's death, but as no mention was made in her will to this effect the trustees have found it incumbent on them to realise on the building. The sum required for it is understood to be between 8,000*l.* and 9,000*l.*, but this is regarded by the Council as excessive, and an offer has been submitted for a smaller amount.

PRELIMINARY work in connection with the new range of offices in the North Yard, Devonport, has commenced. The old entrance to the interior of the tower which abuts on the structure about to be demolished is being built up, and a new entrance made, which will give access to the stairway leading to the residences, &c., adjacent to the R.N.E. College. The new offices, which are estimated to cost over 20,000*l.*, will provide accommodation for the Admiral-Superintendent and the heads of departments and their staffs. The offices will occupy a commanding and central position, in close proximity to the train terminus, and directly in line with the principal landing place at the North Yard.

THE Corporation of Southampton having applied to the Local Government Board for sanction to borrow money for the purchase of a motor-car for the use of the borough engineer (Mr. J. A. Crowther), an inquiry was held by Mr. F. H. Tulloch last week. At the outset the town clerk intimated that the application for sanction to purchase a motor-car would not be proceeded with, as the firm who were to have supplied the car declined to allow it to remain on trial for a week, and without this understanding the Council refused to complete the bargain.

THE proposed erection of a house refuse destructor at Dorking, for which a loan of 3,225*l.* is necessary, was the subject of a long Local Government Board inquiry last week. Counsel appeared both for and against the proposal, the Dorking Water Company objecting to the site, which adjoins their reservoir, and a large number of ratepayers objecting on the ground of no present necessity .The Rural Council protested against the refuse from the urban district being dumped down in their district.

THE construction of the upper and lower Brush Quays for the Yarmouth Port and Haven Commissioners is to be carried out by contract. At the last meeting the chairman of the executive committee said the committee were of opinion that it would be advisable to put the work in the hands of contractors, in order that it might be done quicker. Their own employés could do the work, but it would take them five years, whereas if they placed the matter in the hands of contractors they would get it done in two years. It would mean a probable expenditure of about 28,000*l.*

AT the South-Western Police Court the County of London Electric Light Company were summoned, at the instance of the Wandsworth Borough Council, last week for contravening a prohibition order which required them to abate a nuisance arising from the issue of black smoke from their

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chimney-shaft at Wandsworth. The company, it was said, had spent 2,000*l.* in securing the best possible appliances, but the issue of smoke occasionally was unavoidable. In this instance the issue only continued for five or six minutes. Mr. W. W. Young, supporting the summons, said the maximum penalty was 40*s.* a day. A penalty of 20*s.* was imposed.

AT Dartmouth Police Court last week Mr. Thos. W. Joyce, borough surveyor, was summoned for obstructing the highway. The obstruction was caused at South Town in consequence of an auction sale on the highway of firewood removed from three old houses which were then in course of demolition for the purpose of street widening. The Surveyor contended that the summons ought to have been served on the local authority, and not upon himself. The Chairman said the Bench found that the surveyor had committed a technical offence, and the majority of the Bench had decided to impose a nominal fine of 1*s.* and costs. The Bench were of opinion, further, that the Corporation had acted in good faith. The total amount of the fine was 12*s.*

A NEW china clay kiln has just been opened at Charlestown, St. Austell. The kiln is 380 feet long and 18 feet wide, and has a shed capacity for 10,000 tons. There are six large tanks adjoining the kiln, which when filled contains about 8,000 tons in its nica or raw state. The stack, which has been built of Pentewan concrete blocks, is 120 feet high. The fires were first lit on Saturday at noon. The clay will be conveyed in its liquid state to the new kiln through a deep granite adit from Carclaze, one of the oldest pits in the county. In the completion of the work it is estimated that 12,000 tons of stone have been used, 3,000 tons of sand, and over 300 tons of cement.

MR. HENRY CHAPMAN, M.I.C.E., M.I.M.E., civil engineer, chairman of the General Hydraulic Power Company, Ltd., deputy-chairman of the Employers' Liability Assurance Company, Ltd., an officer of the Legion of Honour, who died on October 8, aged seventy-three years, left estate valued 187,464*l.* 11*s.* gross, with net personalty 185,606*l.* 9*s.* 5*d.* He bequeathed to his Paris manager, Henri Vaslin, if still in his service, 1,000*l.*, and the goodwill of his business at 10 Rue Lafitte, Paris, and 91 Boulevard du Nord, Brussels, stock, plant, and furniture, but not the benefit of existing contracts and book debts. To his London manager, Arthur Henry Hernu, if still in his service, he left 1,000*l.*, and his London engineering business at 69 Victoria Street, S.W., with stock, plant, and furniture, but not the benefit of existing contracts and book debts.

THE Nottingham Corporation have approved plans for the erection of a Wesleyan Institute adjoining the Albert Hall, which is in course of construction. The building will have four storeys and a mezzanine floor. On the ground floor there is to be a gymnasium about 47 feet square, a large reading-room, a billiard-room for three tables, a coffee lounge, a kitchen and offices. The whole of the accommodation here is to be utilised for the social side of the life of the men and boys. On the first floor there is to be a hall capable of seating 500, a crush hall and office rooms. On the second a large parlour, practically 40 feet square, and five other rooms of varying sizes for club purposes. There are to be four rooms of different sizes on the mezzanine floor and eight on the third floor. The cost is estimated at 32,000*l.* Mr. A. S. Lambert, of Nottingham, is the architect.

THE London County Council on November 26, 1907, authorised the employment until March 31, 1909, of clerks of works in the architect's department, to supervise the erection of working-class dwellings and other work on housing estates. The expenditure sanctioned was limited to a sum not exceeding 24*l.* a week, but it is estimated that the amount required for similar services during the ensuing financial year will not exceed 16*l.* a week. The establishment committee recommend that, subject to the passing of the estimates for the unestablished staff of the architect's department for the financial year 1909-10, weekly expenditure not exceeding the undermentioned amounts for the employment of assistants on the unestablished staff in the several sections of the architect's department for the year commencing April 1, 1909, be sanctioned:—Building Act section, 46*l.*; means of escape section, 11*l.*; improvements section, 25*l.*; establishment and fire brigade section, 50*l.*; housing section, 50*l.*; general section, 50*l.*; highways section, 30*l.*; measuring surveyor's section, 55*l.*

A TEST case of great interest to owners of property in Glasgow is engaging the attention of the Dean of Guild

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Court. It was brought at the instance of the Master of Works, Mr. Thomas Nisbet, against Messrs. Aikman & Thomson, in respect of property in Henderson Street, the windows of which, Mr. Nisbet complained, are not so constructed as to be capable of being cleaned from the inside of the apartments. The case was debated before the Dean of Guild, Mr. M. Pearce Campbell. At the debate the Dean of Guild stated that he would visit the property and inspect the windows. This visit took place, and in presence of the Dean and other officials there was an experimental cleaning of the windows from the inside. The case was again on the roll of the Court on December 24, when it was intimated on behalf of the Fiscal that he did not desire to add anything to his previous argument. Accordingly the matter was left to the consideration of the Court, parties being asked to lodge a joint minute setting forth the dimensions of the windows. The decision is expected shortly.

THE Staffordshire education committee have adopted the works sub-committee's recommended acceptance of the tender of Messrs. G. Cave & Son, of Wolverhampton, of 8,786*l.*, for the erection of a Council school at Albion Street, Willenhall, to accommodate 1,090 children. The following other estimates were also accepted:—Messrs. W. H. Manley & Co., of Penn Road, Wolverhampton, installation of low-pressure hot-water heating apparatus, 543*l.*; Messrs. Lea, Son & Co., Ltd., Shrewsbury, electric lighting throughout, 224*l.* 4*s.*; Midland Electric Corporation for Power Distribution, Ltd., of Birmingham, providing and laying electric service cables, 19*l.* 0*s.* 5*d.* The County Council were recommended to provide 11,000*l.* for the proposed school. The tender of Mr. F. J. Tooby, of Wolverhampton, for 3,673*l.*, for the erection of Bushbury Lane proposed Council school, and that of Messrs. Manley & Co. for installation of heating apparatus, for 192*l.*, were accepted. The County Council were recommended to provide 4,700*l.* It was resolved to purchase 5,536 square yards of land, at 1*s.* 6*d.* per square yard, from Mr. M. Farmer, as a site for Essington new Council school, and two freehold cottages in Tenterbanks, Stafford, from Mr. E. Price, of Walton, near Stafford, for 250*l.*, for the purpose of providing additional site for the proposed Council school in Tenterbanks. Amended sketch plans for Darlaston proposed handicraft centre were submitted by the architect and approved.

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No. 1 Tudor Street has for ten years been occupied by Benson's, one of the leading advertisement agencies in London. The firm have now moved into more prominent quarters at Kingsway Hall, W.C., on the great Holborn to Strand thoroughfare, where the upper floors have been constructed to their special needs. Perhaps another indication of improvement is in their new designation as "Professional Advertisers." S. H. Benson, Ltd., have in the past achieved numerous triumphs, the benefits of which are enjoyed by their clients; these must number many thousands, for some of the largest companies have entrusted the advertisement of their commodities to this firm. It might perhaps be hinted by some that they have done their work too well, inasmuch as it is difficult to escape the outdoor advertisements of certain soups, soaps, mustard, meat extracts, &c. Kingsway Hall can be located from either the Strand or Holborn by a lofty dome surmounted by a time ball. The entrance is immediately under the dome. The offices are reached by a private lift, and will in a few weeks shelter all the departments of Messrs. Benson, which should be able to do still better work in their new premises.

THE Coventry City Council on Tuesday considered a report of the general works committee on schemes for municipal buildings, including a town hall, &c., on the cleared site in Earl Street. The city engineer (Mr. Swindlehurst) had prepared sketch plans showing how the land could be utilised—the offices to face the front of the street and going down St. Mary's Street, with a town hall located at the western end of the street and Hay Lane. The matter was eventually adjourned for a month.

THE Edinburgh Dean of Guild Court have granted a warrant to the United Free Church General Trustees for the erection of a building for their offices at 119 and 121 George Street, Edinburgh. The building, which is of four storeys, includes a basement with store cellar and strong room, while shops will occupy the street level. On the first floor will be the Presbytery hall, committee room and clerk's offices; and the second floor will include luncheon and smoke rooms.

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ABERDEEN WATER SUPPLY.

DR. MATTHEW HAY, medical officer of health for Aberdeen city, referring to the city water supply in his annual report to the Town Council, quotes from a report which Professor Hamilton and he prepared for the water committee, in which they stated:—"We may remind the committee (water committee) that, at their request, we made an examination, in the autumn of 1906, of some of the sources of domestic pollution of the river Dee. We have also seen the report prepared by the burgh surveyor on the subject, with the accompanying map, showing numerous points of pollution—actual or possible—of the river from the Invercannie intake upwards, and we are satisfied that it is not practicable effectually to guard against dangerous pollution at all these points and at all times. In view, therefore, of the results of our examination of the water supply, and of our knowledge of the impracticability of adequately protecting the river against domestic pollution, we have no hesitation in expressing the opinion that the water supply of the city in its present condition is dangerous, and that steps should be taken either to filter the water or to obtain a supply from a source not open to domestic pollution. Filtration of the present supply is, in any case, advisable in order to remove the turbidity which is so frequently observed after wet weather."

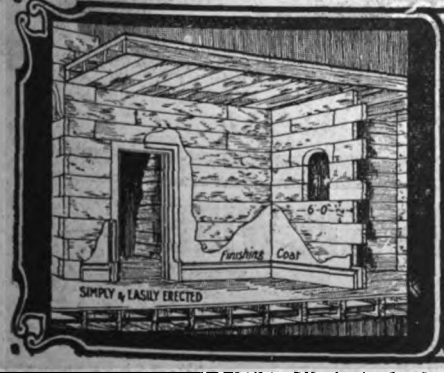
Continuing, Dr. Hay says:—This report serves to confirm the opinion I have frequently expressed in my annual public health reports regarding the unsatisfactory, and even dangerous, character of the present water supply so long as it remains unfiltered. The towns are quite exceptional in which a similar supply is drawn without filtration from a river open to the same kind and extent of pollution as the Dee. It may not be held to fall within the province of the medical officer of health to express an opinion upon the recent proposals for the provision of a purer and more ample water supply for the city, especially when these proposals have assumed a somewhat controversial character; but, having recently visited, along with the Town Council, the source of a proposed new supply in the river Avon, and knowing something of the nature of its gathering ground and of the character of the water, I cannot refrain from expressing the opinion that the city would be highly fortunate if it were found practicable to obtain a new supply from such a source. The water is obviously one of great natural purity, and so placed as to be beyond the possibility of dangerous contamination, and the best of all waters is one—like this of the Avon—of such natural purity as not to require filtration. Such a water is more wholesome and safer hygienically than a contaminated water purified by filtration.

PANAMA CANAL CONTRACTS.

THE news that the Lunkenheimer Company, of Cincinnati, Ohio, U.S.A., have just received an order for some 7,000 valves, in sizes ranging from ¼ inch to 3 inches, in connection with the work on the Panama Canal, reminds us of some of the enormous contracts given out in America when this work was first undertaken by that country. The days of the French régime were looked upon as times of extravagance as regards supplies, but it appears that in more recent times others have not been altogether free from fault in this respect. For instance, when Chief-Engineer Stevens took up his appointment he found 3,000 cases of stores at the Isthmus without names or destination, and his first efforts were directed towards sorting and allocating these supplies. From eight to sixteen per cent. of the men employed were at one time engaged in receiving and handling the stores. Up to 1906, some 262,420 pairs of butt and strap hinges had been ordered and supplied to the Canal works; also 70,992 files, in equal numbers of all sizes, from 4 inches to 14 inches; 530 tons of lead were supplied for one year's painting, which entailed the employment of one painter for every fifty men at work in the Isthmus. No less than 100 rail-saw machines were ordered in April, 1905, the size of this order being largely accounted for by the necessity of constantly relaying the working tracks. Another order of some size was one made up of several for bolts, screws, &c., altogether amounting to about 4½ million bolts, from which it would appear that the American steam-shovels and other plant in use at the Isthmus shed bolts and nuts about as freely as balsam distributes its ripe seeds on a hot day. In the above it may be noted that at the time the contracts for hinges were given out there were only some 1,222 buildings under the control of the Canal authorities, though this number has now been

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doubled. Even so, however, the figures suggest something more than lavish provision, taking into account hinged mosquito screens in addition to doors and windows, &c. Of files it is quite unusual to order equal numbers for all sizes, some sizes, as a rule, being much more in demand than others. Then, again, we hear of thousands upon thousands of hand-saws, and of every other item all through hardware or ironmongery catalogues. In his book "Retrieval at Panama," Mr. Lindon W. Bates takes up this question and shows that on official statements the consumption of stores at Panama has been enormous. It was once officially stated that a stock of stores valued at $1,200,000 was equivalent to no more than a thirty-five days' supply. Mr. Bates figured it out that at this rate materials and supplies alone from 1907 to the completion of the Canal project would cost the United States over $115,000,000, not to mention the amount already then spent.—*Engineering.*

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THE Great Northern, Great Central and Great Eastern Companies announce that on and from January 1 the undermentioned duplicate booking and receiving offices in London will be closed, and the business transferred to adjacent offices as under:—

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G.E. Office, 353 Upper Street, Islington, transferred to G.C. Office, 341 Upper Street.

G.C. Office, 105 and 107 High Street, Borough, transferred to G.N. Office, "George Inn," and 75 High Street, Borough.

G.E. Office, Magnus House, Monument Square, transferred to G.C. Office, Dalmeny House, Monument Square.

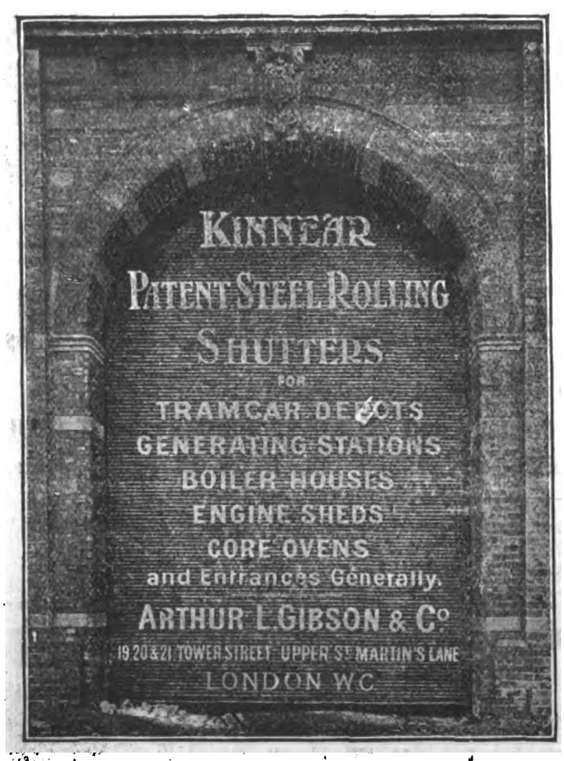
G.E. Office, 120 Brompton Road, transferred to G.N. Office, 126 Brompton Road.

Also on and from January 1 the present Great Northern and Great Central joint booking and receiving offices, and the majority of the Great Northern, Great Central, and Great Eastern booking and receiving offices in London now separately owned will come under the management of the three companies, and these offices will, with one or two exceptions which will be notified, all deal with matters connected with the issue of passenger tickets, the collection and forwarding of goods and parcels traffic on behalf of the Great Northern, Great Central and Great Eastern Companies.

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THE new scheme for the building of a pier and casino at Brighton is to be strenuously opposed. The committee, consisting of persons with interests on the sea-front and in the town, which so strenuously opposed the late scheme for a summer and winter palace, decided at a meeting at the Royal Pavilion recently, to oppose the new proposal. The resolution also suggested the desirability of considering the propriety of forming a permanent association which might be prepared to take the initiative in opposing any future attempt to interfere with the rights of the public in the foreshore.

THE East Anglian Cement Company, whose offices are at Cambridge, have leased twenty-seven acres of land between Rushall and Aldridge, and in close proximity to the borough, with a view to the establishment of new works. Plans for the latter have been submitted to the Walsall Rural District Council, and experimental operations have already been commenced by a staff of workmen. The proposed works will be in close proximity to some extensive limestone workings. The whole district is noted for its limestone, and it is believed that a seam can be worked which will provide a valuable material for cement making.



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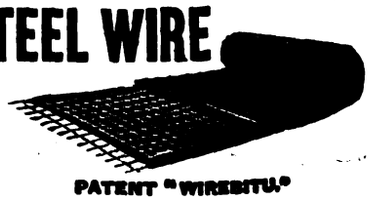
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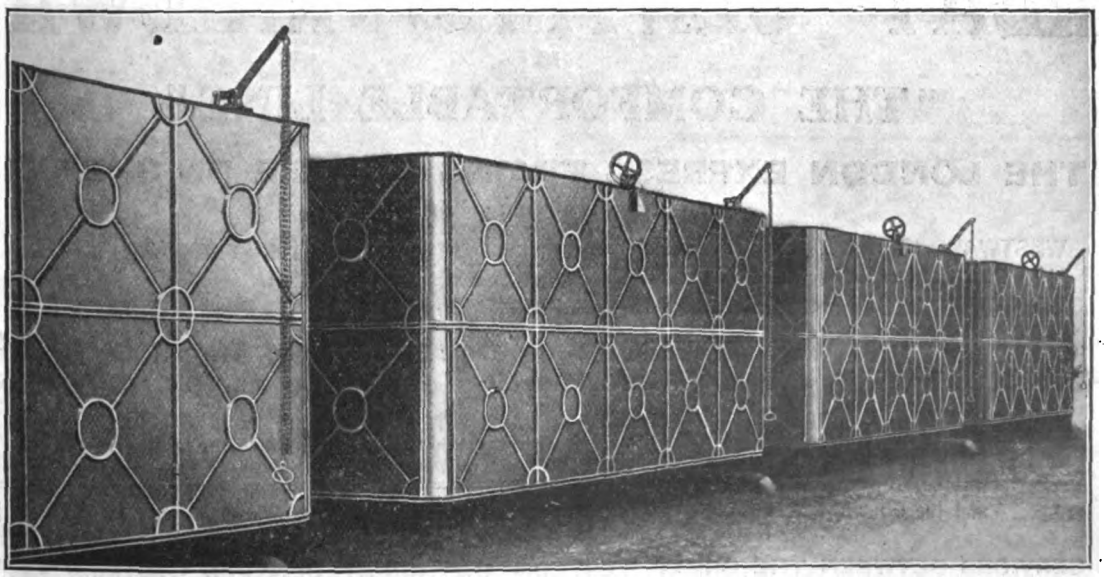
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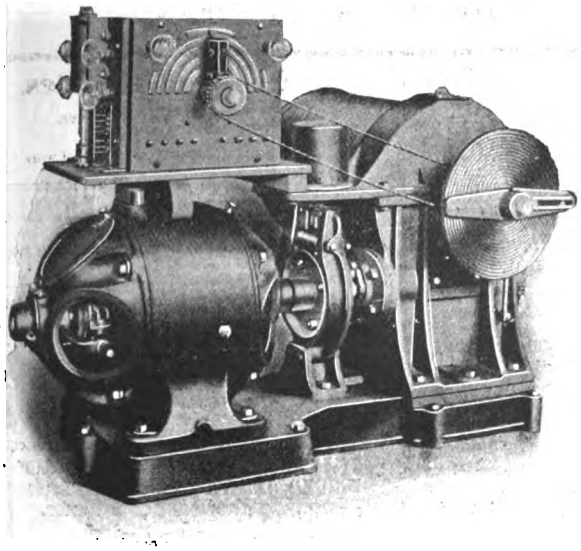
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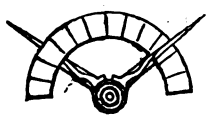
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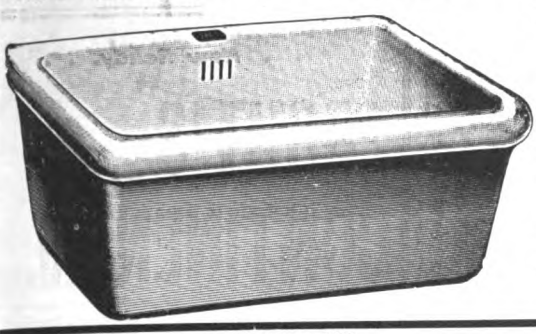
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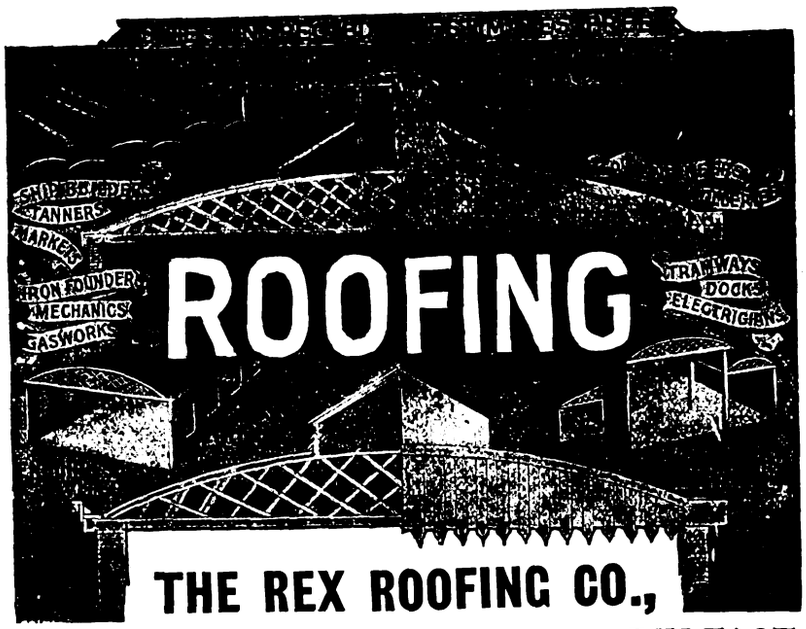
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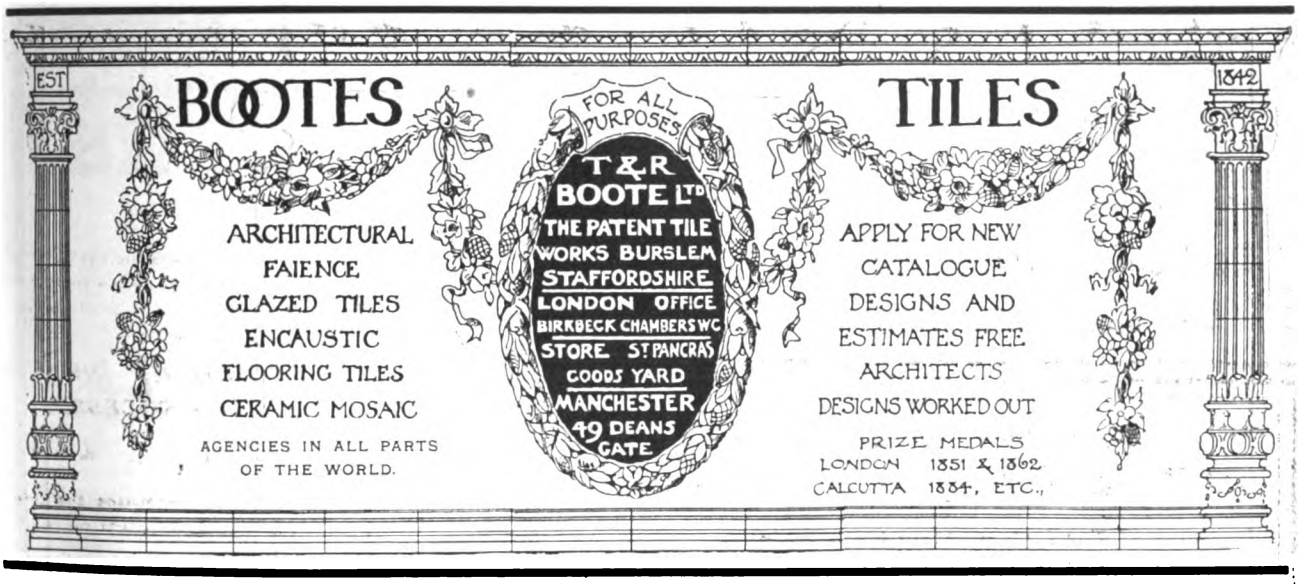
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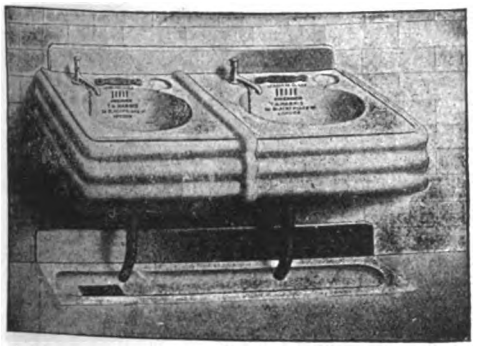
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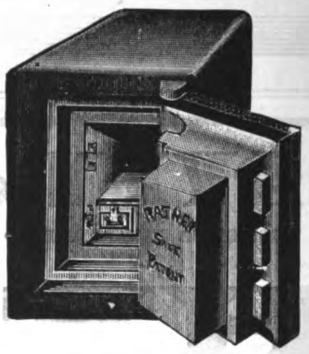
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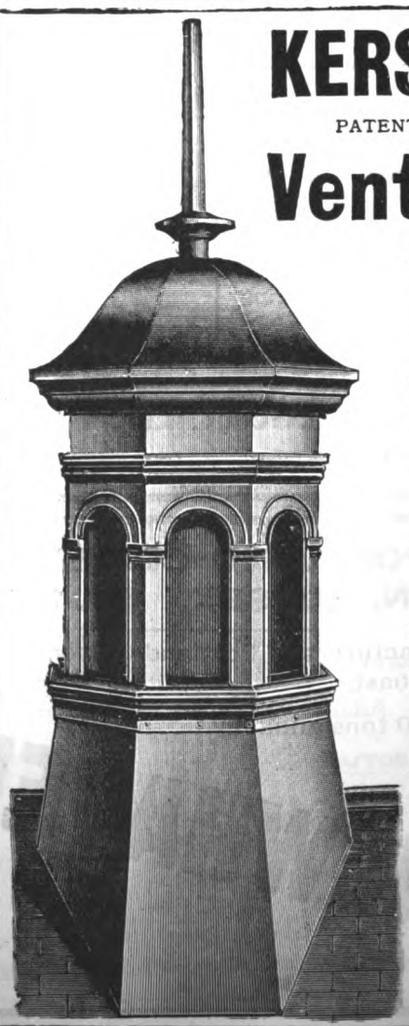
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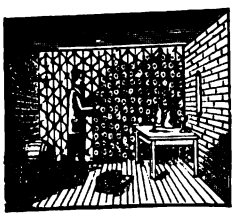
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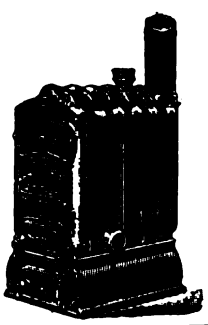
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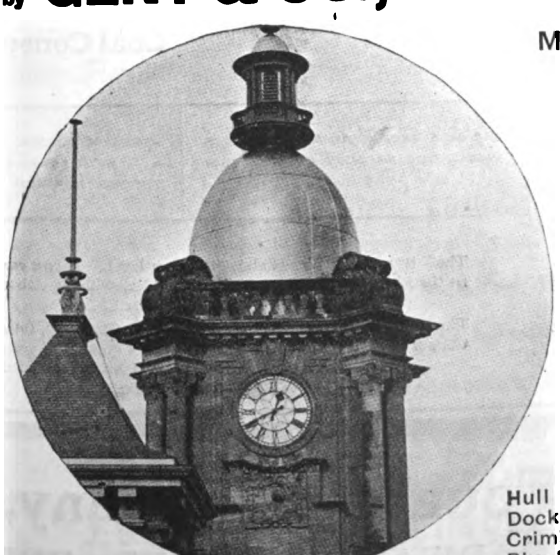
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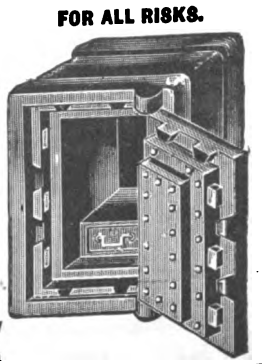
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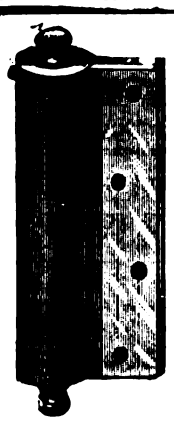
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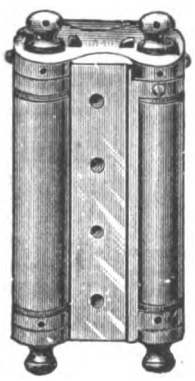
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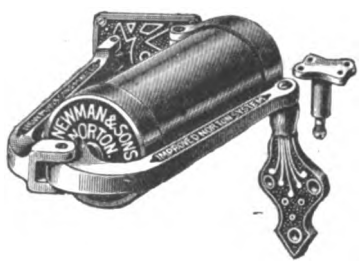
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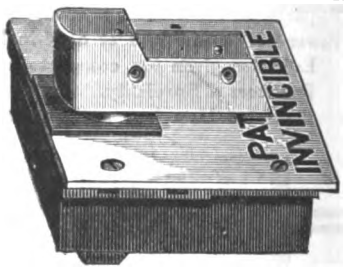


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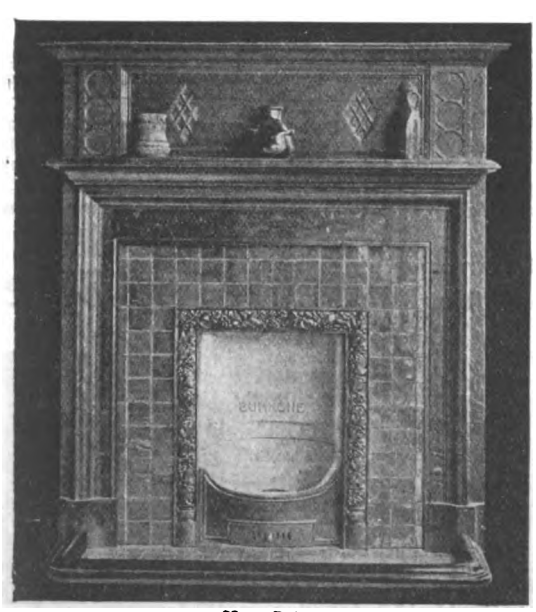
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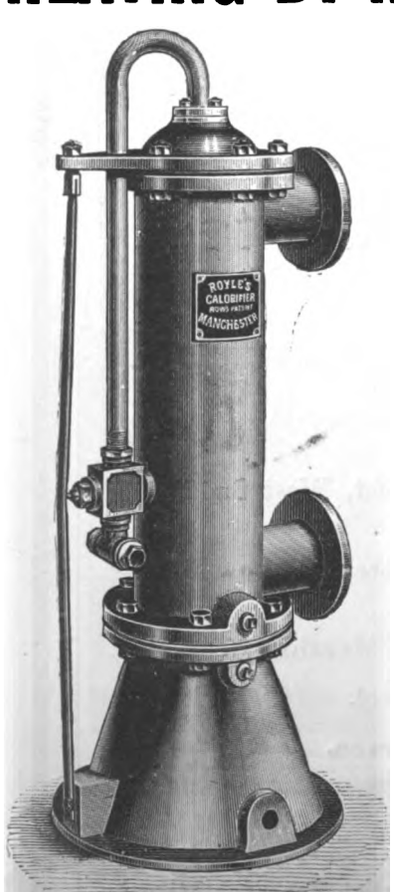
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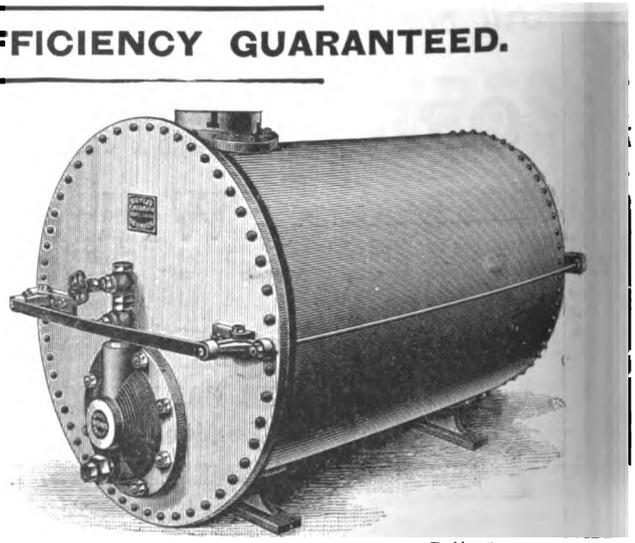
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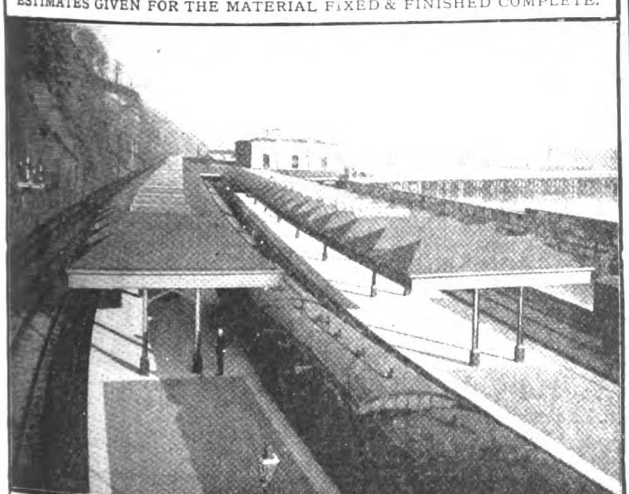
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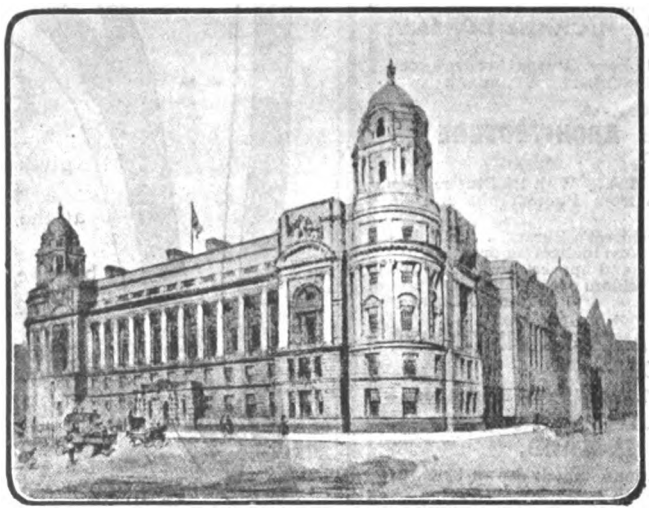
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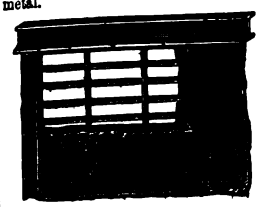
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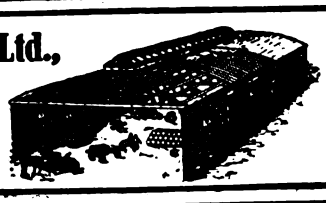


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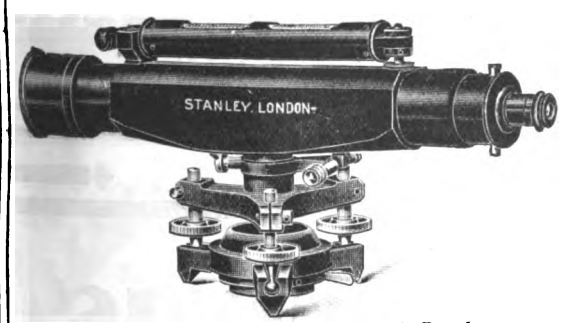
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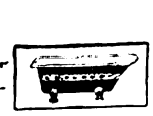
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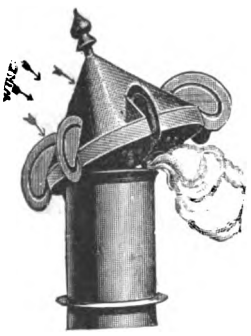
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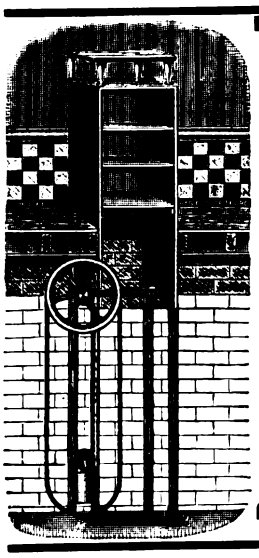
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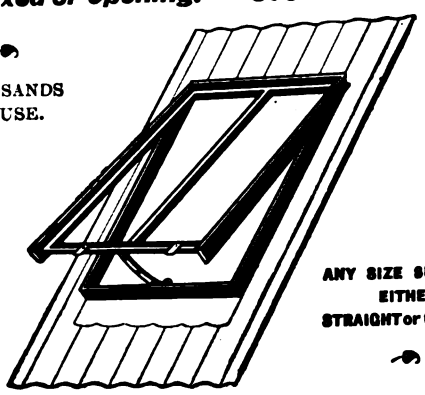
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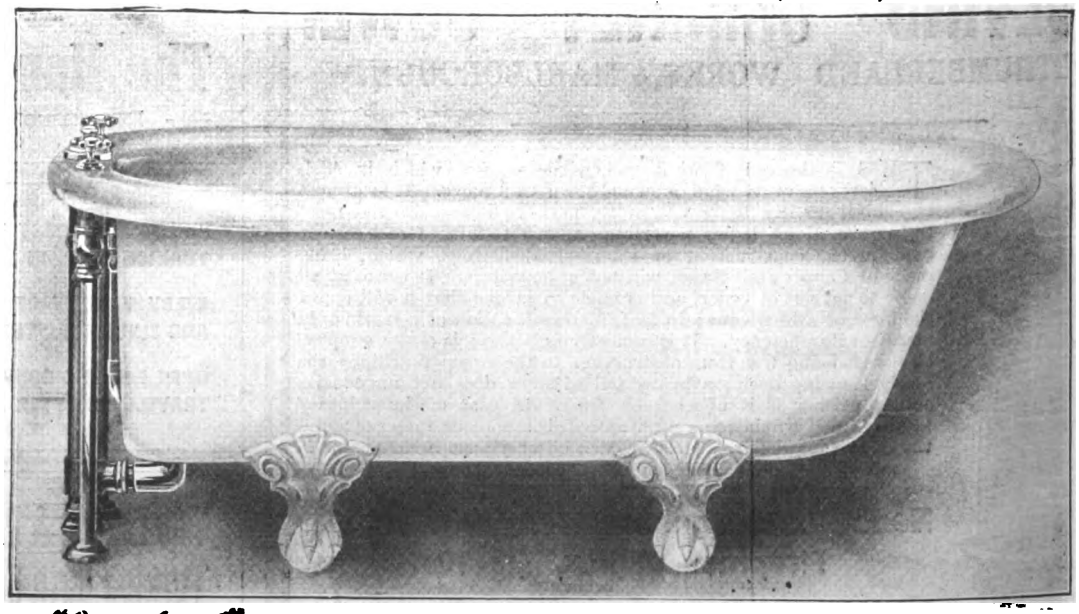


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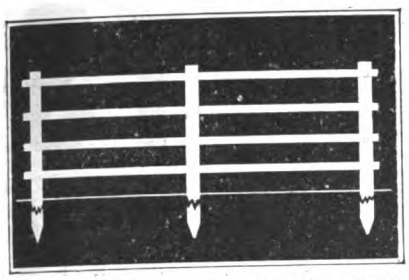
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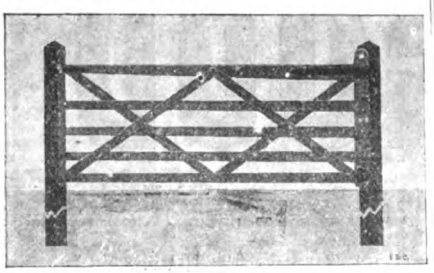
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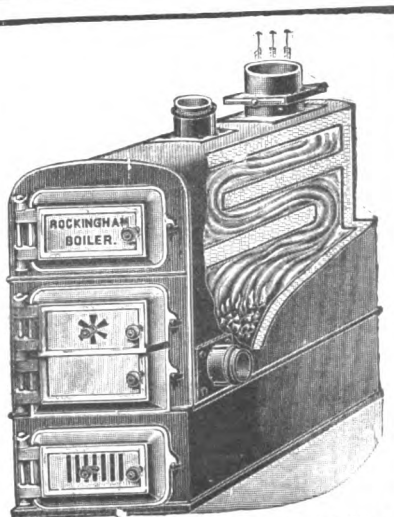
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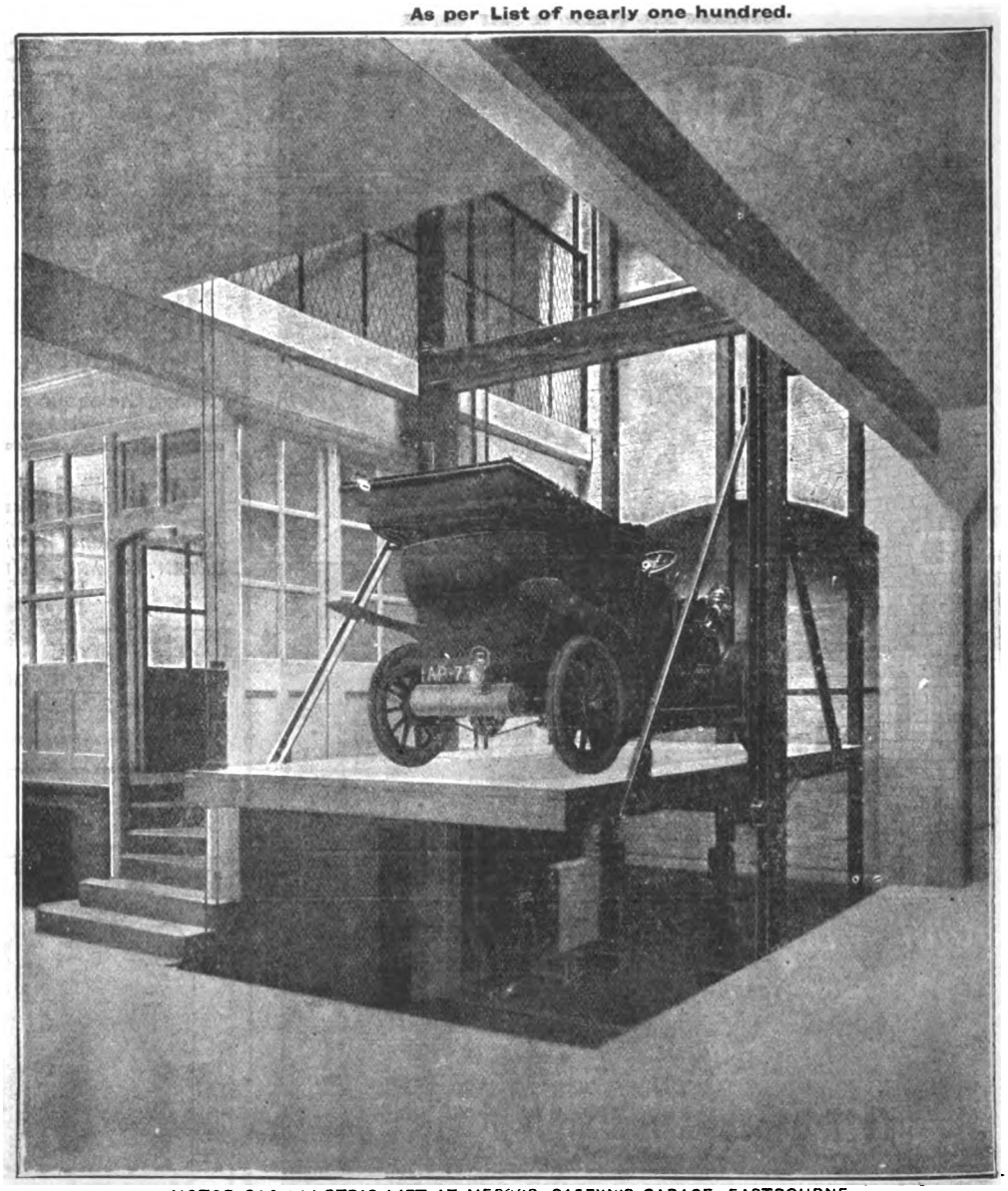
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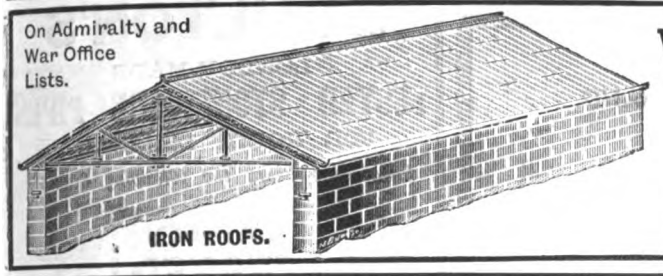
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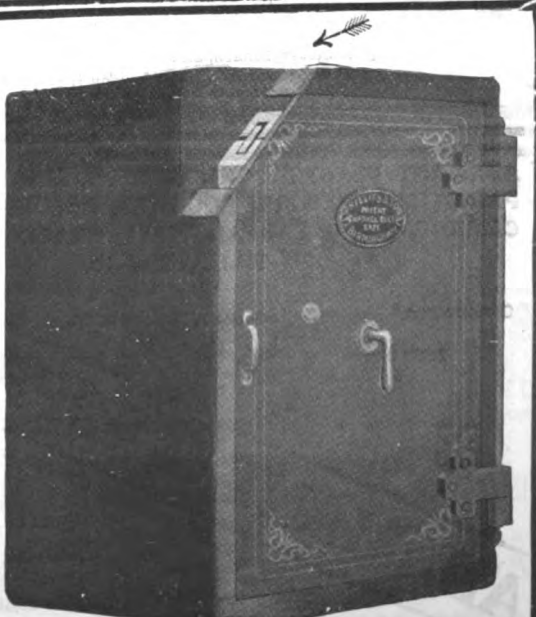
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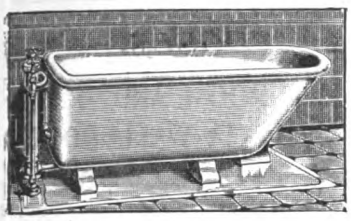
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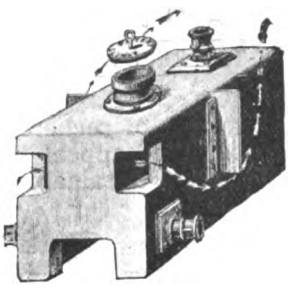
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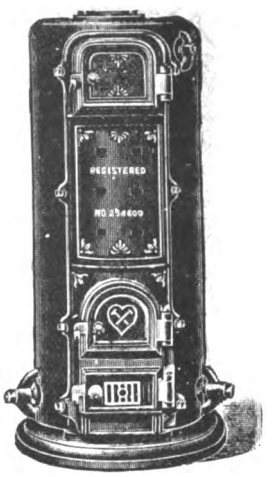
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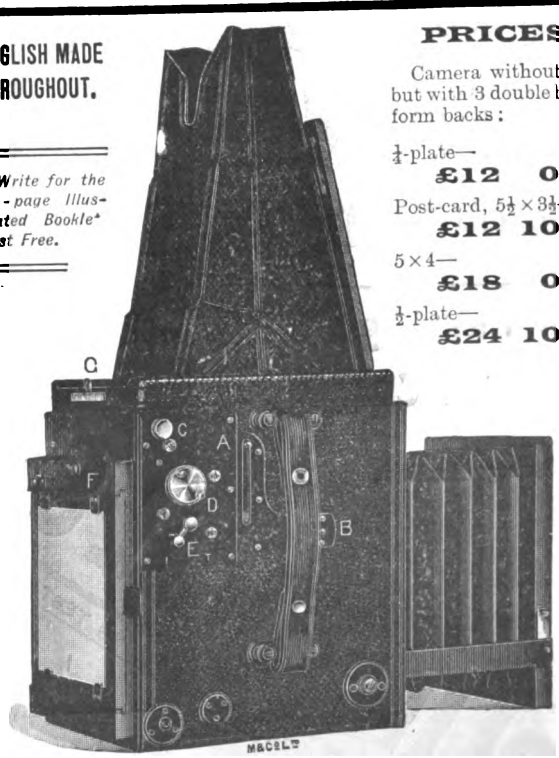
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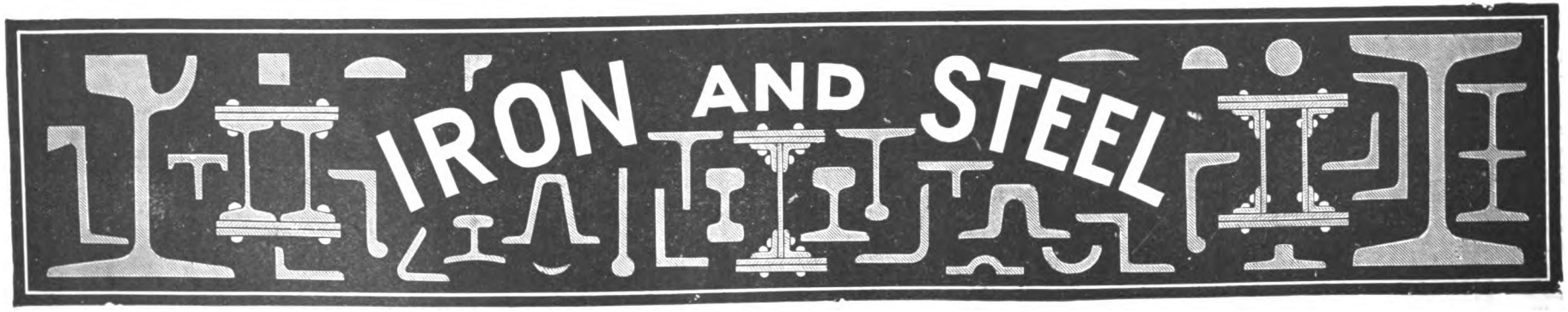
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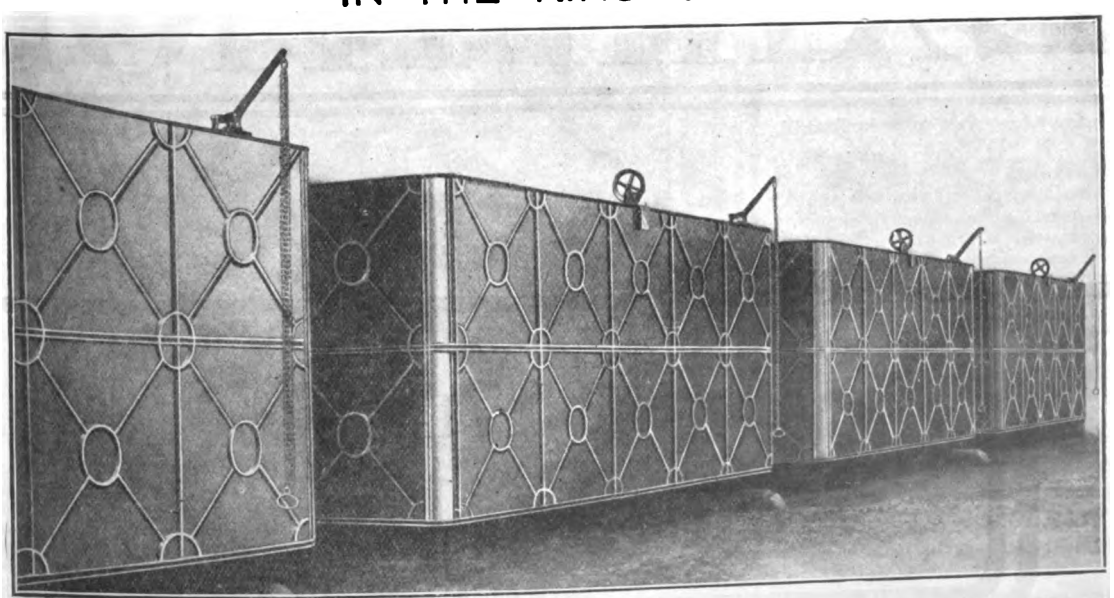
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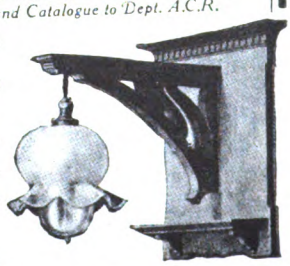
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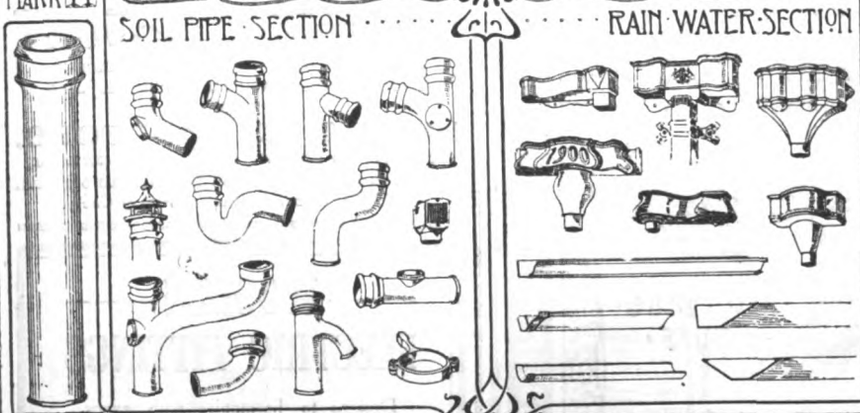
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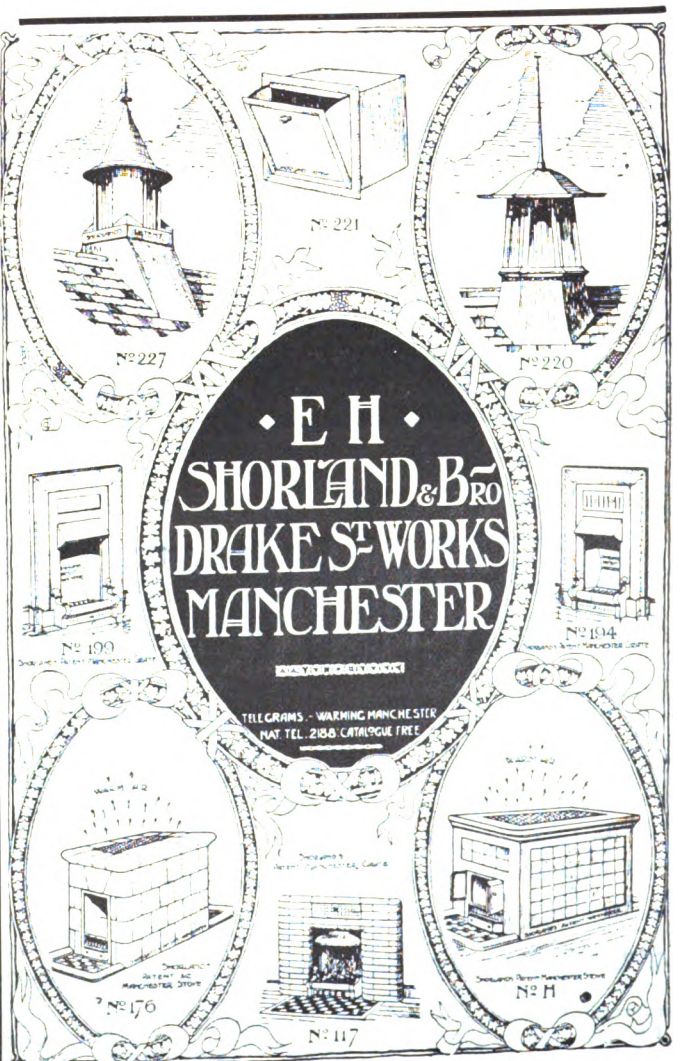
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THE

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Under no circumstances whatever can the Proprietors of this Journal guarantee alteration of copy if received after the first post on Tuesday mornings, and no proofs can be submitted if copy arrives later than first post on Saturday mornings.

EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of thi difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

**** *As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITION OPEN.

LYNTON (DEVON).—Jan. 30, 1909.—Sketch plans to scale and sketch designs, with approximate cost for Wesleyan church and additional buildings, on land near the town hall. Design placed first will be appointed to carry out the work; 2nd premium, 7*l.* 7*s.*; 3rd premium, 5*l.* 5*s.* Deposit 10*s.*, returnable to competitors. Plans and further particulars from Mr. K. Jutsum, Clarence Terrace, Lynton.

CONTRACTS OPEN.

ABINGDON.—Jan. 12.—For erection of station buildings. The Engineer, the Great Western Railway Co., Paddington Station, W.

ANNFIELD PLAIN.—Jan. 16.—For erection of two houses in Annfield Plain, Durham. The Weardale and Consett Water Company's office, Consett, or at 5 Neale Street, Annfield Plain.

ASHTON-UNDER-LYNE.—Jan. 11.—For erection of offices for the South-East Lancashire Card and Blowing Room Operatives' Association. Messrs. Lindley & Gibson, architects and surveyors, Ashton-under-Lyne.

BISHOP AUCKLAND.—Jan. 11.—For extensions to the Lady Eden Cottage Hospital. Mr. F. H. Livesay, architect and surveyor, Bishop Auckland.

BISHOP AUCKLAND.—Jan. 20.—For alterations and additions to workhouse. Deposit 5*l.* Mr. F. H. Livesay, architect, Bishop Auckland.

CHARTHAM DOWNS.—Jan. 15.—For plastering, repairs, painting, &c., to Ward A 2, male, at Kent County Lunatic Asylum. Deposit 5*l.* Mr. W. J. Jennings, architect, 4 St. Margaret's Street, Canterbury.

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DARLASTON (STAFFS.).—Jan. 14.—For erection of handicraft centre on site of Central Council school. Deposit 10*s*. 6*d*. Mr. Graham Balfour, director of education, County Education offices, Stafford.

DEWSBURY.—Jan. 9.—For erection of Dewsbury Empire Palace of Varieties. Messrs. Chadwick & Watson, architects, 9 Albion Street, Leeds.

EAST HAM.—Jan. 18.—For erection of residence for medical officer upon Isolation Hospital site at Boundary Road. Deposit 5*l*. Mr. Adam Horsburgh Campbell, M.I.C.E., borough engineer, Town Hall, East Ham, E.

EAST PRESTON.—Jan. 18.—For repair of chimneys and other works at the workhouse, East Preston, near Worthing. Mr. A. Shelley, clerk, Littlehampton.

ELLAND.—Jan. 27.—For erection of a four-storeyed fire mill, engine house, &c., at Springwood Mills, Holleywell Brook, Elland, Yorks. Messrs. Chas. F. L. Horsfall & Son, architects, Halifax.

DUBLIN.—Jan. 27.—For erection of ward block and boiler house, &c., at the Military Hospital, Arbour Hill. Deposit 10*s*. Director of Barrack Construction, 80 Pall Mall, London, S.W., or at Barrack Construction Office, Arbour Hill Hospital, Dublin.

GLASTONBURY.—Jan. 11.—For erection of annexe to engine house on Wellhouse reservoir. Mr. G. Alves, borough surveyor.

GLOUCESTER.—Jan. 12.—For construction, erection, and removal of temporary footbridge over River Severn at City Quay, Gloucester, 60 feet span, 36 feet total width over outer girders, underside of girders to be 7 feet 6 inches above coping of Quay Wall, or 18 feet above lowest summer level. The City Surveyor, Guildhall, Gloucester.

HEALING.—Jan. 14.—For elementary school and teacher's house at Healing. Deposit 2*l*. 2*s*. Messrs. Scorer & Gamble, architects, Bank Street Chambers, Lincoln.

HUNSLET.—Jan. 18.—For bricklayer, joiner, plumber, plasterer, slater and painter's work required in erection of Council's new offices in Leek Street, Hunslet, Leeds. Deposit 10*s*. 6*d*. Mr. B. Wood Higgins, architect, Oulton, near Leeds.

ILFORD.—Jan. 16.—For erection of caretaker's house at South Park school, Water Lane. Deposit 2*l*. 2*s*. Mr. C. J. Dawson, F.R.I.B.A., 11 Cranbrook Road, Ilford.

IRELAND.—Jan. 21.—For erection of Crown Post Office at Tullamore. Deposit 1*l*. Office of Public Works, Dublin, and at the Post Office, Tullamore.

KINGSTON-ON-THAMES.—Jan. 18.—For additions to Union offices, Coombe Lane. Mr. William H. Hope, C.E., 12 Clarence Street, Kingston-on-Thames.

LANCHESTER.—Jan. 13.—For erection and completion of extra nurses' bedrooms, &c., to administrative block and new lodge at Tanfield Hospital. Mr. Geo. Thos. Wilson, architect, 22 Durham Road, Blackhill.

LITTLE COATES.—Jan. 14.—For building elementary school at Little Coates, for the Lindsey County Council. Deposit 2*l*. 2*s*. Messrs. Scorer & Gamble, architects, Bank Street Chambers, Lincoln.

LONDON.—Jan. 11.—For joinery for large block of model dwellings in St. Pancras, N.W. Pension Dwellings Company, 69 Euston Road, N.W.

LONDON.—Jan. 13.—For partial reconstruction and additions to Desiccated Grain Company's factory, Rotherhithe, S.E. Works Manager, 199 Rotherhithe Street, Rotherhithe.

LONDON.—Jan. 19.—For branch post office and meteorological office, South Kensington (second contract—superstructure). Deposit 1*l*. 1*s*. Sir Henry Tanner, F.R.I.B.A., H.M. Office of Works, &c., Storey's Gate, S.W.

LONDON.—Jan. 21.—For provision of improved receiving ward accommodation at St. John's Road Workhouse, Upper Holloway, N. Deposit 5*l*. 5*s*. Mr. William Lockwood, architect, 12 Sherwood Street, Piccadilly Circus, London, W.

LONG EATON.—Jan. 9.—For erection of Council schools at Long Eaton, Derbyshire, to accommodate 960 children in three blocks for boys, girls and infants, with cookery and manual instruction rooms. Deposit 1*l*. 1*s*. Mr. George H. Widdows, A.R.I.B.A., architect to the committee, St. Mary's Gate, Derby.

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MANCHESTER.—Jan. 23.—For erection of new municipal secondary school for girls, in Chorlton Street. Deposit 3*l.* 3*s.* Elementary Education Office, Deansgate, Manchester.

MORPETH.—Jan. 12.—For erecting Council school to accommodate 520 scholars at Morpeth, Northumberland. Deposit 2*l.* 2*s.* Mr. C. Williams, secretary, The Moot Hall, Newcastle-on-Tyne.

NUNEATON.—Jan. 13.—For (1) addition to Council offices (deposit 1*l.* 1*s.*); (2) construction of timber footbridge in Riversley Park. Mr. F. C. Cook, borough surveyor.

OLD FLETTON.—Jan. 16.—For erection of commercial and technical school at Old Fletton, Hunts. Deposit 2*l.* 2*s.* The County Surveyor, High Street, Huntingdon.

SEAHAM HARBOUR, &C.—Jan. 19.—For erection of temporary Council school at Seaham Harbour. Alterations and improvements at Middlestone Moor, South Frosterley, Easington Lane and Hedley Hill Council schools. Mr. F. E. Coates, A.R.I.B.A., Shire Hall, Durham.

SNEATON.—Jan. 14.—For alterations in chancel, re-seating and other works at parish church of Sneaton, near Whitby. Mr. Edward H. Smales, A.R.I.B.A., architect, 5 Flowergate, Whitby.

THURNSCOE (YORKS).—Jan. 18.—For alterations and improvements at Thurnscoe Sewage Disposal Works, comprising secondary contact beds, sludge well, sludge filters, storm-water carrier, and laying out land filtration area. Mr. Henry Smith, engineer, Compton Buildings, Bow Street, Keighley.

TEWKESBURY.—Jan. 13.—For erecting generating station in St. Mary Street, together with excavating for, and filling in, for about a mile of electric cables (laid for the most part under Victoria stone pavement), including making good the surface. Mr. C. W. Jones, secretary, Electric Light Company, Tewkesbury.

THRESHFIELD.—For erection of residence at Threshfield, near Skipton. Mr. J. W. Broughton, architect, 19 High Street, Skipton.

WALES.—Jan. 11.—The Ebbw Vale education committee invite tenders (by schedule of prices) for stripping, boarding, felting, and reslating roofs of Victoria Schools, together with various jobbing works. Deposit 1*l.* 1*s.* Mr. Henry Waters, architect, Market Chambers, Ebbw Vale.

WALES.—Jan. 13.—For erection of a school at Killay, Glamorgan. Messrs. Hartland, Isaac, Watkins & Lewis, 7 Rutland Street, Swansea, and also the Glamorgan County Council Offices, Westgate Street, Cardiff.

WALES.—Jan. 13.—For works for Glamorgan County Council, viz.:—(1) Diverting, widening and improving Bridgend and Port Talbot main road between Caegarw Farm and the Vicarage, Pyle; (2) foundation and boundary wall, &c., for new school at Tonmawr, near Neath; (3) new offices at Neath intermediate school; (4) building new school at Nelson. Mr. T. Mansel Franklen, clerk, Glamorgan County Council Offices, Westgate Street, Cardiff.

WALES.—Jan. 16.—For erection of a mixed and infants' school at Blaina, Mon., to accommodate 510 scholars. Deposit 3*l.* 3*s.* Mr. C. Dauncey, secretary, County Council Offices, Newport, Mon.

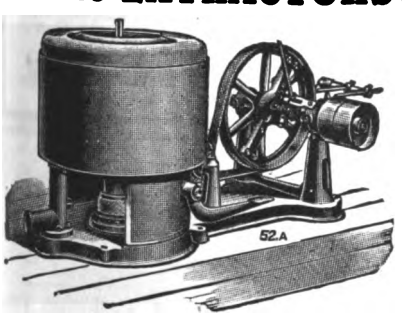
WALES.—Jan. 19.—For erection of twenty-two houses at Kenry Street, Ynyswen, Treorchy, Rhondda Valley. Mr. W. D. Morgan, M.S.A., architect, 194 Ystrad Road, Pentre.

WALES.—Jan. 23.—For erection of twenty-eight workmen's dwellings at Cwmbach, also twenty-two at Godreaman, for the Aberdare Urban District Council. Surveyor's Office, Town Hall, Aberdare.

WALES.—Jan. 26.—For electrical work in connection with new factory about to be erected at Cardiff, including alternatives and exciters, high and low pressure switchboards, and all necessary wiring, for the Boston Collapsable Barrel and Manufacturing Company, Ltd. Deposit 5*l.* Mr. Walter Sayer, superintendent, 79 York Road, London, S.E.

IT has been agreed under conditions to purchase a site for a secondary school for girls in Upper Brook Street, Oswestry.

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TENDERS.

BAUMBER.

For alterations at school. Messrs. SCORER & GAMBLE, architects, Lincoln.

Sutton	£236	15	0
Giles	230	17	0
Hensman & Son	207	7	6
Miller & Son	198	0	0
Bell & Sons	192	0	0
SUTTON & HORTON, Horncastle (*accepted*)	190	0	0

BUSHBURY.

For erection of a Council school in Bushbury Lane, Bushbury, South Staffs. Mr. G. BALFOUR, director of education.

TOOLEY, Wolverhampton (*accepted*)	£3,673	0	0

For installation of heating apparatus.

MANLEY & Co., Wolverhampton (*accepted*)	192	0	0

CHELMSFORD.

For the execution of works of street improvement in Duke Street between the Golden Lion and Threadneedle Street.

The Acme Flooring and Paving Co. (1904)	£416	16	0
Wilson, Border & Co.	321	12	6
Peters	303	19	4
The Improved Wood Pavement Co.	292	2	6
Bonnett	270	8	3
Griffiths & Co.	268	17	10
BURHAM, Birmingham (*accepted*)	207	10	6
Borough surveyor's estimate	350	0	0

CHELTENHAM.

For laying storm-water culvert at Hayden Farm, for the Town Council.

Cornock	£811	3	0
Packer	464	0	4
Riley	437	3	2
Cresswell	404	5	1
Williams & Co.	285	17	0
DIX (*accepted*)	271	15	5

DURHAM.

For the construction of 230 lineal yards of 9-inch and 6-inch pipe sewer with river crossing, and the construction of sewage tanks, &c., near Crossgate Moor. Mr. GEO. GREGSON, surveyor, 38 Sadler Street, Durham.

Oliver	£778	5	10
Mackay & Son	717	17	5
Henderson	693	6	11
Gradon & Son	664	15	0
CARRICK, Durham (*accepted*)	645	10	9

FENTON.

For alterations to the Crown Bakery. Messrs. ELIJAH JONES & JACKSON, architects, Hanley.

Tompkinson & Betteley	£647	0	0
Underhill Bros.	632	0	0
Caulcott	625	0	0
Ball & Robinson	607	0	0
Walters, jun.	595	10	0
Yoxall	595	0	0
Godwin	569	0	0
Bennett Bros.	560	0	0
Goodwin	540	10	0
Cornes & Sons	540	0	0
Bennion	537	0	0
HEATH, Stoke-on-Trent (*accepted*)	494	10	0

HINCKLEY.

For additional sewage disposal works, Sketchley Farm. Mr. E. H. CRUMP, engineer and surveyor, Hinckley.

For construction of settling tanks, ejector-chamber, carriers, screening-chamber, and engineering work.

Sharpe	£2,779	19	0
Macdonald	2,740	16	11
Chamberlain	2,686	0	0
Greaves	2,645	19	0
Chaplin	2,518	5	6
Firth & Co.	2,508	2	8
Fox	2,468	0	0
Cunliffe	2,455	19	5
Palmer	2,447	15	0
Firth	2,436	2	5
JEWELL, Market Harborough (*accepted*)	2,389	15	9

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HINCKLEY—*continued.*

For the supply of valves, floating arms, &c.

Adams & Co.	168	14	6
Ham, Baker & Co.	166	7	0
FARRER, Birmingham (*accepted*)	145	0	0

For the supply and fixing of 35 b.h.p. gas engine, ejector, compressor, &c.

HUGHES & LANCASTER, Westminster (*accepted*)	840	0	0

HENLEY-ON-THAMES.

For erection of receiving wards, mortuary and remodelling part of the workhouse. Messrs. CHARLES SMITH & SON, architects, Reading.

Godwin	£1,997	0	0
Stimson & Sons	1,815	0	0
Newberry	1,795	0	0
Jenkins & Son	1,784	0	0
Bloxham	1,776	0	0
Hunt & Son	1,751	0	0
Fryer & Co.	1,698	0	0
Buller Bros.	1,669	0	0
Aldridge	1,656	0	0
Walden & Son	1,624	0	0
Kingerlee & Sons	1,619	0	0
Tydeman Bros.	1,600	0	0
Cobborne	1,598	0	0
Henson & Son	1,566	0	0
Fitt	1,562	0	0
Lewis & Bro.	1,550	0	0
Hughes	1,499	0	0
Gibson	1,486	0	0
Creed	1,350	0	0

KIRKBY-CUM-OSGODBY (LINCS).

For alterations at the school. Messrs. SCORER & GAMBLE, architects, Lincoln.

Sanderson	£202	6	0
Ranyard	200	0	0
Coles	175	10	0
Clarke	162	1	4
SUTTON, Market Rasen (*accepted*)	160	0	0

HUNGERFORD.

For carrying out drainage scheme. Mr. HUMPHREYS, engineer.

COLLIER & CATLEY, Reading (*accepted*)	£9,543	0	0

LEYTON.

For new school buildings, Lybourn Street. Mr. W. JACQUES, A.R.I.B.A., architect, 2 Fen Court, E.C. Quantities by Messrs. J. RIDER HUNT & Co., 181 Queen Victoria Street, E.C.

Johnson & Co.	£13,205	0	0
King & Son	12,258	0	0
Appleby	11,900	0	0
Spencer, Santo & Co.	11,709	0	0
F. & G. Foster	11,541	0	0
Harewill	11,502	0	0
J. & J. Dene	11,470	0	0
Rawley Bros.	11,465	0	0
McCormick	11,421	0	0
Coles	11,368	0	0
Lowe & Co.	11,335	0	0
Brand, Pettit & Co.	11,309	0	0
Hyde & Co.	11,198	0	0
Jerram	11,154	0	0
North Bros.	11,139	0	0
Symes	11,086	0	0
Patman & Fotheringham	11,049	0	0
Nightingale	11,029	0	0
Carter	11,016	0	0
Maddison	10,922	0	0
Kirk & Randall	10,896	0	0
Henson & Son	10,820	0	0
J. & E. Davey	10,685	0	0
COXHEAD (*accepted*)	10,647	0	0

LIVERPOOL.

For new roofs over the swimming-baths at Margaret Street baths.

Spencer (*recommended*)	£1,660	0	0

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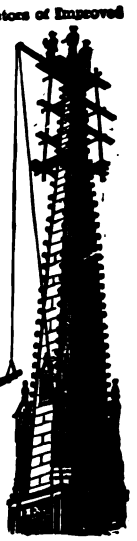
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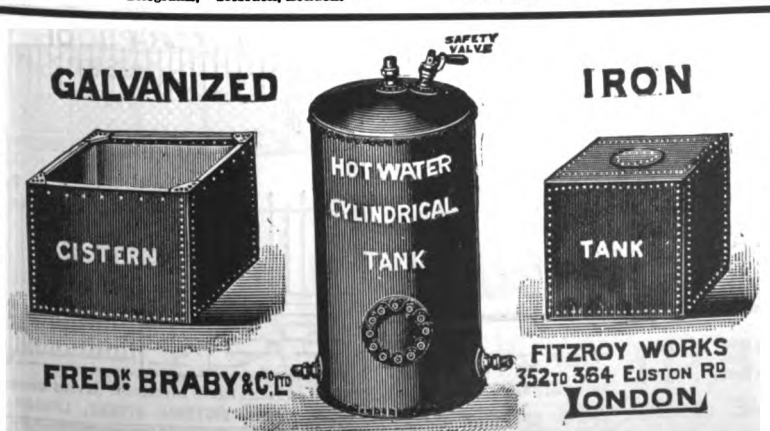
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LANCASTER.

For erection of a lecture hall and class-rooms, for the trustees of the Independent Methodist Chapel, Lancaster. Mr. J. PARKINSON, architect, 67 Church Street, Lancaster.

Accepted tenders.

Executors of W. Harrison, mason	£294 0 0
Executors of J. Parkinson, joiner	270 0 0
Simpson, plumber and glazier	106 3 0
Cross & Sons, slater and plasterer	93 19 6
Taylor, painter	19 16 10

LONDON.

For making-up and paving Emlyn Road (part of). Mr. H. MAIR, borough surveyor, Hammersmith, W.

	Excelsior Stone.	Imperial Stone
Champness & Co.	£427 0 0	£427 0 0
J. & W. Drake	372 0 0	372 0 0
Mowlem & Co.	368 0 0	366 0 0
Rogers & Co.	359 0 0	369 0 0
Brummell	355 0 0	365 0 0
Wimpey & Co.	335 0 0	335 0 0
Wheeler & Co.	328 0 0	333 0 0
Daniel & Co.	314 19 0	314 19 0
RHODES, South Ealing (*accepted*)	309 0 0	321 0 0

MANSFIELD WOODHOUSE.

For the construction of sewerage and sewage-disposal works for the Forest Town portion of the district and laying out about five acres of land for the disposal of the sewage and other appurtenant works. Mr. F. P. COOK, A.M.I.C.E., engineer, Mansfield.

Johnson Bros.	£5,333 4 10
Johnson	4,900 0 0
Firth & Co.	4,843 15 0
Cottle	4,841 0 0
Cox & Co.	4,808 6 6
Ward & Petley	4,815 15 7
J. & F. L. Parsons	4,400 0 0
Lane Bros.	4,141 0 0
Ashley	4,032 0 0
BECKETT (*accepted*)	3,698 10 0

OLDBURY.

For erecting schools and caretaker's house in Abbey Road, Worley.

JACKSON (*accepted*)	£9,830 0 0

PADIHAM.

For the erection of an elementary school at Padiham, near Burnley, Lancs, to accommodate 620 scholars. Mr. H. LITTLER, county architect, Preston.

Mullin & Durkin	£8,031 0 0
Tinline	7,944 0 0
M. & J. W. Heap	7,930 3 6
Pickles	7,925 0 0
Lumb (*recommended*)	7,616 0 0

PORTSMOUTH.

For the erection of two refuse-destructors at Baffins and Eastney. Messrs. BRAMWELL & HARRIS, consulting engineers, Westminster.

	Baffins.	Eastney.
Horsfall Destructor Co.	£15,490 0 0	£15,518 0 0
HEENAN, FROUDE & Co. (*accepted*)	14,465 0 0	14,430 0 0
Manlove, Alliott & Co.	13,830 0 0	13,884 0 0
Goddard, Massey & Warner	12,926 0 0	14,553 0 0
Hughes & Sterling	12,116 0 0	13,325 0 0

RAVENFIELD (YORKS).

For erection of a school. Mr. JAMES TOTTY, architect, Rotherham.

Unwin	£2,198 0 0
Marlow & Son	2,176 0 0
Snell	2,140 0 0
Chadwick & Co.	2,003 0 0
Trehern	1,852 7 9
BEEDEN, Thrybergh (*accepted*)	1,766 15 10

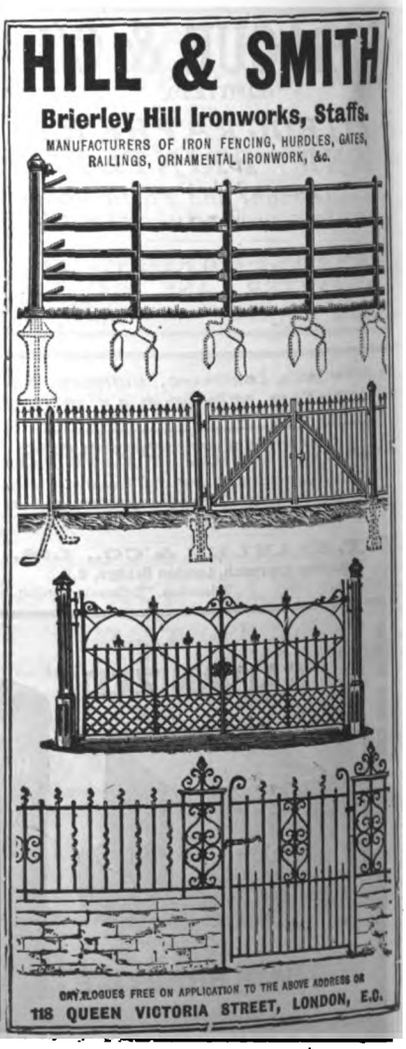
ROCHDALE.

For supplying a 10-ton steam road-roller for the paving committee.

AVELING & PORTER, Rochester (*accepted*).

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NAT. TEL. Nº 12
G.P.O. Nº 2

FIRE! FIRE!! FIRE!!! For a special announcement of Messrs. FEATHERSTONE & CO. see page xiii.

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ROWLEY.

For the erection of a school for 310 children in Doulton's Road. Messrs. PRITCHARD & PRITCHARD, architects, Kidderminster.

BRIDGWATER, Cradley Heath (*accepted*)	£3,136 10 0

ST. HELENS.

For surface and foul water-pipe sewers for the drainage of Orrell Estate. Messrs. CHASE & BROOM, engineers, 67 Dale Street, Liverpool.

Hutton & Co.	£5,087 0 0
Jowett Bros.	4,322 14 9
Holme & King	4,234 14 2
Williams & Farley	4,105 4 8
Morr & Son	3,947 0 0
Brebner & Co.	3,947 0 0
Heaton & Son.	3,829 13 0
Macdonald	3,795 0 0
Meikle	3,499 18 0
EDMONDSON & WYATT, Oldham (*accepted*)	3,294 0 0

SCOTLAND.

For additions and alterations at the City Hospital, Aberdeen, for the Town Council.

Accepted tenders.

Leslie, Smith & Son, mason	£4,773 0 0
Jamieson, carpenter	3,000 0 0
Blinkie & Sons, plumber	1,682 0 0
Bunnochie & Sons, plasterer	915 1 0
Blinkie & Sons, heating engineer	658 10 0
Gordon & Watt, painter	498 0 0
Maitland & Son, slater	361 0 0
Sangster, ironworker	123 18 6
Architect's estimate	12,000 0 0

WILLENHALL (STAFFS).

For building a Council school in Albion Street, to accommodate 1,090 children.

CAVE & SON, Wolverhampton (*accepted*)	£8,786 0 0

For installation of low-pressure heating apparatus.

MANLEY & Co., Wolverhampton (*accepted*)	543 0 0

For electric lighting.

LEA, SON & Co., Shrewsbury (*accepted*)	224 4 0

SOUTHAMPTON.

For new roof over drill-hall, St. Mary's Road. Messrs. LEMON & BLIZARD, MM.Inst.C.E., engineers, Southampton and Westminster.

Wakeham Bros.	£2,110 0 0
Bagshaw & Son	1,948 0 0
Long	1,885 0 0
Executors of Franklin	1,830 0 0
Playfair & Toole	1,712 0 0
Cawte	1,682 0 0
Wort & Way	1,675 0 0
Nichol	1,649 0 0
Osman	1,640 0 0
JENKINS & SONS, Southampton (*accepted*)	1,584 0 0

STOKE-ON-TRENT.

For alterations at Primitive Methodist Church, Lonsdale Street. Messrs. ELIJAH JONES & JACKSON, architects, Hanley.

		Alternate tender.
North of England School Furnishing Co.	£976 6 11	£894 0 7
Breeze & Sons	828 10 0	739 10 0
Addison & Co.	742 10 0	707 10 0
Gallimore	710 0 0	680 0 0
Godwin	677 0 0	648 10 0
Ellis	669 0 0	623 10 0
Howlett	614 0 0	579 0 0
Frost	605 0 0	536 2 0
Colley & Lindop	591 10 0	552 8 0
Cornes & Sons	577 0 0	549 0 0
Walters, jun.	575 0 0	—
Thomas & Son	565 0 0	530 0 0
Ward & Son	560 0 0	530 0 0
Blakemore & Sons	549 0 0	528 0 0
Salt	530 10 6	505 0 0
BENNETT BROS., Burslem (*accepted*)	490 0 0	465 0 0

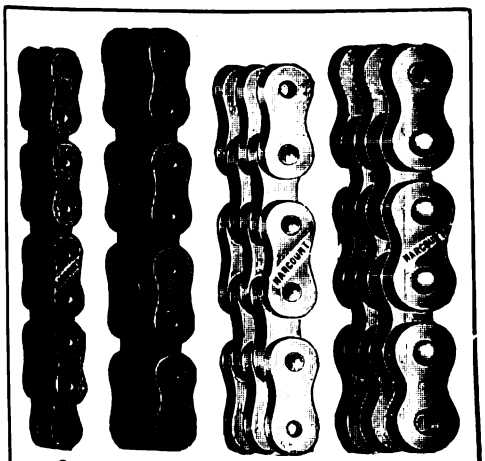
WALES.

For private street improvement works at Gabalfa, in the parish of Llandaff. Mr. JAMES HOLDEN, A.M.I.C.E., surveyor, Cardiff.

RUSS, Whitechurch, near Cardiff (*accepted*)	777 11 1

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The Royal Exchange, Liverpool.
The Convalescent Home, Aldford.
The Post Office, Montreal.
The New Lunatic Asylum, Bristol.
The Houses of Parliament, Brisbane.
The Holborn Viaduct Buildings, London.
The New Library, Pollokshields.
The Asylum, Letterkenny.
The Dykebar Asylum, Paisley.
The Metropolitan Carriage Works, Saltley.
The Royal Artillery Barracks, Manchester.
The Cottage Hospital, Walsall.
The Fever Hospital, Bristol.
The Stores of A.T. Stewart, Esq., New York.
The Mansion of T. Wilson, Esq., Hull.
The City Asylum, Birmingham.
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TENDERS FOR THE YEAR 1908.

THE following are a few of the more important works of which the tenders appeared in our columns in the course of 1908:—

COLCHESTER.

For erection of superstructure of County Asylum. WHITMORE and W. H. TOUN, architects.

	Mr.	F.
Pethick	£237,777	0 0
Foster & Dicksee	233,332	0 0
Parnell & Son	222,334	0 0
McCormick & Son	222,222	0 0
Minter	220,000	0 0
Young & Son	214,995	0 0
Wall	214,000	0 0
Bennett	212,600	0 0
Lovatt	207,789	0 0
Lowe & Son	206,925	0 0
Bateman	204,307	0 0
Willcox	202,500	0 0
Pattinson	202,426	0 0
Perry & Co.	199,350	0 0
Wallis & Son	198,840	0 0
Leslie & Co.	197,000	0 0
Blake	195,000	0 0
Allen & Sons	194,000	0 0
Arnold & Son	191,866	0 0
King & Son	191,700	0 0
Waring & White	191,545	0 0

DONCASTER.

For construction of Marsh Gate bridge and road. EDWARD PARRY, engineer.

	Mr.	
Thorne & Son	£66,192	6 11
Whitaker Bros.	62,198	0 0
Baker & Sons	60,648	18 7
Dixon	58,219	14 4
Logan & Hemingway	57,325	0 0
Cleveland Bridge Co.	55,181	9 4
Lamb	55,137	0 1
Wrigley	54,884	1 4
Kelletts	54,598	5 4

DONCASTER—*continued.*

Bott & Stennell	54,402	3 3
Scott	53,752	16 3
Moffatt	53,231	9 9
Widnes Foundry Co.	52,698	0 2
Muirhead & Co.	52,384	0 3
Lovatt	51,983	2 0
Firth	51,948	9 2
Holmes & King	49,994	0 1
ARNOLD & SON, Doncaster (*accepted*)	47,790	0 0

DUBLIN.

For construction of additional storage reservoir at Roundwood and other works in connection with water supply of city.

Heggarty & Gault	£295,426	10 5
Stewart	171,482	0 0
Best & Sons	145,228	4 9
J. & T. Binns	138,500	0 0
Mitchell & Son	127,927	6 4
McLoughlin & Harvey	123,600	0 0
Moran & Son	119,223	13 4
Nott	106,405	2 3
Collen Bros.	104,440	0 0
Crawford	100,864	16 4
Whyte & Co.	91,879	18 8
KINLEN (*accepted*)	86,998	13 8

For erection of technical schools in Bolton Street, from plans by City architect.

Beckett	£40,000	0 0
G. & T. Crampton	38,860	0 0
Pemberton & Son	38,250	0 0
Mackey	37,770	0 0
McLoughlin & Harvey	37,267	0 0
Collen Bros.	36,762	19 0
J. & P. Good, Ltd.	36,600	0 0
Hull & Co.	36,498	0 0
Donovan & Sons	36,421	0 0
J. & W. Stewart	35,293	0 0
Langley	34,995	0 0
H. & J. MARTIN, Ltd., Belfast and Dublin (*accepted*)	34,000	0 0

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HAMMERSMITH.

For erection of factory at Brook Green, W., for the Wolfram (Tungsten) Metal Filament Lamps, the Robertson Electric Lamps, and the General Electric Co. Mr. R. J. LOVELL, architect, 46 Queen Victoria Street, E.C.

Hughes & Stirling	£41,688 0 0
Roome & Co.	39,686 0 0
Wisdom Bros.	39,403 0 0
Spencer, Santo & Co.	39,377 0 0
Allen & Co.	38,265 0 0
Chessum & Co.	37,892 0 0
Trollope & Colls	37,587 0 0
Barnett & Brotchin	37,510 0 0
Walkerdine	36,939 0 0
Waring-White Building Co.	35,978 0 0
Lovatt	34,832 0...0
Carmichael	34,456 0 0
McMANUS, Hammersmith (*accepted*)	34,400 0 0

LEE VALLEY.

For construction of storage reservoir for the Metropolitan Water Board.

Kennedy	£925,386 19 11
Pedrette & Co.	847,454 2 0
Moran & Sons	596,730 7 9
Byrom	570,717 17 4
Monk & Newell	560,834 14 5
Perry & Co.	558,181 0 0
Leslie & Co.	539,144 0 0
Neal	499,629 0 0
Nowell	468,460 19 1
McAlpine & Sons	428,059 15 2
Playfair & Toole	427,040 17 7
Topham, Jones & Railton	420,529 5 8
Kirk & Randall	415,544 0 0
Baldry & Yerburgh	404,314 12 7
Nuttall & Co.	402,617 1 4
Scott & Middleton	396,891 11 10
Morrison & Mason	394,591 11 5
Docwra & Sons	388,516 17 11
Pearson & Son	375,960 2 3
Aird & Sons	373,984 15 5
WALL, LTD. (*accepted*)	340,770 0 0

LEICESTER.

For Derwent supply section of water works. Messrs. EVERARD, SON & PICK, engineers, Leicester.

Constructing service reservoirs, bridges, laying mains and other works.

Monk & Newell	£171,101 17 3
Lawson	140,134 1 9
Wright, Green & Co.	133,350 12 2
Crawford	127,870 13 1
Pattinson & Sons	127,846 2 11
Bentley & Co.	125,488 0 0
Cochrane & Sons	123,510 18 7
Pearson & Co.	122,878 18 10
Manders	122,284 10 4
Brebner & Co.	120,338 11 6
Firth & Co.	120,106 0 0
Bentley & Son	115,350 13 2
Law	115,031 6 4
Mackay	112,984 17 4
Coles	110,207 0 10
Morrison & Mason	109,775 7 7
Jewett Bros.	108,214 12 7
Underwood & Bro.	106,386 6 0
Muirhead & Co.	106,227 5 9
Moffat	105,731 0 9
Docwra & Son	104,856 7 8
Aird & Sons	102,267 12 1
Neal	90,606 0 0

Cast-iron pipes.

Macfarlane, Strang & Co.	111,677 3 0
Stewart & Co.	111,384 8 5
McLaren & Co.	110,149 17 10
Sheepbridge Coal and Iron Co.	98,607 8 6
Staveley Coal and Iron Co.	97,774 13 0
Holwell Iron Co.	97,083 10 7
Cochrane & Co.	96,666 16 6
Stanton Ironworks Co.	94,668 9 9
Cochrane & Co.	93,781 16 1

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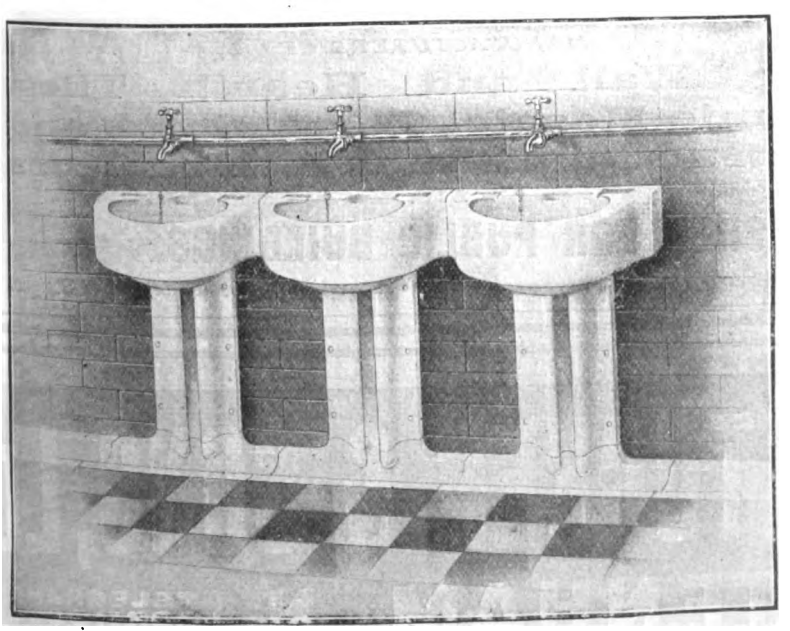


FIG. 971.—PATENT "OPEN CHANNEL" DOWNFLOW.

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LONG DITTON.

For construction of filter-beds, &c., at Long Ditton, for the Metropolitan Water Board.

Mayoh & Haley	£77,716	7	1
Mowlem & Co.	63,498	0	0
Aird & Sons	60,187	17	5
Holliday & Greenwood	58,649	0	0
Docwra & Son	55,924	9	9
MORAN & SON (*accepted*)	52,564	0	0

LONDON.

For erection of workhouse and infirmary for the City of London Union at Homerton. Mr. STUART HILL, architect, 106 Cannon Street.

Foster	£66,637	0	0
Lawrence	64,854	0	0
Cubitt & Son	64,293	0	0
Patman & Fotheringham	63,223	0	0
Trollope & Colls	61,998	0	0
Rider	61,598	0	0
Williams	61,574	0	0
Carmichael	61,448	0	0
Ashby & Horner	60,870	0	0
Lawrance & Sons	60,200	0	0
Perry & Co.	60,171	0	0
Holloway Bros.	60,076	0	0
Dove Bros.	59,925	0	0
Chessum & Sons	59,901	0	0
Perry & Bros.	59,897	0	0
F. & H. F. Higgs	59,750	0	0
Johnson & Co.	59,739	0	0
Kilby & Gayford	59,374	0	0
Godson & Sons	58,979	0	0
Porter	58,326	0	0
Greenwood	56,472	0	0
Shurmur	55,854	0	0
MONK, Lower Edmonton (*accepted*)	55,400	0	0

LONDON—*continued.*

For erection of out-patient, casualty, and bathing departments, King's College Hospital, Denmark Hill. Mr. WILLIAM A. PITE, architect; Messrs. FOWLER & HUGMAN, quantity surveyors.

Rider & Son	£73,870	0	0
Lawrance & Sons	73,798	0	0
Colls & Son	73,333	0	0
Holland & Hannen	72,888	0	0
Leslie & Co., Ltd.	72,000	0	0
Holliday & Greenwood, Ltd.	69,949	0	0
Perry & Co.	69,784	0	0
Holloway Bros., Ltd.	69,400	0	0
Carmichael	68,828	0	0
Dove Bros., Ltd.	67,375	0	0
FOSTER & DICKSEE, LTD. (*accepted*)	65,658	0	0

For erection on the West Hill site (Wandsworth) of a secondary school for the accommodation of 476 girls.

King & Son	£34,254	0	0
Patman & Fotheringham	33,741	0	0
Downs	30,537	0	0
Garrett & Son	29,943	0	0
McCormick & Sons	29,940	0	0
Holloway Bros. (London)	29,595	0	0
Appleby & Sons	29,586	0	0
Spencer, Santo & Co.	29,311	0	0
W. Smith & Son	28,740	0	0
Holliday & Greenwood	28,623	0	0
Lovatt	28,507	15	7
Lawrance & Sons	28,306	0	0
J. & C. Bowyer	28,257	0	0
Works Committee estimate	27,938	0	0
J. Smith & Sons	27,870	0	0
Leslie & Co.	27,820	0	0
Whitehead & Co.	27,600	0	0
Treasure & Son	27,573	0	0
F. & H. F. Higgs	27,554	0	0
Carmichael	27,554	0	0
Johnson & Co.	27,448	0	0
J. & M. Patrick, Wandsworth (*recommended*)	25,852	0	0
Estimate of architect (education)	28,200	0	0

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LONDON—*continued.*

For erection of infirmary buildings, St. James Road, Wandsworth Common, S.W. Mr. T. S. GIBSON, architect, 50 Old Bond Street.

Airey & Son	£77,687	0	0
Lovatt	75,980	0	0
Parnell & Son	75,049	0	0
Leather	74,989	0	0
Bulled & Co.	74,650	0	0
Armitage & Hodgson	74,613	0	0
Higgs & Hill	74,474	0	0
Carmichael	74,350	0	0
Leslie & Co.	73,790	0	0
Patrick	73,630	0	0
Moss & Sons	73,453	0	0
Nightingale	73,190	0	0
Pattinson & Sons	72,991	0	0
Holloway Bros.	72,300	0	0
Minter	71,759	0	0
F. & H. F. Higgs	71,500	0	0
Watson	71,400	0	0
Wallis & Sons	70,880	0	0
Kirk & Randall	70,820	0	0
Wall, Ltd.	70,741	0	0
Wallis	69,997	0	0
Holliday & Greenwood	69,949	0	0
Waring-White Building Co.	69,864	0	0
Brand, Pettit & Co.	69,560	0	0
Saunders	69,500	0	0
Dove Bros.	68,985	0	0
Hawkins & Co.	68,644	0	0
Gray	68,500	0	0
Coles	67,804	0	0
Lorden & Son	67,789	0	0
Spencer, Santo & Co.	67,398	0	0
Lawrence & Son	66,784	0	0
Patman & Fotheringham	66,663	0	0
JOHNSON & Co., Wandsworth Common (*accepted*)	66,550	0	0

LONDON—*continued.*

For construction of embankment wall and certain work incidental thereto in connection with the new County Hall.

Topham, Jones & Railton	£75,528	13	6
Pearson & Son	70,856	14	0
Mowlem & Co.	68,799	13	0
Scott & Middleton	66,082	18	1
Westminster Construction Co.	65,509	11	9
Cochrane & Sons	64,486	4	0
Price & Reeves, Waterloo Place, S.W. (*recommended*)	62,662	9	7
Ditto (alternative tender)	59,480	0	10

For construction of Section B, about 5½ miles in length, of the sewer between Queen's Road, Shoreditch, and Formosa Street, Paddington.

Trentham	£521,169	12	10
Perry & Co.	312,167	0	0
Bentley & Son	240,518	12	10
Pearson & Son	239,041	11	8
Manders	237,566	3	1
Scott & Middleton	231,935	1	9
Kennedy	229,675	2	1
Muirhead & Co.	219,549	10	7
Neal	217,063	11	10
Works Committee	213,268	17	0
Paterson	210,589	3	4
Westminster Construction Co.	203,417	1	2
Kelletts, Ltd.	199,898	7	2
Ditto, alternative	188,400	0	0
Hay & Co.	181,468	14	10
Moran & Sons, Ltd., Westminster (*recommended*)	172,015	11	11

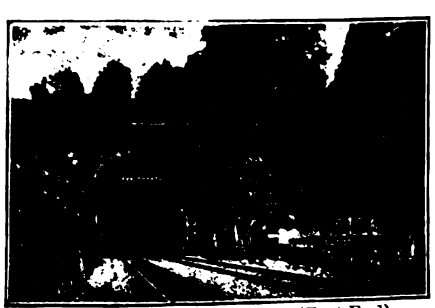
MOLESEY.

For construction of storage reservoir and other works for the Metropolitan Water Board.

Turner	£279,255	10	11
Moran & Son	245,596	0	0
Kirk & Randall	239,426	0	0
Neal	232,000	0	0
Pearson & Son	229,133	13	6
Monk & Newell	227,973	8	0

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MOLESEY—*continued.*

Trentham	227,154	14	8
Mowlem & Co.	224,898	0	0
Aird & Sons	215,074	8	3
Nunn & Co.	213,302	1	3
Docwra & Son	212,993	11	3
Moffat	211,386	10	9
Byrom	210,952	16	3
Playfair & Toole	209,877	0	0
Scott	207,107	6	3
Scott & Middleton	205,882	17	8
Manders	194,200	6	9
Shellabear & Son	189,053	17	11
Dick, Kerr & Co.	185,828	5	9
Pattinson & Sons	181,402	17	3
Holme & King	180,247	11	6
Nott	178,453	1	6
Morrison & Mason	176,751	1	0
Nowell	172,023	4	2
Topham, Jones & Railton	171,054	11	4
McALPINE & SONS, 25 Victoria Street, S.W. (*accepted*)	152,727	7	9

NEWPORT.

For erection of Technical Institute. The Borough Engineer, architect.

Reed	£44,101	0	0
Moon	42,797	0	0
Wakeham Bros.	42,498	0	0
Stephens, Bastow & Co.	41,899	0	0
Williams	40,900	0	0
Holton & Whiting	40,768	0	0
Jenkins	40,298	0	0
Charles	39,968	0	0
Long & Sons	39,893	0	0
Davies	39,254	0	0
Collins & Godfrey	39,180	0	0
King & Co.	38,532	0	0
Jordan & Son	38,320	0	0
Turner & Sons	37,938	0	0
BLAKE, Plymouth (*accepted*)	36,130	0	0

ILLUSTRATIONS.

HOUSE OF SIR PAUL PINDAR, LONDON.
OLD HOUSES, EXETER.

INTERIOR OF CHAPEL FOR GIGGLESWICK SCHOOL.

SMALL COUNTRY HOUSES.

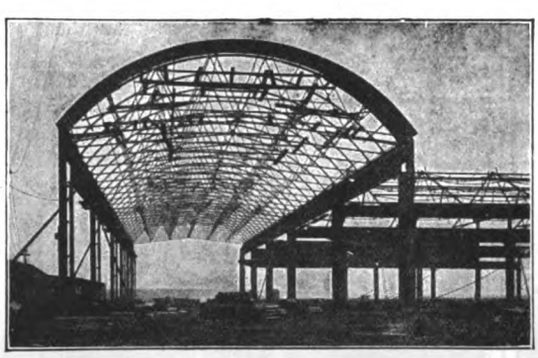
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UPPER EDMONTON.

For the erection of the first portion of the New Infirmary at Bridport Road, for the Guardians of the Edmonton Union. Mr. STUART HILL, architect, 106 Cannon Street, E.C. Quantities by Messrs. D. CAMPBELL & SON, 4 Finsbury Circus, E.C.

Dove Brothers, Ltd.	£87,035	0	0
Porter	86,972	0	0
Miskin & Son	85,627	0	0
Fairhead & Son	84,317	0	0
Leslie & Co., Ltd.	83,681	0	0
General Building Co.	83,495	0	0
Brand, Pettit & Co.	82,297	0	0
Wall, Ltd.	81,950	0	0
Kirk & Randall	81,923	0	0
Lovatt & Co.	81,712	0	0
Sabey & Sons	81,400	0	0
Perry & Co.	80,306	0	0
Waring & White, Ltd.	80,191	0	0
Coles	79,951	15	7
Minter	79,931	0	0
Spencer, Santo & Co.	79,866	0	0
Johnson & Co.	79,783	0	0
Rowbotham	79,777	0	0
Pattinson & Sons	79,346	0	0
Monk	79,300	0	0
Moss & Sons	79,180	6	11
Hawkins & Co.	77,690	0	0
Nightingale	77,113	0	0
Knight & Son	76,811	0	0
Patman & Fotheringham	75,444	0	0

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WALTON.

For erection of engine and boiler houses, &c., at Walton, for the Metropolitan Water Board.

Portland Stone and White Glazed Facings.

Pedrette	£121,530	0	0
Hughes & Stirling	118,377	0	0
Wall	106,236	0	0
Higgs	106,103	0	0
Perry & Co.	100,859	0	0
Foster & Dicksee	100,396	0	0
Hawkins & Co.	96,035	0	0
Miskin, Ltd.	94,112	0	0
Nunn	93,729	0	0
McCormick & Sons	92,484	0	0
Leather	92,422	0	0
Coles	90,579	0	0
McAlpine & Sons	88,491	0	0
Wallis & Sons	88,372	0	0
Lawrence & Son	88,362	0	0
Munday & Sons	88,212	0	0
Moran & Son	87,558	0	0
Mowlem & Co.	86,135	0	0
Pattinson & Sons	85,162	0	0
Whitehead & Co.	85,126	0	0
Jackaman & Son	83,878	0	0
Holloway Bros.	83,592	0	0
Holliday & Greenwood	83,365	0	0
Aird & Sons	82,886	0	0
Shurmur & Sons	82,611	0	0
Moss & Sons	81,966	0	0
Kirk & Randall	81,136	0	0
Hay & Co.	80,761	0	0
Fitt	79,705	0	0
Waring & White (1906)	73,316	0	0
Dick, Kerr & Co. (*recommended*)	69,542	0	0

WE have received a request from Mr. J. N. Milner, the Oneida Community, Ltd., Oneida, New York, to supply him with a list of fireproof-window manufacturers in this country.

TRADE NOTES.

UNDER the direction of Messrs. Singer Hyde & Son, architects, Worthing, the "Boyle" system of natural ventilation, embracing the latest patent "air-pump" ventilators, has been applied to Christchurch schools, Worthing.

A LARGE clock has just been erected in the tower at the Public Park, Tunstall. It has four large dials, and strikes the hours. The work has been carried out by Messrs. John Smith & Sons, Midland Clock Works, Derby, who made the large memorial chiming clock in Tunstall Market Place some years ago.

MESSRS. E. P. ALLAM & Co. announce their change of address from 11 Red Lion Street, Clerkenwell Road, E.C., to 28 Gray's Inn Road, W.C., as and from January 1.

THE United Kingdom Fireproofing Company, Ltd., 47 Victoria Street, S.W., have recently secured the following contracts:—Bromley Telephone Exchange; Chester Telephone Exchange; Northern Insurance Buildings, Glasgow; St. James's Church, New Barnet; Eccles Hall, Drayton Park; new power station, Grove Road; constabulary buildings, Northallerton; new schools, Southbank; Clarence Hotel, Manchester; Ram Hotel, Doncaster; laundry block, Salford Hospital; shops and offices, Chippenham.

THE new schools, Skegness, are being supplied with Shorland's patent warm-air ventilating Manchester grates by Messrs. E. H. Shorland & Brother, of Manchester.

THE new premises of Mr. Ellis, at the corner of High Street and Market Place, Burton-on-Trent, are a noteworthy addition to the town. Mr. Fourshaw, the architect, has made the buildings quite up to date. The facings are of red Heather brick with Hollington dressings, and the chimneys are finished with "Edwardian" pots. The builder is Mr. George Hedges. The steelwork and fire-resisting floors are by Mark Fawcett & Co., of Westminster and Greenwich.

THE Colne Town Council have received the formal sanction of the Local Government Board to borrowing powers to the extent of 750*l.* for the installation of Royles's patent filtration and aerating plant at the new public baths.



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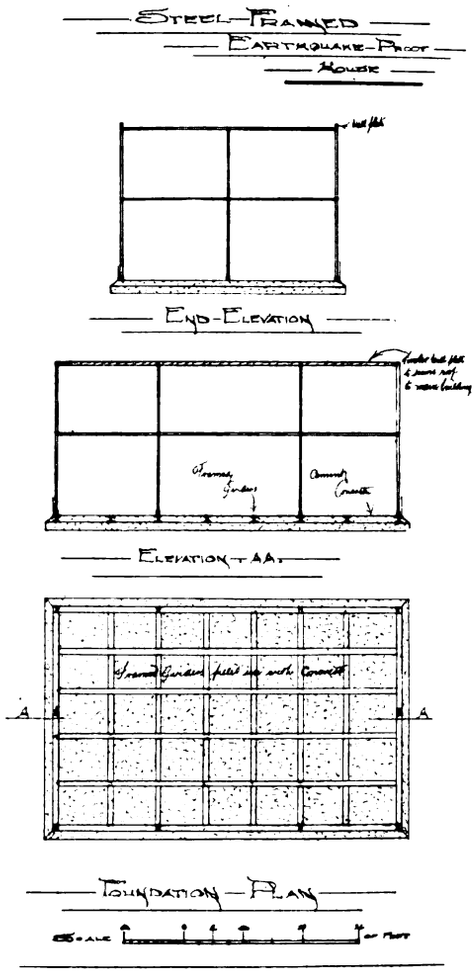
"PENROSE'S PICTORIAL ANNUAL" has now reached its fourteenth volume and it gives pride of place to none of its predecessors. Messrs. A. W. Penrose, of Farringdon Road, E.C., may be said to be as successful with their "Process Year Book" as in the lifts with which their name is associated. The contents are almost bewildering in their variety, though this is inevitable in a book which is a faithful review of the graphic arts for a whole year. There are over fifty illustrated articles dealing with various kinds of process work and kindred subjects. Some of the colour prints are of great beauty, while others would admirably suit their purpose of attracting attention to trade.

MESSRS. VINCENT ROBERTS & MARR, heating and drying engineers, Leeds, have recently carried out the following contracts for heating at Roundhay Congregational Church, Belgrave Central Hall, Harehills Cemetery chapels, Alwoodley Golf Club house, new clothing factory for Messrs. Joseph Hepworth & Son, Ltd., Leeds, and numerous others, and supplied and installed a large boiler for municipal buildings, Leeds. They have fitted their patent drying machinery at the Manchester Royal Infirmary laundry, under Mr. Edwin T. Hall, V.P.R.I.B.A., and for textile work at Messrs. Pyrah & Son, Heckmondwike, and Messrs. T. Liversidge & Sons, Ltd., Huddersfield.

CORRESPONDENCE.

Earthquake-proof Houses.

SIR,—After reading of the horrible scenes and of the loss of life and suffering in Italy, and of the hundreds who would otherwise escape being buried alive in the *débris* from earthquake shock, does it not behove all thinking men, especially architects, to devise some means that will obliterate or in some way lessen the dangers? I beg to submit plans for improved housing in these stricken districts, which, if properly executed, should save the property entirely, unless the shock was sufficient to turn the house completely over. They would certainly meet many requirements both for durability and economy. It will be seen by the drawings, which are void of all intricate, elaborate and unnecessary fittings, the idea is simply to cover the whole site with cement concrete 12 inches deep, and to properly frame on the top of this foundation a framework of iron girders of a like depth, say



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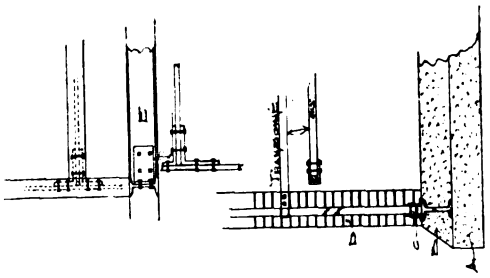
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12 inches, crossed and recrossed, as shown, filled in with cement concrete to the top of girders and splayed on the outside, the foundation concrete to project 1 foot—not more—as in my opinion a projection of, say, 3 or 4 feet would be liable to break off under a very great shock, and therefore less foundation the better. For example, suppose an earthquake seam runs under a house thus built, is it not reasonable to believe that the combustion would glide off to the edge of the concrete, if the said foundation is sufficiently strong, before shattering the house?



Of course, the house must not be merely built on the level foundation, but should have standards attached to the iron girders and built into walls. This class of house should also be exceptionally dry, as the whole site would be made of damp-proof foundation. The framework of iron girders is shown on foundation plan, fixed in position and filled in with cement concrete, and also the proposed position for the mullions of 4 inch by 2 inch solid iron, framed and bolted together, in elevation AA and end elevation. To make these iron fittings would be very simple. The foundation girders could be made in sizes of 6 feet long, the short ones with holes cast, as shown in enlarged detail E; the long girders would be made, say, from 10 feet upwards. The 4 inch by 2 inch solid mullion ties could also be made any size, holed ready for use to fit all requirements, and could be attached to the foundation girders, as shown on detail A, B, C and D, or on any part of the foundation; also it would be very advisable to have the 4 inch by 2 inch ties built into the partition walls, say, on a level with and through the ceiling joists from front to back of house, and, of course, any quantity of these mullions and tie-pieces could be used and built into wall, as in detail D and C, in a 14-inch wall, or in practically any thickness of wall. If this is not the best way to guard against earthquakes' terrible death, I do hope and trust I have been able to offer some advice to those whose lot it is to provide plans and supervise the rebuilding of new homes for the remaining population.—Yours truly,

THOS. PERCIVALE WRAY.

Langthorpe House, Boroughbridge, Yorks.

VARIETIES.

AMONG the recent Government publications is a catalogue of wood engravings after Millais.

VARIOUS schemes, involving a total expenditure of about 60,000*l.*, are under consideration by the Matlock authorities.

MR. WILLIAM RICHARD MILLS, of 4 Constitution Hill, Ipswich, and of Dovercourt, Essex, retired builder, left estate valued at 23,976*l.* gross, with net personalty nil.

THE Local Government Board have sanctioned the borrowing of 37,000*l.* for carrying out a drainage scheme for the borough of Christchurch.

THE Board of Education have signified their approval of the plans for the new Northampton and County school, and have urged that the building should be proceeded with at once.

THE erection of a new hospital for Lewes will be commenced in a few months. The site acquired is on the Downs, and a pleasing design has been prepared by Messrs. Ernest Rüntz & Ford, of Lewes and London.

A LADY with an interest in some property in Birmingham has been fined 5*l.* and costs for attempting to give a bribe of a sovereign to an official of the Corporation's Housing Department who had warned her that she would have to appear in court.

THE extension of the South Shields Post Office buildings is under consideration by the Board of Works in London. Nearly twenty years have elapsed since the present premises were opened, and the business has very greatly increased during that period.

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SOME time ago Sir Donald Currie was approached with a view to inducing him to give a donation to the fund for the erection of a new infirmary in Perth. Sir Donald replied that he was prepared to give a quarter of the cost of a new institution provided certain conditions were observed, the principal of which was that Sir Donald's own architect should be appointed. The directors of the infirmary considered Sir Donald's offer from every point of view, and reluctantly had to forego it on the ground that the time limit was too short, and that the appointment of his architect did not meet with approval.

A COTTAGE hospital is to be erected at Denbeath, N.B., at a cost of about 6,000*l*. The accommodation will include two principal wards, an emergency ward, operating-room, X-rays room, an administrative block, bathrooms, &c. Apart from the building is a mortuary and chapel. The contractors are:—Mason, John Farmer, Methil; joiners, Bruce & Sons, Dundee; slaters, J. & T. Stobie, Buckhaven; plasterer, R. Neaves, Leven; plumbers, Rolland & Co., Dunfermline; electric fittings, Oliver Melville, Kirkcaldy. The work is to be begun in the spring.

MESSRS. SPRAGUE & CO., LTD., of East Harding Street, Fetter Lane, London, forward us a copy of their pocket-book diary and letter wallet. This is one of the most valuable diaries issued, containing as it does so much information valuable to all engaged in connection with the building trade. Messrs. Sprague are the proprietors of the well known process known as ink photo, and our illustrations for the past thirty-nine to forty years give evidence of the high-class nature of this work.

THE Local Government Board have sanctioned an application of the Brampton Rural District Council, Cumberland, for an extensive scheme for supplying the parishes of Brampton, Hayton, Castle Carrock and Irthington with water. There will be between twenty-seven and twenty-eight miles of water mains and three reservoirs, which it is intended to construct of ferro-concrete. The estimated cost of the works is about 16,000*l*. The engineer of the scheme, Mr. Harry W. Taylor, A.M.I.C.E., of Messrs. Taylor, Wallin & Taylor, of Newcastle and Birmingham, has been instructed to obtain tenders for the construction of the works as soon as possible.

THE Stoke-on-Trent Town Council have received a letter from the Local Government Board relative to the application to borrow 650*l*. for a water-cooling apparatus at the electricity and destructor works. The Board are not satisfied as to the necessity for incurring that expenditure, and consider the matter should be deferred pending the settlement of the question of the federation of the Potteries towns. The Council are however of opinion that it is extremely important, both from an economical standpoint, and with a view to safeguarding the uninterrupted continuity of the electrical supply, that the proposed plant should be installed, and therefore a further application will be made to the Board, urging reconsideration of the matter.

THE Bedford Town Council have received a protest from the Carpenters' and Joiners' Union against carpenters being employed on relief works at less than the recognised rate of wages, viz. 7½*d*. per hour. The answer of the Town Council was to the effect that the carpenters were given the work in order to put a shilling or two extra per day into their pockets, and the authorities were certainly not prepared to pay 7½*d*. per hour for the kind of work they were employed in doing.

MR. EDGAR DUDLEY, on behalf of the Local Government Board, held an inquiry at the town hall, Hammersmith, on Monday, in regard to the proposal of the Great Western Railway Company to displace the occupants of a number of dwelling-houses in Providence Place, Uxbridge Road, Shepherd's Bush, for the purpose of obtaining additional access to the company's premises. It was stated that seventy-four persons would be displaced by the scheme and suitable accommodation would be provided for them.

THE laying out of Fitzalan Square, Sheffield, is to be commenced as soon as possible. The Local Government Board have given sanction to a loan for about 8,000*l*. to cover the cost. The square will be laid out in two terraces, one on the level of Market Street, and the other on the low side of the square, reached by five or six steps. Underground conveniences will be provided in the centre of the square, and an office for the tramways department will also be provided underground. When the work is complete, and the new post office and other buildings are erected, the square will be a great improvement.

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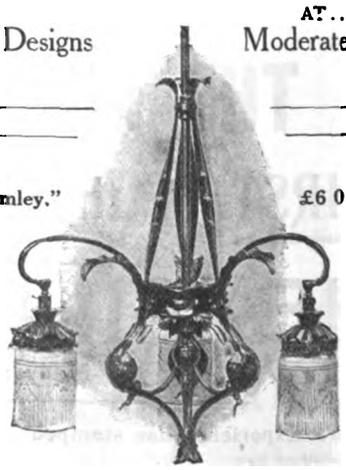


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AN interesting article appears in our issue this week from Mr. Challoner, who, as will be seen, is the president of the Plumbers' Institute. Mr. Challoner has had a considerable experience both in London and the provinces of the plumbing trades, and may rightly be classed as a specialist in his work. He is a Chief Examiner for the City and Guilds of London Institute, and was recently a member of the advisory committee on plumbing to the same authority. As a member of the Blackpool Town Council and the joint hospital committee for the County Palatine his experience has been of particular value in connection with sanitation generally. Although not perhaps agreeing with all our correspondent's remarks in his letter, there are points connected with it which are well worth attention.

THE Turners' Company will shortly give another exhibition of turnery—the thirty-fourth of its kind—at the Mansion House, E.C. The competitions will include turning in both hard and soft wood, the awards being for masters, journeymen and apprentices to the craft, while other prizes will be distributed among amateurs and boys in industrial and training schools. The competitions in pottery will embrace designs in terra-cotta, stoneware, earthenware, and porcelain. Beauty of design, symmetry of shape, utility, novelty, general excellence, and good copying will be rewarded. The Turners' Company have given 50*l.* towards the prize fund, in addition to promising their freedom and membership to the most successful competitors.

A BILL to authorise the Worksop Waterworks Company to construct new works and to raise additional capital has been deposited for introduction into Parliament next session. Power is sought to sink a well and erect a pumping station at Checker House, in Worksop. For the construction of these works, and for the general purposes of the company, it is desired to raise further capital to the extent of 32,000*l.* by auction or tender. The new capital is to bear interest at a maximum rate of 7 per cent. if issued as ordinary capital, and 5 per cent. if issued as preference capital. Upon this sum further borrowing powers are proposed to be exercised to the extent of 10,000*l.*

WORTHING railway station is to be reconstructed by the London Brighton and South Coast Railway Company. The present buildings on the down side will be demolished, and in their place a structure with a frontage of 250 feet will be erected. The chief provision will be a wider platform, a booking hall 60 feet long by 40 feet wide, with ticket office, telegraph office, and bookstall abutting thereon. Adjoining the booking hall will be a luggage labelling space, 30 feet by 30 feet; the general waiting room will be 30 feet by 24 feet, with a ladies' waiting room and retiring rooms adjoining. The principal refreshment room will be conveniently placed, and will exceed 30 feet in length. A new subway under the line will also be made.

THE Local Government Board having refused to sanction the proposed sale by the Hornsey Borough Council of several acres of land originally acquired for workmen's dwellings, the Council proposes to negotiate for the leasing of the land to the Improved Industrial Dwellings Company, which was prepared to purchase the freehold. The Hornsey authority has already erected houses on two sites for 308 families at a capital cost of 95,510*l.*

FROM the Local Taxation returns which were published as a Blue Book on Monday, it appears from the returns of the councils of county boroughs that there were maintained by them public roads and streets of an aggregate length, at the commencement of the year 1905-6, of 8,816 miles, and that the expenditure on the maintenance and repair of such roads and streets during the year amounted to 1,268,627*l.* This represents an average cost of 144*l.* per mile. As regards the non-county boroughs, the aggregate length, at the commencement of the year, of the main roads maintained and repaired by the councils under the provisions of sub-sections 2 and 4 of section 11 of the Local Government Act 1888, was 1,242 miles (excluding any such roads in the new boroughs), and that the expenditure on the maintenance and repair of these roads amounted to 261,643*l.*, being at the rate of 211*l.* per mile. The total length, at the commencement of the year, of roads other than main roads maintained by the councils of non-county boroughs (excluding roads in the new boroughs) was 4.612 miles. The expenditure on the maintenance and repair of these roads during the year amounted to 479,589*l.*, and represented an average cost of 104*l.* per mile. The amounts of expenditure mentioned exclude sums shown as received from accounts of the councils incurring the expenditure.

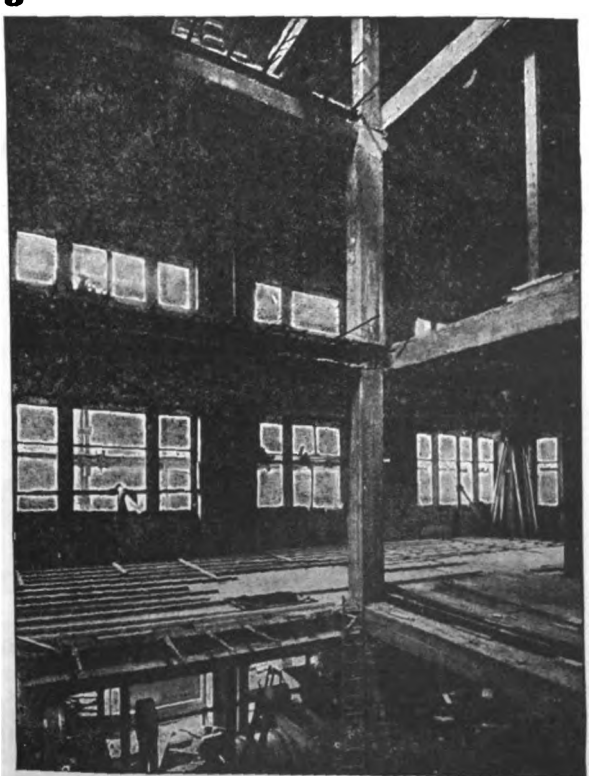
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MR. JUSTICE PARKER recently gave an important decision in an action brought by the Midland Railway Company, who endeavoured to show the Derbyshire Council were responsible for keeping in repair a bridge and approaches thereof. The bridge carried the highway over the railway. The road had been to this extent diverted from its old form by the company under their statutory powers when they got leave to build their line. They had to build the bridge according to certain statutory specifications as to width and elevation, and several sections of the Railway Clauses Act provide that a railway thus bridge building shall "continue" such bridge. Mr. Justice Parker held that this duty to continue included responsibility for maintenance of the bridge and also of all its approaches, and of such fences to them and to the bridge as statute ordained the railway to construct, when the road diversion for their benefit was first made by them.

A SANITARY JUBILEE.

FROM A CORRESPONDENT.

IN January 1859 a paper was read before the Glasgow Architectural Society by Mr. John Honeyman, architect (now Dr. John Honeyman, R.S.A.), on the ventilation of sewers and soil drains, and it was accompanied by a full-size section of the trap he had invented to attain that end. Up to that time the old syphon trap, with an eye in the centre of the tongue and which usually left no water seal, had been in use. The cardinal difference in the new invention was that an eye was made at each side of the tongue, and the outfall half of the trap was sloped away with a parabolic curve instead of a circle. This not only provided the means of ventilating either section of the drain as circumstances required, but it greatly facilitated the cleansing of the trap even if a long way below the surface. This invention is now to be found throughout the world, although in few cases is its place of origin acknowledged or even known. Minor alterations (not always improvements) have been carried out from time to time, but the drain is substantially the same as was first brought under the notice of experts fifty years ago.

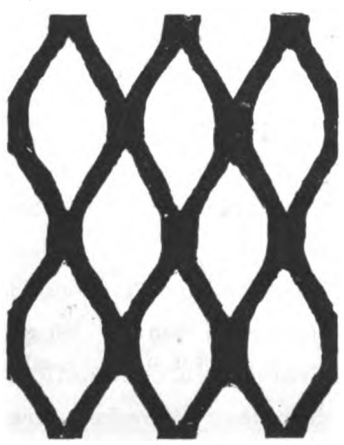
It is a far cry from sewer ventilation to the designing of racing yachts, yet Mr. Honeyman has acknowledged that one of the new ideas in his invention was the outcome of a close study of the illustrations of the United States schooner-yacht *America*, which in 1851 captured the famous cup in a race round the Isle of Wight. The long hollow bow and flat-cut sails were in direct opposition to the then prevailing British theory that a fast boat must have a cod's broad head and a mackerel's slender tail. The victorious challenger was a practical demonstration of the truth of the wave theory which Mr. Scott Russell had propounded earlier to a highly sceptical world. Her lines were known as wave lines, and with good reason—sharp forward and rounding in more abruptly towards the stern. This principle was the very opposite of that followed in designing English racing craft, though it was not unknown on the Firth of Forth among the Newhaven fishing boats.

It occurred to Mr. Honeyman that the curve which allowed a solid body to be most easily driven through water would, if reversed on a solid body, allow water to pass over it most easily. Consequently the longitudinal section of his trap was made on the wave-line principle.

The discovery first met the same fate which has befallen many others before and since (and which no doubt will continue to obstruct the path of improvement), viz. temporary neglect. For over ten years it was ignored by the trade. Ultimately it was taken up by a Glasgow plumber, Mr. W. Buchan, who made slight improvements with the concurrence of the inventor. But in the forty years that have since elapsed the trap has been steadily extending its sphere, and now it must be known on all the four continents. To many contractors it will be more familiar under the title of "Buchan's Trap" or "The Buchan Trap."

MR. EDWIN SEWARD, F.R.I.B.A., chairman of the Cardiff executive of the N.S.P.C.C., states that some of his friends are willing to offer a few prizes for designs or models showing how an adjustable screen of wire or other material could be readily locked to the front of a firegrate by the person quitting a room occupied by a child or children, so as to prevent the many deaths by burning.

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TECHNICAL EDUCATION.

By WILLIAM CHALLONER, President of the Institute of Plumbers.

IT may be of interest to take a retrospective survey of the ideals that prompted the Technical Instruction Act of 1889, and which resulted in the general establishment of technical classes for the training of craftsmen and potential directing heads of the various trades or branches which are more or less associated under the description of Building and Allied Trades. In order to fully appreciate these ideals and the conditions which dictated them, it will be necessary to consider briefly some of the pre-existing systems by which continuity of efficiency was maintained in certain trades which depended upon more or less skilled craftsmanship and knowledge of technique, as also the growth of circumstances which rendered these systems inoperative, or the decadence of the systems themselves.

By this means it may then be possible to estimate to what extent these ideals have been realised, and how far existing industrial and commercial conditions have retarded the realisation of advantages to workmen, employers and the public which higher technical training is intended to confer.

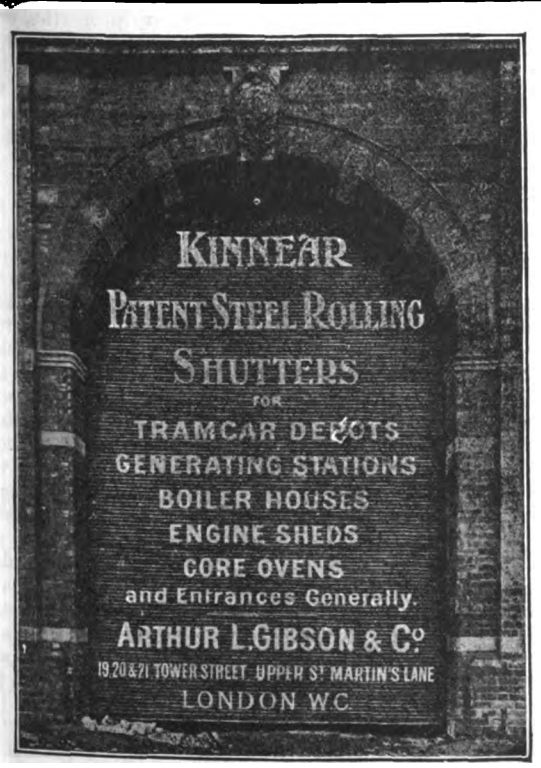
In many branches of the building and allied trades, partly owing to combinations of labour for purposes other than those of the efficient training of workmen, the old system of indentured apprenticeship had almost passed out of existence, and except in a few isolated districts and trades, remained as little more than a tradition. This left the so-called apprentice to shift for himself, it being outside the obligation of either master or man to see that he was taught his trade. It is true that in a few exceptional cases, owing to the influence of the parent or an unusually premature wisdom on the part of the boy himself, the apprentice might be found who took a special interest in his work, and devoted some of his leisure to the acquisition of knowledge necessary to supplement the ordinary training he could obtain during his hours of regular employment. The inevitable result of any such personal effort was encouragement and assistance from both his employer and the men with whom he was associated, and the youth who thus spontaneously followed such a course became eventually at least a leading man, if not a foreman, especially in those branches in which a combination of skill in craftsmanship and knowledge of fundamental scientific principles were necessary or advantageous.

Such cases, however, had become more and more the exception, and declined rapidly when and where trades unionism discounted efficiency by a standardisation of remuneration in which skill and knowledge were not considered as appreciable factors.

Although not within the scope of the present article this same influence (with perhaps one notable exception) has been responsible for an absence of the spirit of sacrifice and enthusiasm upon which the best educational facilities must depend for successful results.

The provision of convenient and cheap, if not free educational facilities, was designed to place within the reach of all the advantages which the anxious and painstaking apprentice had previously been at some considerable trouble to obtain. The result anticipated was an increase in the proportion of skilled craftsmen, if not the complete disappearance of the incompetent or "just in" workman, who either worked for lower wages, or whose discharge was already made out, ready for the time when heads were not required merely to count.

It does not appear to have been anticipated that once these classes were opened any further inducement would be necessary to secure the attendance of those for whom they were provided. In fact, in most cases the classes appear to have been intended to supplant indentured apprenticeship and shop or works' training, instead of supplementing the control which without an indenture could not secure the attendance which experience has shown will not be general if it depends upon the voluntary effort of the apprentices. It may be assumed that classes for technical instruction have been established sufficiently long to enable an estimate to be formed of how far they have contributed to the general improvement of the crafts they were designed to benefit, and also if the advantages for which they can justly claim the credit bear a proportionate value to the cost of the classes and the expenditure of time on the part of the limited number who attend them. Taking the longest technical course as five sessions it would give some four generations of workmen who have had the opportunity of participating in such advantages as are conferred by these classes; and although, for reasons which may be considered later, the



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number of those availing themselves of the privilege has been but a small proportion, there have been sufficient to test the value of the classes in attaining at least the direction which would ultimately lead to the ideal which prompted their establishment. It cannot by any stretch of optimism be claimed that the improvement generally, or in any branch, shows an adequate return for the outlay in time or money. Workmen who "think" are not proportionately more numerous than before these facilities for technical training were placed within easy reach.

To appreciate the reasons for this whole or partial failure it is necessary to consider briefly some of the conditions, or rather omissions, in connection with the several factors upon which the anticipated results of this educational movement depended.

For many of the earliest students who attended the first courses at the newly established technical schools novelty was the enticement. But owing to the absence of connection between what little had survived of the knowledge received at the elementary schools and the higher technical subjects with their application, the task proved too great a mental effort, and this class of student became rapidly a decreasing quantity and had disappeared entirely when the time for examination arrived.

It is true there were in every district a few enthusiasts who had been waiting for the opportunity thus offered, but their number was inconsiderable, and for reasons to be submitted later they did not directly influence the general efficiency of the trades they represented.

(To be continued.)

NEWPORT BRIDGE.

IN consequence of a general feeling of uneasiness as to the stability of Newport Bridge in Monmouthshire, the Corporation recently instructed Mr. R. H. Haynes, M.I.C.E., the borough engineer, to prepare a report on the subject.

Newport Bridge, built in 1800, was widened in 1865-6; while in 1892, upon the bridge passing under the control of the County Borough (formerly it had been a county bridge) it was widened and the western approach raised. The bridge has a total length of 475 feet, and a width from face to face of the arches and spandril walls of 24 feet 3 inches. It has five arches and four inner piers. Three different classes of stone are found in the structure.

Considerable differences of opinion exist as to the necessity for widening in order to provide for the existing traffic, not a few expressing the view that except on special occasions the bridge is sufficient for the normal movement. Mr. Haynes expresses no opinion on that point. Assuming that improved cross-river communication is necessary two main questions present themselves—(1) the best means of widening Newport Bridge if on investigation widening be found practicable and economical; (2) the erection of a new bridge should widening prove too difficult or costly.

Recently trial holes have been sunk on the western side of the piers, and borings have been made on the southern side of the piers. No apprehension need at present be felt with regard to the strength of the footways. So long as the bolts remain in good order the footways will be stable. During the work of renewing the footpaths in 1892 the spandril walls showed signs of movement. Recent measurements indicate that this movement has appreciably increased in the interval. The western abutment wing walls are plumb on both sides. The eastern abutment north wing overhangs a maximum dimension of four inches in a height of 18 feet, but has not recently shown signs of movement. One of the arches is cracked in four places in the eastern haunch and water sweeps through a haunch in another arch.

According to text-books rubble masonry should not be loaded to a greater extent than four tons per square foot. Portions on the arches of Newport Bridge are now carrying more than three and a half times that load. During the passage of a heavy road locomotive, hauling a train of wagons, the vibration in the structure was surprising. Vibration especially when progressive is a notable cause of deterioration in masonry structures, and must eventually result in extensive mischief, not the less dangerous because it is unseen. There are various reasons for regarding the arches with distrust. The overloading of the structure is the more serious because investigations have shown that the foundations of the piers are unsatisfactory. Three of the piers rest upon sand and silt, and careful research for piles was made without effect.

Mr. Haynes discusses the possibilities of reinforced concrete bridges, points out their advantages and difficulties, and leaves it to the Corporation to come to a decision. He discusses the possibility of widening or otherwise patching up the old bridge, but points out that it is economically unsound, and therefore turns to the question of the most suitable type of bridge. Three principal factors are considered—capital cost, low maintenance charges, and durability. A stone bridge best filled the two latter conditions, as its maintenance costs practically nothing. A steel bridge is less expensive in first cost, but its maintenance is a considerable item when capitalised, and its life probably shorter than that of any other. During recent years reinforced or armoured concrete has been extensively adopted for bridge structures of all kinds and possessed great merits. In the present instance a steel bridge has peculiar disadvantages; and the general strain of the report points to armoured concrete as the most suitable material.

Mr. Haynes puts forward alternative schemes for a stone or armoured concrete bridge to replace the present structure, and for a new armoured concrete bridge about 80 feet north of the present one. This would be 50 feet wide between the parapets. It would be level from the western abutment to the eastern pier, when it would fall a gradient of 1 in 25 to the eastern approach road, which would have a similar gradient. This road would curve southward and form a junction with Clarence Place immediately opposite the site of the Technical Institute. The opening at the point of junction would have a width of 120 feet between the kerbs. The western approach would have a slight rising gradient 1 in 296 from Shaftesbury Street. The junction with that street would be formed by curves extending northward and southward, giving a width of nearly 90 feet between the kerbs at the point of junction. The curve to the southward would cut through the Shaftesbury Hotel, and so arrange as to effect a widening of Shaftesbury Street opposite the Castle Hotel. The western approach would pass through the southern and central towers of the Castle, joining up to the bridge at the Castle walls. The purchase of land and properties would be a serious item in the total cost. The proposal was a perfectly practical one, though it was but fair to point out that apart from its costliness it had certain physical disadvantages. The original suggestion to place the bridge and western approach between the northern and central towers of the Castle had been abandoned owing to serious disadvantages which it presented on detailed investigation of its possibilities. The cost of this scheme, including the purchase of all the necessary properties, trade compensation, and works, but excluding any legal or engineering costs, was estimated at 79,000*l*. If a stone bridge was substituted for a concrete bridge the cost was estimated at 116,000*l*. A concrete bridge could be erected in fifteen months, a stone bridge in two and a half or three years.

Mr. Haynes also submits a plan for the removal of the existing bridge and the substitution of a new bridge 50 feet wide between the parapets. This scheme would include the erection of a temporary bridge to the northward of the present structure. This temporary bridge would be approached on the western side of the Castle site between the southern and central towers, from the eastern side by a temporary roadway through the site now occupied by workshop building. The temporary bridge would be 30 feet wide and would be constructed on timber tressels and side spans, with a steel central span of a width suitable for the steamboat traffic to and from the Crindau gasworks. The new bridge would have a roadway of 32 feet 6 inches wide, with two lines of tramway laid in the central position, giving a statutory clearance between rails and kerb. The footpaths would be 8 feet 9 inches wide. The estimated cost of the scheme, including a stone bridge, temporary timber bridge, temporary and permanent rearrangement of mains and tramways, road and footway works, purchase of properties at the eastern end but excluding the purchase of any land on the Castle site or engineering or legal expenses, was 91,000*l*. If an armoured concrete bridge be substituted for the stone bridge, all other items remaining the same, the estimated cost is 56,000*l*.

Mr. Haynes concluded that a new bridge on the site of the existing one would be less expensive in the first cost and would possess additional certain merits. Disturbance of properties would be reduced to a minimum, no part of the Castle site would be permanently appropriated, and except during reconstruction there would be no deviation of the main traffic artery. The balance of advantage was altogether in its favour, and it was recommended as the proper solution of the problem. He hesitated to express a very decided view with regard to the continued stability of

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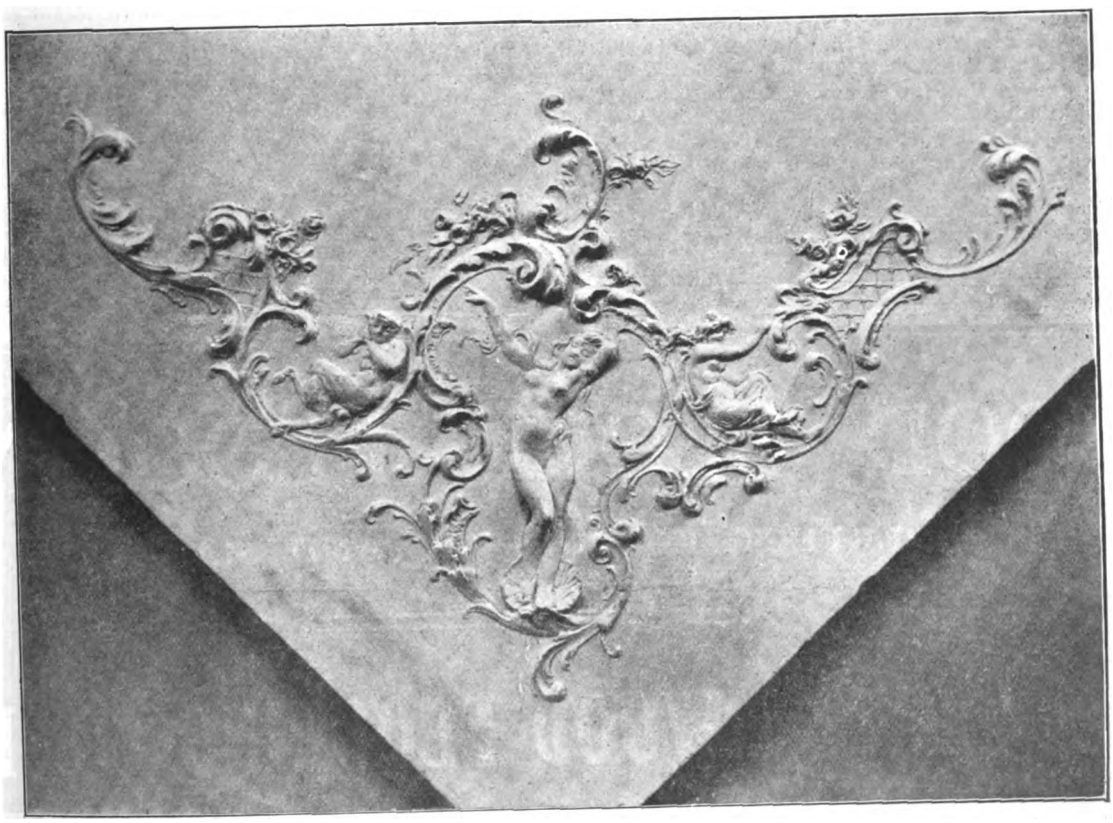
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the existing bridge, but bearing in mind that it was built to accommodate what might not unfairly be described as village traffic, that it is now carrying the traffic of a great community for which it was never intended, as well as other matters of design and structural fitness, it must be said that its construction cannot be indefinitely postponed and should not be delayed.

FALMOUTH Corporation have under consideration an application for permission to establish a system of electric railless traction. Schemes have been carried out in other places, particularly on the Continent, with successful results. The object of the railless system is to run in towns where the traffic is manifestly insufficient to support an ordinary electric tramway, and the system is especially designed for places where the streets are too narrow to permit of rails being laid because of the interference with ordinary traffic. The control arm allows the cars to deviate 10 or 12 feet on either side, and to steer in and out of the traffic and follow the convolutions of roads and streets. It is hoped to be able to secure the current required from the Falmouth Electric Light Works. If permission is obtained to run the cars through the main streets a definite scheme will be prepared with estimates of cost of construction and equipment, and an effort will be made by the parent company to form a local company to finance the scheme.

THE Tees Conservancy Commissioners at Middlesbrough have received inquiries during the year with respect to the purchase of reclaimed land, principally on the north bank of the river Tees, for the erection of large manufactories and other works. One existing disadvantage is the want of road and railway communication between Grantham Creek and Seaton Snook, but this is about to be met by the North-Eastern Railway Company, who had undertaken to construct the roads and railways required. With regard to the reclamation of land on the south side of the river arrangements are being made which would enable deep-water wharves, ironworks, manufactories, &c., to be constructed between Eston Jetty and the Redcar Wharf, close to the navigable waterway similar to those now existing at Middlesbrough.

MOTORS AND ROADS.

A CONFERENCE was held recently in Glasgow between the Scottish Automobile Club and the road surveyors of Scotland.

Mr. Robert Drummond, road surveyor for the County Council of Renfrewshire, read a paper on "The Work of the International Road Congress in Paris last October, and the findings come to as bearing on the road practice in this country." Before dealing with his subject proper, Mr. Drummond, by way of connecting the past with the present, made reference to the unsatisfactory condition of many of our highways in this country between the abolition of the old toll system and the passing of the Local Government Act of 1890, in the course of which he pointed out the improvements effected through the introduction of the steam roller. There were now 250 steam rollers, with forty or fifty motor tractors, employed by the County Councils of Scotland, as well as a large number of boring and breaking machines, the probable cost of which was 200,000*l*. He next dealt with the changes which had taken place on our road systems as following the advent of the motor and the other self-propelled modern vehicles, and said that at the recent Congress there was considerable discussion over the questions of speed and weight of motor-cars and mechanical transports. The Congress made a sharp distinction between town roads and rural roads, and it was universally acknowledged that macadam was as yet the best known and the most suitable material for roads in country districts. The raising of dust by quick-going machines and the forming of separate roadways were also considered. With regard to the dust nuisance it was urged that tarring was undoubtedly an efficient remedy, and one roadway, with a width of six metres, or 19 feet 6 inches at least, was, proportioned to the intensity of traffic, recommended, saving in exceptional cases of broad pleasure avenues of which several roadways might be formed. The effects of the means of locomotion was one of the outstanding questions at the Congress. There was no doubt that the running of fast motor-cars with pneumatic tyres caused the disintegration and uplifting of the smaller particles of road materials. The greater the speed the more this condition was accentuated. Too sudden an increase in

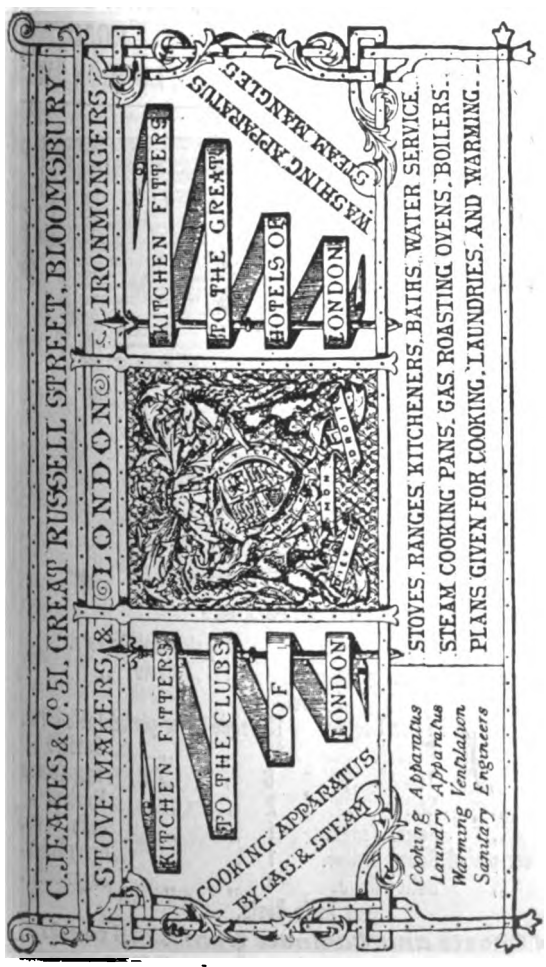
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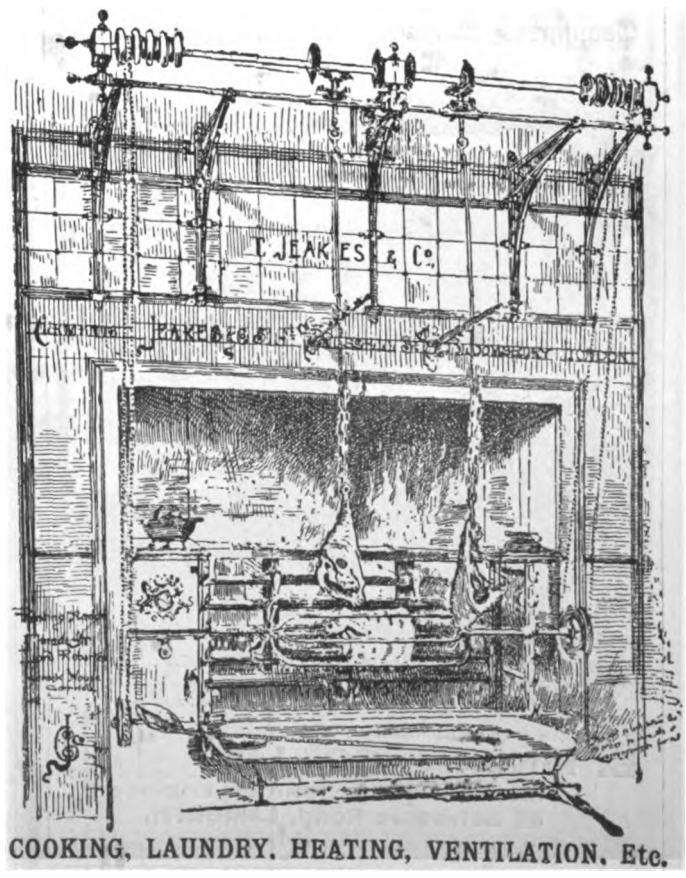
speed, as well as too sharp an application of the brakes, considerably increased the damage to the surface, while all changes of speed also did harm, but in less degree. In taking the curves, the action of the centrifugal force was added to the ordinary effects of speed and considerably increased the damage. It was important to reduce that damage as much as possible, and that could be done by using pneumatic tyres or shoes or covers exclusively of pliable materials, which simply meant that the tyres of the wheels of heavy motor-cars or traction engines should be smooth. It was admitted that the running of heavy motor-cars had a tendency to damage the road principally by causing depression and ruts, and to avoid this it was important that the pressure per running inch should be moderate in relation to the resistance of the road to shear. All automobile vehicles employed for public conveyance might be advantageously used without injuring the road to any appreciable extent if kept at a reasonable weight and within a reasonable speed, and a formula was suggested and embodied in the conclusions of the Congress reducing the weight at present allowed by one-fifth. There was great diversity of opinion over this question, not a few remarking that many of the heavy motor-cars to be seen on the roads were much too heavy, and that in point of fact they were little else than traction engines in disguise. In this connection it was found to be difficult, in the present condition of the roads and of the automobile industry, to arrive at a satisfactory solution of the difficulties arising from the traffic of motors. But in order to affirm the data and make them more complete, the Congress considered it desirable to collect exact particulars controlled by competent authorities, so as to determine the relations to be kept between the constitution of the roadways, the power of resistance of structures connected therewith, and the speed, right width of rims, diameter and nature of the tyres of the vehicles, the method of suspension, the number of axles, and their distance apart. The conclusions arrived at by the Congress, however, clearly showed that the modern traffic problem was a very serious one. With regard to damage caused by weight, the general opinion was expressed that some alteration was required in the size of the wheels on heavy motors. There was a lack of due proportion between diameter of wheel, breadth of tyre, and load carried. As small wheels if heavily loaded had the tendency to push or move stones out of their places they were most destructive to road surfaces, and no additional breadth of tyre would compensate for want of diameter. He was of opinion that however well the surface of a macadamised road might be formed, nothing short of an "armour"-proof road would suffice to resist the action of heavily-loaded motors; but in this matter motor-car manufacturers could greatly assist by altering their designs, and thereby show some regard for existing public roads. The Scottish road surveyors certainly recognised that it was their duty to construct and maintain the public highways in a condition fit to carry all traffic legalised to pass over them, and a great advance generally, and particularly towards coping with the new means of locomotion, had undoubtedly already been attained, whilst the results of recent experiments would also encourage local authorities to surface all roads in or around urban areas, villages, and popular places with material such as tar macadam or tar spray for the abatement of the dust nuisance. Regarding the roads in the country, they were gradually being improved by using the best material both in metal and hard binding, widening metal beds by filling up deep side channels, and obtaining a good side resistant, as well as reducing the camber to make it suitable to the requirements of all traffic. The standard of road maintenance in the interests of the public had altogether been very much raised since the inception of the County Council.

In Renfrewshire, in 1890-1, 23,505*l.* was spent on the highways, and in 1907-8, 35,710*l.*, showing an increase of annual expenditure of 12,215*l.*; whilst Lanarkshire in the same two periods spent 53,710*l.* and 89,805*l.* respectively, or an annual increase of 36,098*l.* Taking the whole expenditure over Scotland for the same periods, there was an annual increase of over 50 per cent.

The question might very well be asked, however, how was any further serious expenditure to be met without creating undue burdens upon the local ratepayers? Officially it was not customary, Mr. Drummond continued, for surveyors to discuss or suggest where money was to come from, their duties being confined to advising what sums were required, and after obtaining the sums requisitioned to spend them to the best advantage; but as they were there



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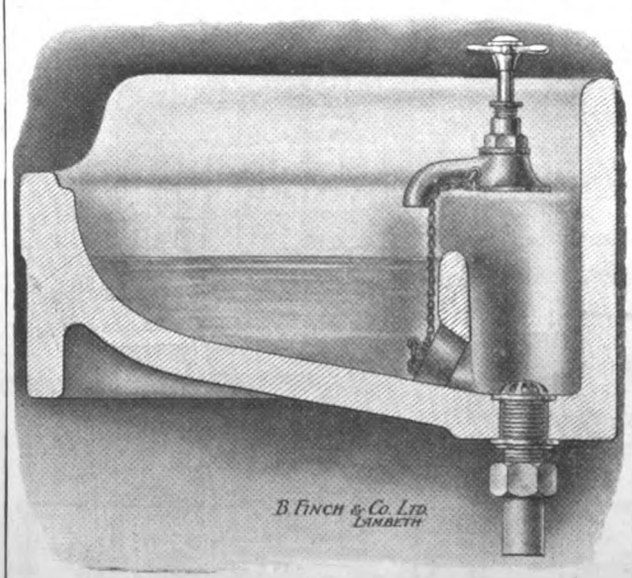
to discuss matters non-officially the question of finance might be touched upon, for after all was said any drastic change in the methods of road maintenance meant increased expenditure. Now he considered that all roads in urban and populous places might be surfaced with materials treated with tar in some form without unduly increasing the expenditure, and the results of experiments showed that road surfaces treated with tar tended to economy in many ways, and gave added comfort to the inhabitants. But no matter what steps might be taken by local authorities towards strengthening and improving our roads, their surveyors would have to advise them that unless some moderation was effected both in the speed and the weight of motor traffic, nothing short of a bituminous binding would serve to keep in good order a macadamised surface, however good the materials used in it, and however well it might be kept. It was nothing unusual nowadays for a new coating of metal to be applied on our main lines, rolled hard, and finished to a proper contour with altogether an excellent surface, but in three months' time the surface would be tracked and pitted with "pot" holes at irregular intervals by motors, and it was nigh impossible to repair the damage without scarifying and re-rolling. Any attempt to repair those pot holes with patching metal was rendered abortive in view of the fact that the first fast car that came along and was carelessly driven would undo in a few minutes the whole day's work of the surfaceman and scatter the material in all directions. It was the settled opinion of all surveyors that motorists could help matters very much with a little care, and with some consideration for the road. Many stretches of the main roads had been surfaced under the expectation that motorists would be induced to shift their line from the centre, but no good results had been attained. Taking into consideration the condition to which the roads had been brought, and which might be said to meet all reasonable requirements, he thought that inconsiderate driving was largely responsible for the damage caused. By inconsiderate driving he meant excessive speed and adhering to one track. Beyond this, of course, there was the question of weight and steel-studded tyres. There was another side to inconsiderate driving, a side, too, which was not generally remembered by motorists—that it was as easy to bespatter other users of the road with mud in wet weather as to becloud them with dust in dry weather, even although they might be on the footpath. In concluding, Mr. Drummond remarked that he thought he had said enough as a contribution towards the evening's discussion, and he would only hope that a solution of this question satisfactory to the users of the road would be reached in the near future, although he rather doubted it might not be quite so satisfactory to them as ratepayers.

THE West Bromwich borough surveyor has submitted plans and estimates for fencing, levelling, and laying a drain through the land at Bromford Lane, for the purposes of allotments. The estimated cost is 1,200*l*., and the committee recommend that the work be carried out, and application be made to the Local Government Board for sanction to borrow the money.

MR. C. F. WIKE, city surveyor, Sheffield, in his annual report, states that the number of houses erected and certified for occupation during 1907 was 1,753, and as compared with the number (1,904) certified during the previous year shows a decrease of 151 houses, or 7.9 per cent. This is a less number than have been erected in any year since 1897, when the boom in the building trade first made itself felt. These figures bring up the total number of houses erected in the city under the Sheffield by-laws since the year 1864 to 50,647. Other buildings have been completed during the year to the number of 358, an increase of sixteen on the number (342) completed in the previous year. There are nearly 400 miles of streets in Sheffield. Nearly twelve miles of new roads were added during the last year. Of the 400 miles, 299 are "adopted" and 97 unadopted. New sewers 10½ miles long were constructed last year. There are still 44 miles of rubble sewers needing reconstruction. Last year 5½ miles were dealt with. The average number of workmen in the highway department last year was 1,812. The highest number employed during the year was 2,209. Workmen's wages totalled 106,715*l*., an average of 1*l*. 2*s*. 8*d*. per man per week.

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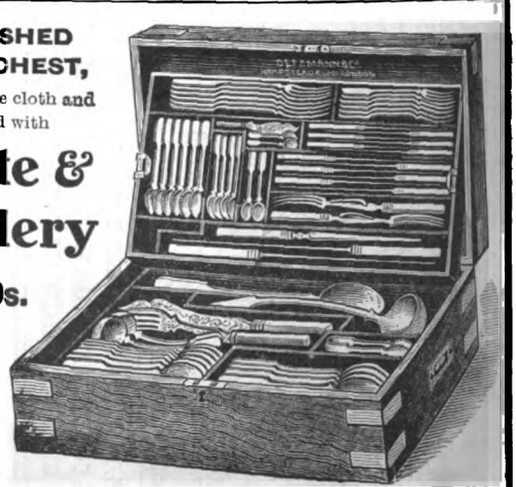
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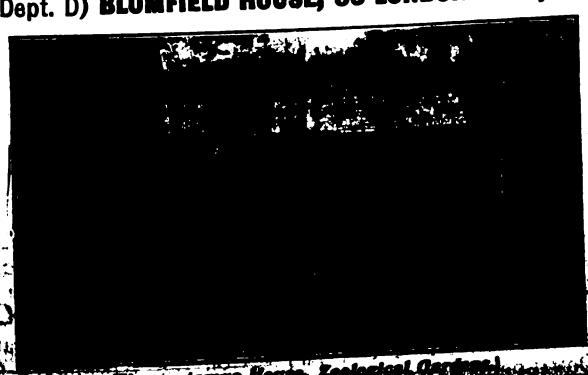
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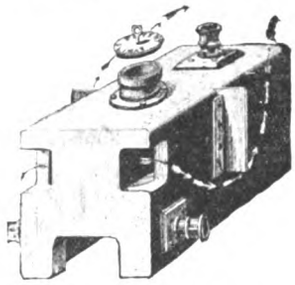
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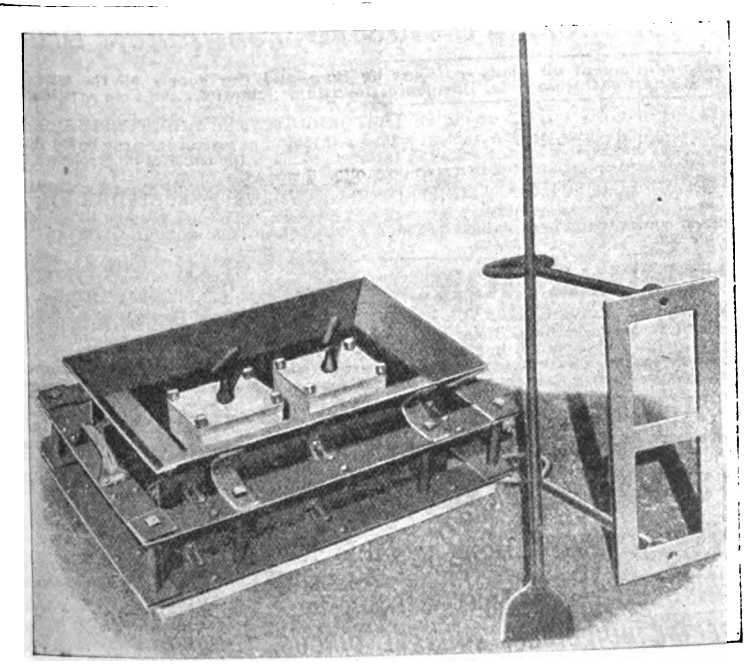
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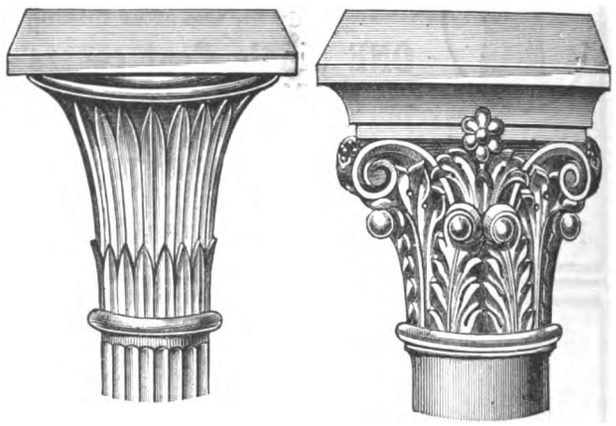
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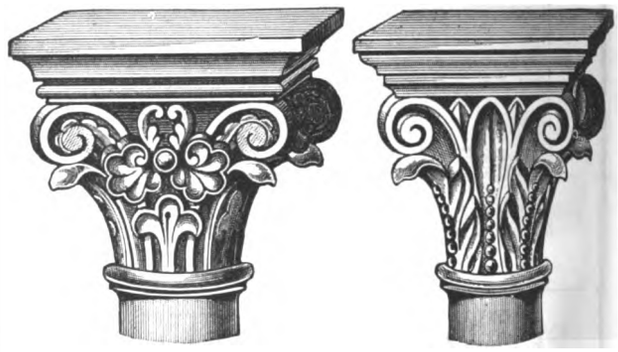
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EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

*** *As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than* 2 P.M. *on Thursdays.*

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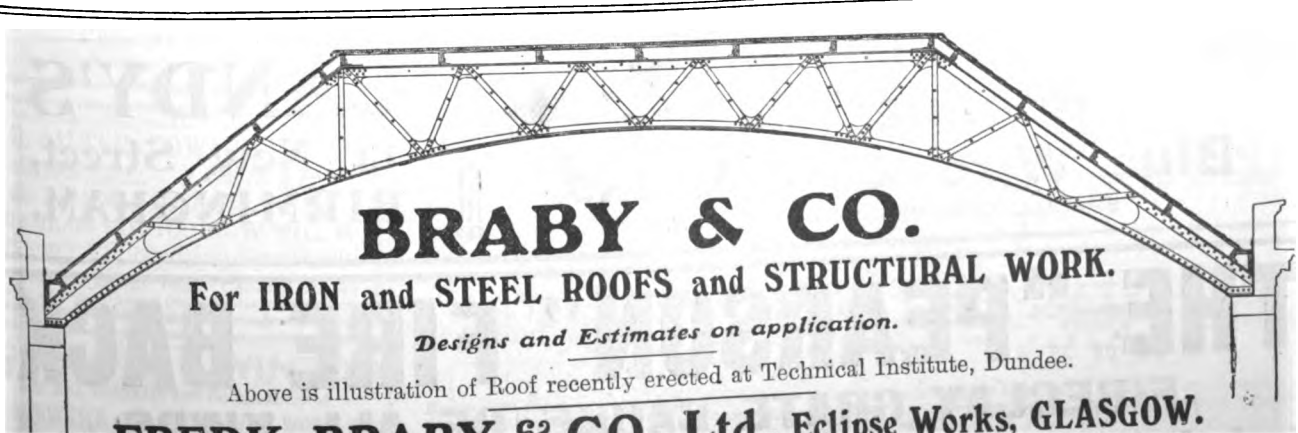
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HALIFAX.—Jan. 18.—For rebuilding retaining wall at Pellon recreation ground. Deposit 1*l*. Mr. James Lord, C.E., borough engineer, Town Hall, Halifax.

HOUGHTON-LE-SPRING.—Jan. 16.—For construction of underground public convenience in Newbottle Street. The Surveyor of the Council, Newbottle Street, Houghton-le-Spring.

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SCOTLAND.—Feb. 4.—For taking down existing timber bridge over river Annan at Woodfoot, about two miles from Beattock station, Dumfries, and supplying and erecting new steel girder bridge of three spans, for Lockerbie district committee. Deposit 1*l.* 1*s.* Messrs. Crouch & Hogg, C.E., engineers, 14 Blythswood Square, Glasgow.

SCOTLAND.—Jan. 18.—For mason, carpenter, slater, plaster, plumber, painter, glazier and heating works at United Free Church, Methlick. Messrs. D. & J. R. M'Millan, architects, 105 Crown Street, Aberdeen.

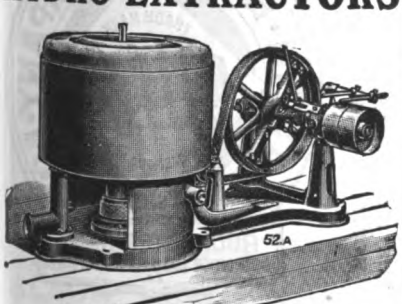
SEAHAM HARBOUR, &c.—Jan. 19.—For erection of temporary Council school at Seaham Harbour. Alterations and improvements at Middlestone Moor, South Frosterley, Easington Lane and Hedley Hill Council schools. Mr. F. E. Coates, A.R.I.B.A., Shire Hall, Durham.

THRYBERGH.—Jan. 19.—For erection of working men's club, Thrybergh, near Rotherham. Mr. P. A. Hinchliffe, A.R.I.B.A., 14 Regent Street, Barnsley.

THURNSCOE (YORKS).—Jan. 18.—For alterations and improvements at Thurnscoe Sewage Disposal Works, comprising secondary contact beds, sludge well, sludge filters, storm-water carrier, and laying out land filtration area. Mr. Henry Smith, engineer, Compton Buildings, Bow Street, Keighley.

TIDWORTH.—Feb. 1.—For erection of army ordnance receiving-shed, general stores, offices, &c., also clothing, camp and mobilisation stores at Tidworth. Deposit 10*s.* The Director of Barrack Construction, 80 Pall Mall, London, S.W., or at the Barrack Construction Office, Tidworth.

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WALES.—Jan. 16.—For erection of a mixed and infants' school at Blaina, Mon., to accommodate 510 scholars. Deposit 3*l.* 3*s.* Mr. C. Dauncey, secretary, County Council Offices, Newport, Mon.

WALES.—Jan. 19.—For erection of twenty-two houses at Kenry Street, Ynyswen, Treorchy, Rhondda Valley. Mr. W. D. Morgan, M.S.A., architect, 194 Ystrad Road, Pentre.

WALES.—Jan. 23.—For erection of twenty-eight workmen's dwellings at Cwmbach, also twenty-two at Godreaman, for the Aberdare Urban District Council. Surveyor's Office, Town Hall, Aberdare.

WALES.—Jan. 26.—For erection of large villa residence, Bolgoed, Pontardulais. Mr. W. Beddoe Rees, architect, 3 Dumfries Place, Cardiff.

WALES.—Jan. 26.—For electrical work in connection with new factory about to be erected at Cardiff, including alternatives and exciters, high and low pressure switchboards, and all necessary wiring, for the Boston Collapsable Barrel and Manufacturing Company, Ltd. Deposit 5*l.* Mr. Walter Sayer, superintendent, 79 York Road, London, S.E.

WALES.—Feb. 4.—For erection of six dwelling-houses at Port Tennant, Swansea. Mr. Talfourd Strick, clerk, Harbour Offices, Swansea.

WALLASEY.—Jan. 22.—For erection of buildings in connection with extension of refuse destructor, Gorsey Lane, Poulton. Deposit 2*l.* Mr. W. H. Travers, A.M.I.C.E., Public Offices, Egremont, Cheshire.

WATERLOO.—Jan. 29.—For erection of Council school for 100 children at Waterloo, Hants. Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

WORKSOP.—Jan. 19.—For erection of cycle house at workhouse, Eastgate. Mr. Thomas Webster, architect, Market Street, Worksop.

WORTHING.—Jan. 21.—For erection of public elementary school at Broadwater. Deposit 2*l.* 2*s.* Borough Surveyor's Office, Worthing.

YORK.—Jan. 30.—For construction of temporary timber grand stand (to seat about 5,000 persons) in Gardens of Yorkshire Philosophical Society. Deposit 2*l.* 2*s.* Mr. F. W. Spurr, city engineer, Guildhall, York.

TENDERS.

ASFORDBY.

For Council school for Leicestershire County Council education committee.

Deacon	£4,695 0 0
Burnett	4,634 0 0
Hockley & Co.	4,566 0 0
Frisby	4,547 0 0
Griffin Bros.	4,436 0 0
Robinson	4,431 14 0
Cole & Sons	4,397 0 0
Moss	4,380 12 0
Scurr, Jowett & Co.	4,376 0 0
Haycock & Sons	4,340 0 0
Fox	4,325 0 0
Clarke	4,262 0 0
T. & H. Denman	4,170 0 0
COBAH & SON, Loughborough (*accepted*)	4,123 0 0

BROWNHILLS.

For the following works for the Brownhills Urban District Council, Staffs:—(1) Erection of stables and conversion of old building into cartsheds, &c., at Norton Canes; (2) supplying and fixing one 14-b.h.p. gas engine and gas-suction plant and pumps at the Mosspits pumping station. Mr. J. H. SHAW, surveyor, Brownhills.

Stables, &c.

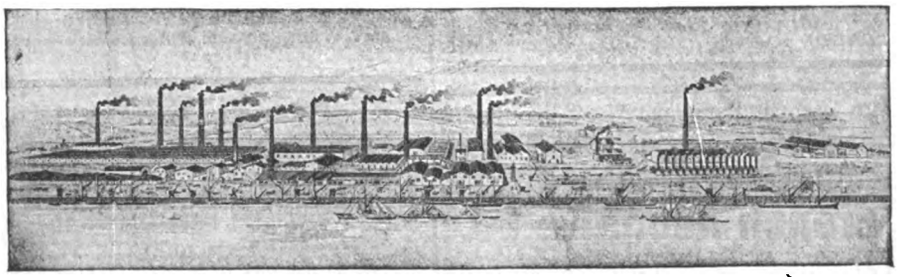
Harris	£158 0 0
J. & F. Wootton	155 0 0
Goodall	149 10 0
Oakley & Wigley	142 12 0
DERRY, Brownhills, near Walsall (*accepted*)	125 10 0

Pumping plant.

Dudbridge Ironworks	674 0 0
Kynoch	501 5 0
Dudbridge Ironworks	490 0 0
Tangyes	435 0 0
THE CAMPBELL GAS ENGINE CO., Halifax (*accepted*)	395 0 0
Wilkes	388 0 0

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BUXTED.

For sewerage and sewage-disposal works for Uckfield Rural District Council. Mr. J. TAYLOR, surveyor, Uckfield.

Rowlinson	£3,368 1 10
Collingwood & Co.	2,641 15 3
Neal	2,539 16 4
Edwards & Co.	2,464 19 9
Jackson	2,412 14 11
Parker	2,320 7 7
Watson	2,240 0 0
Smith & Co.	2,043 18 10
Carey	2,024 10 3
Wort & Way	1,996 19 10
Bate & Co.	1,974 10 0
Bingham	1,960 19 11
McKellar	1,899 0 0
Young	1,805 8 9
Rayner	1,759 9 4
HUTCHINSON & Co., St. Leonards (*accepted*)	1,746 16 10

CALDECOTE (BEDFORDSHIRE).

For erection of a Wesleyan chapel and schools for the trustees. Mr. THOMAS COCKRILL, A.M.I.C.E., architect, Biggleswade.

Redhouse & Son	£1,684 15 0
Bailey & Sons	1,592 10 0
Haynes	1,532 0 0
Wrycroft & Son	1,399 0 0
WRIGHT, Langford (*accepted*)	1,363 10 0

CHELTENHAM.

For the cartage and laying of about 700 yards of 6-inch cast-iron pipes and about 950 yards of large stoneware pipes and other work at Haydon Sewage Farm.

Cornock	£811 3 0
Packer	464 0 4
Riley	437 3 2
Cresswell	404 5 1
Williams & Co.	285 17 3
DIX (*accepted*)	271 15 5

DARTMOUTH.

For construction of retaining wall, steps, filling-in to basements of old buildings and other works at Southtown. Mr. T. W. JOYCE, borough surveyor.

Bovey	£314 0 0
Gullett	305 0 0
Watts	263 15 0
Pillar	252 0 0
BACK, Dartmouth (*accepted*)	227 0 0

DUNTON.

For enlargement of Bassett school, for the Leicestershire County Council education committee.

Martin	£916 0 0
Haycock & Sons	900 0 0
King & Ridley	885 0 0
H. H. Garlick	885 0 0
Cole & Sons	875 5 0
Rourke	865 0 0
Fox	859 19 0
E. W. Garlick	854 10 0
Lord	840 0 0
Cooke	828 6 0
Rudkin & Sons	808 10 0
Oldershaw	781 10 0
POTTER, Blaby (*accepted*)	780 9 6

GUILDFORD.

For foundations for refuse-destructor plant, for the Town Council. Mr. C. G. MASON, C.E., borough engineer, Guildford.

Smith	£2,024 0 0
Tribe & Robinson	1,897 0 0
James & Co.	1,856 2 10
Osenton	1,846 13 0
Lindfield & Son	1,672 12 0
Higlett & Hammond	1,615 0 0
Franks	1,575 17 6
MANLOVE, ALLIOTT & Co., Nottingham (*accepted*) *	1,572 6 8
Streeter & Co.	1,512 11 1

* These contractors are erecting the destructor.

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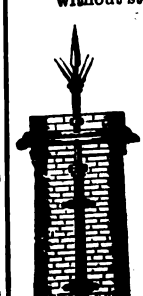
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Mill Chimney & Church Spire Repairers.
Mill Chimneys Raised, Lowered, Pointed, Hooped, and Straightened without stoppage of works.

Manufacturers and Erectors of the PATENT Solid Copper Tape LIGHTNING CONDUCTORS.

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HANLEY.

For the erection of new shop premises, Market Square, and for alterations to the existing premises. Messrs. R. SCRIVENER & SONS, architects, &c., Hanley.

Tompkinson & Betteley	£3,391	0	0
Cornes & Son	3,317	0	0
Grant & Sons	3,315	0	0
Ellis	3,285	0	0
GODWIN, Hanley (*accepted*)	3,037	0	0

HEMEL HEMPSTEAD.

For sinking new well, &c., at Markyate, near Luton. Messrs. ELLIOTT & BROWN, engineers, Nottingham.

Lane Bros.	£1,366	12	3
Rollinson & Son	1,053	0	0
Smart	973	10	0
Sangwin	968	13	0
Crompton	907	19	10
Timmins & Sons	888	17	9
Crossland	844	4	6
Batchelor	835	14	9
Brown & Son	825	11	0
Jewell & Co.	825	6	0
Fretwell	815	12	0
Nunn & Co.	788	18	3
Duke & Ockenden	775	0	0
Titt	647	16	0
Chamberlain	650	0	0
Pennington	616	14	0
Smith & Son	542	6	9
Wilsher	538	0	0
Williams	471	9	3
Miskin & Sons	452	0	0
The New England Boring Co.	422	19	0
ELL, Victoria Ironworks, Leagrave, Luton (*accepted*)	300	10	6

HORSHAM.

For the extension of the sewer to Ifield Hall. Mr. R. RENWICK, surveyor.

Cook & Sons	£230	0	0
Easton	217	0	0
Peskett & Co.	110	0	0

HOYLAND.

For erection of schools in King Street to accommodate 300 children.

Accepted tenders.

Blakeley & Co., builder	£2,713	0	0
Hawley & Sons, joiner	1,225	0	0
Higginbotham & Son, plumber	825	0	0
Atkinson & Son, slater	168	0	0
Charnock, plasterer	150	0	0
Varley & Son, painter	86	2	0
Surveyor's estimate	5,250	0	0

MAIDSTONE.

For supply of the electric cable to be laid from the electricity station to the sewage disposal works at Allington.

British Insulated and Helsby Cables	£936	15	0
Henley's Telegraph Works Co.	929	10	0
Callender's Cable and Construction Co.	916	1	2
Glover & Co.	913	5	0
Johnson & Phillips	912	7	0
WESTERN ELECTRIC Co. (*accepted*)	904	15	0

NORTHAMPTON.

For building isolation hospital at Berrywood Asylum. Mr. W. B. PARTINGTON, surveyor, Berrywood, Northampton.

Carlyle	£2,903	0	0
Higgs	2,897	0	0
Cosford	2,849	0	0
Higgins	2,718	0	0
Sharman & Son	2,700	0	0
G. F. Sharman	2,698	0	0
Hawtin	2,674	0	0
Chown	2,663	0	0
Green	2,637	0	0
Martin	2,570	0	0
Hickman	2,560	0	0
Heap	2,497	0	0
Webster	2,487	15	0
Fisher	2,342	0	0
ROBERTS & Co., Weedon (*accepted*)	2,285	10	0

BOX GROUND TRADE MARK
THE BATH STONE FIRMS LTD
MONK'S PARK TRADE MARK
BATH & PORTLAND QUARRY OWNERS
QUARRIES
MONK'S PARK, CORSHAM DOWN, CORNGRIT, FARLEIGH DOWN, BRADFORD,
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Tel. No.: 2141. Cherry Row, LEEDS.

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MENSTON (YORKS).

For erection of a villa residence at Menston. Mr. HAROLD CHIPPINDALE, architect, Guiseley.

Accepted tenders.

Mounsey & Son, Guiseley, mason.
Greenhow & Murgatroyd, Keighley, joiner.
Hird, Menston, plumber.
Frith, Henshaw, Yeadon, plasterer.
Thornton, Shipley, tiler.

NEWPORT (ISLE OF WIGHT).

For the erection of a mixed school in place of the National schools.

MEADE (*accepted*)	£3,618 0 0

SANDWICH.

For waterworks for the Town Council.

Contract No. 1.—Suction-gas plant.

National Gas Engine Co.	£367 10 0
Wingham Agricultural Co.	360 0 0
Mather & Son	359 0 0
Teasdale Bros.	359 0 0
Hornsby & Sons	354 0 0
Clark	352 17 6
Crossley Bros.	340 0 0
Warner	339 0 0
Davey, Paxman & Co.	333 0 0
Power Gas Corporation	325 0 0
Duke & Ockenden	300 0 0
Stewart & Co.	300 0 0
Tangyes	298 0 0
Ruston, Proctor & Co.	288 0 0
CAMPBELL GAS ENGINE Co., London Bridge (*accepted*)	297 0 0

Contract No. 2.—Three-throw pumps.

Cross	875 0 0
White	850 0 0
Birtley Ironworks Co.	700 0 0
Hornsby & Sons	689 10 0
Clark	649 17 6
Warner & Co.	644 0 0
Teasdale Bros.	600 0 0
Hunter & English	565 0 0

SANDWICH—*continued.*

Glenfield & Kennedy	560 0 0
Tangyes	550 0 0
Mather	477 0 0
CAMPBELL GAS ENGINE Co., Halifax (*accepted*)	360 0 0

Contract No. 3.—Engine house.

BRISLEY BROS., Ash (*accepted*)	405 10 0
Denne & Son	390 0 0
Wallis & Son	390 0 0
Paramors	380 0 0
Ovenden	379 10 0

Contract No. 4.—Reservoir.

Brebner & Co.	1,162 0 0
Rowlingson & Co.	755 1 4
Ovenden	690 5 0
BRISLEY BROS. (*accepted*)	661 0 0
Denne & Son	646 0 0
Paramors	644 0 0
Wallis & Son	616 0 0

Contract No. 5.—Rising main.

Bond	199 0 0
Wallis & Son	187 0 0
Rowlingson & Co.	168 0 0
Brebner & Co.	162 10 0
Ball & Co.	148 17 6
Ovenden	143 10 0
Paramors	132 10 0
BRISLEY BROS. (*accepted*)	108 0 0

Contract No. 6.—9-inch cast-iron pipes.

Ovenden	5 18 6
Birtley Iron Co.	5 18 0
Stewart & Co.	5 12 6
Clay Cross Iron Co.	5 10 10
Oakes & Co.	5 7 6
Sheepbridge Coal and Iron Co.	5 6 0
Stanton Iron Co.	5 5 10
Rowlingson & Co.	5 5 6
Staveley Coal and Iron Co.	5 2 6
HOLWELL IRON Co., Melton Mowbray (*accepted*)	4 19 6

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The 472 Patent Kinnear Steel Rolling Shutters
which we are now erecting in
THE NEW SELFRIDGE BUILDING
if placed end to end
would reach from Marble Arch to Wardour St:
in an unbroken wall 12 ft. high.

ARTHUR L. GIBSON & COMPANY,
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For Index of Advertisers, see page x.

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SCOTLAND.

For erection of business premises at the corner of High Street and Church Street, Arbroath. Mr. H. GAVIN, architect.

Accepted tenders.

Ramsay & Gordon, mason.
Robertson & Son, joiner.
Grant, plumber.
Mitchell & Son, slater.
Donald, plasterer.

SHINFIELD.

For building a new County school for 250 scholars at Hyde End, Shinfield, Berks.

		Extra for tiled dado.
Spear & King	£4,076 0 0	£128 0 0
Bosher & Sons	4,073 3 6	167 17 10
Seward	4,031 0 0	116 0 0
Hunt & Son	3,961 0 0	96 19 0
Flint	3,943 0 0	113 0 0
Fitt	3,923 0 0	114 0 0
Love	3,858 0 0	125 0 0
Cæsar Bros.	3,844 16 0	137 0 0
Godwin	3,839 3 7	103 0 0
Hughes	3,829 0 0	142 4 7
Lewis Bros.	3,804 0 0	115 0 0
ALDRIDGE, Spencer's Wood (*accepted*)	3,477 12 8	94 5 4

SIDCUP.

For alterations and additions to Hughenden, Station Road. Mr. E. C. BEAUMONT, architect, 78 Fleet Street, E.C.

Fletcher	£359 15 0
Barrett & Power	323 0 0
Rider & Son	289 17 0
Champion	282 7 6
Dunn	218 9 6
Clark & Dunham	215 0 0
KNIGHT (*accepted*)	197 0 0

STRATFORD-ON-AVON.

For house scavenging, for the Rural District Council.

Accepted tenders.

Henley-in-Arden and Beaudesert.

Pearsall	£43 0 0

Wootton Wawen district.

Hopkins	20 0 0

Ullenhall district.

Pearsall	20 0 0

TONBRIDGE (KENT).

For making-up Chichester Road. Mr. HARRIS, surveyor.

Chittenden & Simmons	£288 0 0
Pratt	277 0 0
ROOTS (*accepted*)	216 18 0

TUNBRIDGE WELLS.

For house and shop in St. John's Road.

Strange & Sons	£1,875 0 0
Roberts & Co.	1,780 0 0
Jarvis	1,765 0 0
Goodwin Bros.	1,735 0 0
Soper & Jones	1,685 0 0

WALES.

For erecting seventeen houses on the Maindee Road, Cwmfelinfach (Mon.). Mr. J. W. ALDISS, architect, Newbridge, Mon.

Edwards	£4,049 10 0
Williams & Co.	4,037 10 0
Herbert & Co.	3,700 0 0
James	3,663 10 0
PHILLIPS, Ynysddu, Mon. (*accepted*)	3,655 0 0
Bell	3,100 0 0

For private street improvement works for Llandaff and Dinas Powis Rural District Council, Gabalfa, Llandaff. Mr. J. HOLDEN, A.M.I.C.E., Cardiff.

Rutter	£926 1 8
Osmond & Sons	822 19 3
Williams	810 0 5
REES, Whitchurch (*accepted*)	777 11 1

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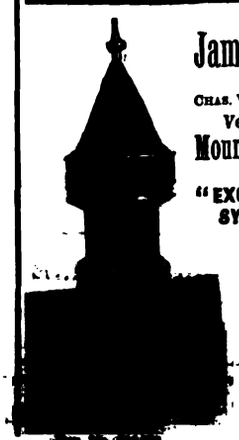
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WALES—*continued.*

For the erection of a Council school at Ystrad Mynach, for the Glamorgan county education committee. Mr. D. PUGH-JONES, F.S.I., county architect, Cardiff.
BOND, Cardiff (*accepted*) £2,980 1 5

For the additions to the Gelligaer Council schools, Glam. Mr. D. PUGH-JONES, F.S.I., county architect (Eastern Division), Cardiff.
DAVIES & LLOYD, Senghenydd (*accepted*) . £1,975 0 0

For the additions to the Trelewis Council schools, Glam. Mr. D. PUGH-JONES, F.S.I., county architect, Cardiff.
SHAIL, Llandaff (*accepted*) £1,155 0 0

For providing and fixing a chemical laboratory at Hengoed County school. Mr. D. PUGH-JONES, F.S.I., county architect, Cardiff.
BENNET FURNISHING CO., London (*accepted*) £363 1 0

For the erection of a higher elementary school at Bargoed, for the Glamorgan education committee. Mr. D. PUGH-JONES, F.S.I., county architect, Cardiff.
HOWELLS, Cardiff (*accepted*) £7,819 16 2

For the erection of a temporary school at Porth, Glam. Mr. D. PUGH-JONES, F.S.I., county architect, Cardiff.

Footings.
JENKINS & SONS, Porth (*accepted*) . . £360 0 0

Superstructure.
LEE & CO., Manchester (*accepted*) . . 869 0 0

For the erection of a temporary school at Bridgend, Glam. Mr. D. PUGH-JONES, F.S.I., county architect, Cardiff.
GAYLARD, Bridgend (*accepted*) £400 0 0

WORTHING.

For repairs to the cemetery chapels. Mr. F. ROBERTS, borough surveyor.

Lelliott	£162 0 0
Herbert	123 0 0
Standing	116 17 6
MOAT, Worthing (*accepted*)	95 0 0

WIGAN.

For the cleaning, painting, &c., of the interior of the first-class swimming-bath, for the Corporation.
LEA & SON, Wigan (*accepted*) . . . £3,617 0 0

Repairs.
RHODES, Wigan (*accepted*) . . . 255 10 0

WREXHAM.

For erection of a shelter, convenience and other works at the William Jones recreation ground, Rhosddu. Mr. J. ENGLAND, borough engineer.

Stephens	£589 0 0
Hughes	483 0 0
Jones	447 0 0
Engineer's estimate	434 0 0
Roberts	425 0 0
Davies Bros.	409 0 0
Wooley	394 0 0

THE issue of *Country Life* for January 9 contains an interesting illustrated article on The Moot, Downton, Wiltshire, the residence of Mr. E. Pitts Squarey.

THE Shoreditch Borough Council have instructed their standing committees to give preference, when accepting tenders or placing orders, to goods of British manufacturers.

THE Borough Council of Hammersmith are contemplating the expenditure of over 19,000*l.* on extension of generating plant, &c.

A NEW parade at the sea front at Bexhill is to be laid out. A prominent feature will be the covered colonnade, semi-circular in shape and with an open-air bandstand which will accommodate 1,200 people. About 13,000*l.* is the estimated cost.

A BILL has been deposited for introduction into Parliament next session under which it is proposed to incorporate a company under the name of the Donington Water Company. The capital is to be 12,000*l.*, with powers to raise by debenture stock a further sum of 4,000*l.* The water is to be obtained by sinking a well and erecting a pumping station and water tower in Donington.

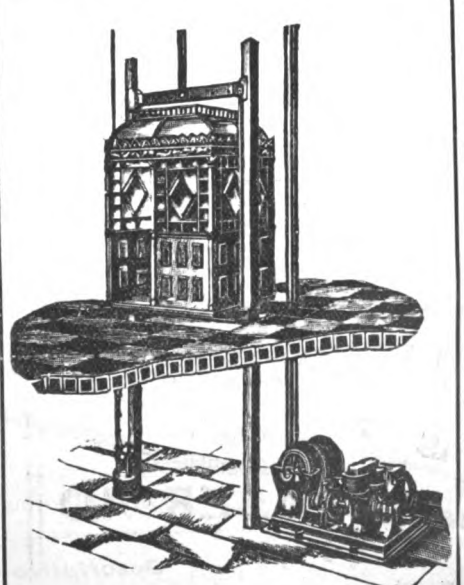
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TRADE NOTES.

MESSRS. PECKETT & SONS have placed in the centre of their calendar a coloured picture of one of their locomotives having cylinders 18 inches by 24 inches. At their Atlas Works in Bristol they have in stock locomotives of various sizes and gauges. Their speciality is tank locomotives.

MESSRS. OGILVY & PARTRIDGE, general brassfounders, of Birmingham, inform us that they have acquired large and extensive factories, known as the Camden Works, Browning Street, Birmingham, where their business will be carried on in future.

THE Sussex Portland Cement Company, Ltd., have every right to adorn their calendar with an excellent pen-and-ink sketch of Winchester Cathedral by Mr. A. Freeman, for their "Newhaven" brand is being exclusively used throughout the important restoration works at that historic structure. A significant fact is that the same cement is being employed on the "Auld Brig o' Ayr."

EVEN in their calendar William Morris & Co., Ltd., Ruskin House, S.W., have been able to introduce an element of beauty and pleasing design, whether in the brown paper, the black printing, or the red seal. An excellent idea is the sliding indicator which frames the current day of the month. It is self-supporting, and would not be out of harmony on any writing table, and it may be attached to a wall. If any criticism might be offered, it is that there seems to be some difficulty in extracting the monthly tablets. This could be very easily remedied.

THE Ratner Safe Company, Ltd., received last month two exceptional orders. The first order is for a safe deposit to be erected in Bombay of the very best construction, of a minimum thickness of 1½ inch solid drill-proof steel, fitted with four rooms to hold nearly 4,000 safes, and numerous strong rooms. The other order (amounting to nearly 5,000*l.*) is for strong-room fittings for new Government buildings at Pretoria. The order was won in competition against English and American makers.

THE well-known preserving and disinfecting properties of copper play an important part in the satisfactory results obtained from the use of Barol on all kinds of timber. Barol is manufactured by a special process, in which certain copper compounds are mixed with oils which themselves have great powers for the preservation of wood. It is applied like paint with a brush, and the covering capacity of a gallon is about 350 square feet of dressed lumber and 250 square feet of rough lumber for the first coat. Barol has a wide range of usefulness, for it is efficacious for every variety of use to which timber may be put, whether in boats, piles, posts, fencing, telegraph poles, railway ties and so on. It protects against dry rot, decay and other evils to which wood is heir. In colour it is ornamental, for the tint of the preservative is a pleasant brown and the wood does not require painting. This is an important recommendation for its employment in buildings. The following simple test is suggested by the manufacturers:—Fill a small bottle about half-full with Barol, add a few drops of muriatic acid and shake this mixture. File or rub a nail with sandpaper till it is perfectly clean and put it in the mixture. After eleven or twelve hours take the nail out, and if the genuine Barol has been used the nail will be covered with copper. The principal representative of the manufacturers in Great Britain is F. S. Schröder, Mincing Lane House, E.C., who has appointed local agents.

THE latest scheme of the London and Lancashire Fire Insurance Company is to issue policies covering consequential loss following fire, payment of standing charges and increase in cost of working afterwards due to partial or total stoppage of work. It may be mentioned that this company (which offers security amounting to nearly four and a half million sterling) so arranges these insurances that (1) there is no necessity for the proposer to declare his net profit, because the policy is taken out to cover both net profit and standing charges in one sum; and (2) in the event of loss, the insured's books are not examined by any official of the company, but only by the confidential accountant mutually appointed by the insured and the company for the purpose of ascertaining the amount of loss.

THE Royal Institute of British Architects will hold a special general meeting, convened by the Council under By-law 60, on Monday, the 25th inst., at 8 P.M., to read a paper on Part V. of the London County Council (General Powers) Bill, dealing with the Amendment of the London Building Acts, by William Dunn.

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Municipal Buildings, Crewe. Columns and Pilasters. Henry T. Hare, Esq., F.R.I.B.A.
King's Theatre, Southsea. Proscenium Border, Piers, Architraves, &c. Messrs. F. Matcham & Co.
2 Great St. Helen's, E.C. Wall-lining, Dado, &c. Messrs. Ellwood & Sledmere.
Waldorf Hotel. Columns and Pilasters. Messrs. A. Marshall Mackenzie, F.R.I.B.A., & Son.
Central Library, Islington. Columns. Henry T. Hare, Esq., F.R.I.B.A.
Palace Kapurthala. Columns and Pilasters. Messrs. Waring & Gillow, Ltd.
Leigh Town Hall. Columns and Pilasters. J. C. Prestwich, Esq.

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ILLUSTRATIONS.

HOLBORN TOWN HALL.—ADDITIONS—THE PRINCIPAL ENTRANCE—THE COUNCIL CHAMBER.

BARRY, NORTHWOOD.—ENTRANCE VIEW—GARDEN VIEW.

LIVING ARCHITECTS.—NO. 2, MR. T. G. JACKSON, R.A.

VARIETIES.

THE Morecambe Town Council has decided to spend 6,250*l.* on improvement of the sea front.

MESSRS. HATCHARD, SMITH & SON, architects and surveyors, have removed to 76 Watling Street from Finsbury Pavement, E.C.

A NEW joiners' shop is to be erected in Portsmouth Dockyard, on the site of the block wooden stores facing the official residences, at a cost of 20,000*l.* Only 5,000*l.* has been provided for the work in the current estimates.

THE Darfield Urban Council have decided to apply to the Local Government Board for sanction to borrow 6,500*l.* for the new sewage works scheme. This amount includes 350*l.* for a sewage works manager's house.

THE Local Government Board has given its sanction to the Eccles Corporation proceeding with the erection of twelve artisans' dwellings in Corporation Road, under the Eccles Housing Order, 1901.

THE Victorian Railway Commissioners have advised against the proposed electrification of the railways in the neighbourhood of Melbourne—a scheme which was recently referred to in these columns. Their report is directed against the general proposal to electrify the railways.

A SUB-COMMITTEE of the plans and works committee of Edinburgh Town Council recommend an extension of the accommodation for washing at Simon Square public washhouses from forty to sixty stalls, at an estimated cost of 640*l.*

THE Falmouth Town Council have approved the plan and estimate of the surveyor for dealing with the surface water in the area draining to Market Strand. Application will be made to the Local Government Board for sanction to borrow 547*l.* for the work.

THE Royal Commission on Coast Erosion and Afforestation, presided over by the Hon. Ivor Guest, M.P., have been considering within the past few days their interim report on that branch of their inquiry which relates to afforestation, and it will probably be issued to the public about the middle of the month.

MESSRS. P. WALKER & SONS, LTD., of Burton and Warrington, have decided on the erection of a new brewery at Burton on the present site at Shobnall for brewing Lager beer. The whole of the plant has been ordered, and the necessary alterations will be put in hand forthwith.

MR. COTTERELL at the last meeting of the Bath Town Council moved the adoption of the report of the special committee which was appointed to consider the desirability of augmenting the attractions of the city with a view to making it still more popular to visitors.

MR. W. N. BLAIR, C.E., borough engineer and surveyor of St. Pancras, has been elected president of the Incorporated Association of Municipal and County Engineers, who will hold their annual meeting in London from January 24 to January 26.

BUCKIE Town Council have decided to accept the 33,000*l.* Government grant arranged by a provisional order to extend the harbour. The weakest portion of the present structure would be demolished for the extension, and the proposal is to borrow for both purchase and extension over fifty years, thereby effecting a saving of 400*l.* yearly.

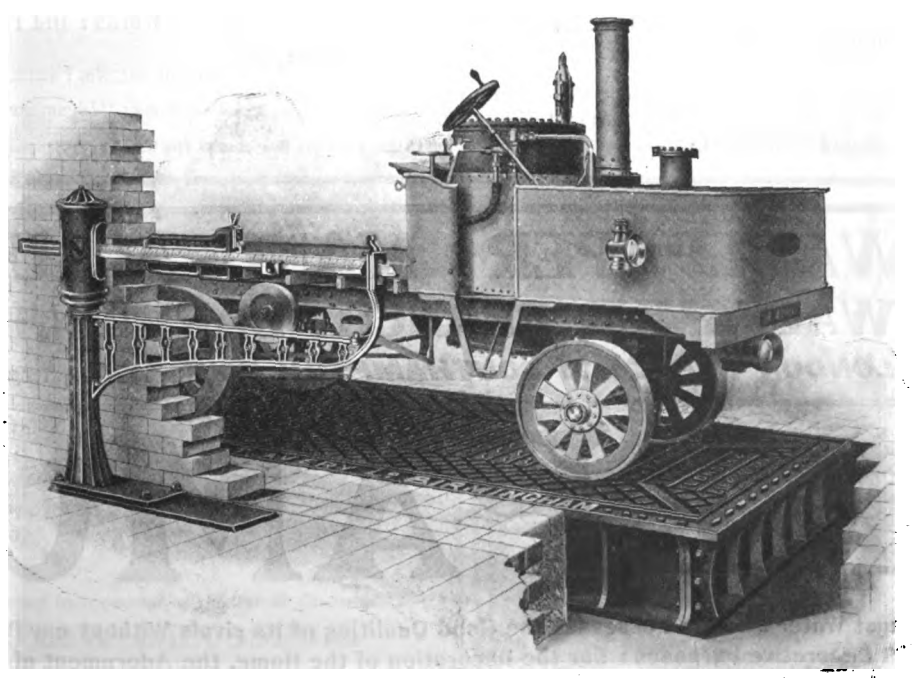
MR. J. G. NEWBIGGING, chief engineer of the Manchester Corporation's gas department, has been unable to accept an invitation from the Calcutta Corporation to visit India and advise them as to the lighting of their city. Mr. Newbigging is found to be indispensable in the important work on hand in Manchester.

IT is proposed to construct docks at St. Just Point, Falmouth, inside the harbour, capable of accommodating the largest ships afloat, and also of dealing with the very extensive china clay and fish traffics. The scheme includes a railway connecting the docks with the Great Western main line and the Cornish china clay district in the northern part of Mid-Cornwall, whence are exported annually about 750,000 tons of china clay. The cost of the scheme is estimated at nearly 800,000*l.*

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THE Ecclesiastical Commissioners on the recommendation of the Bishop of London have allocated 10,000*l.* for the erection of a church in place of the temporary building of St. Peter's, Colney Hatch Lane, Muswell Hill. The plans are being prepared by Messrs. Caröe & Passmore, architects to the Commissioners, and building operations will be started in March.

PRINCESS ALEXIS DOLGOROUKI is building a new house at Taplow, which she hopes to occupy next summer. The place is not far from Taplow Court, Lord Desborough's seat, and when completed, says the *Estates Gazette*, will be one of the pleasantest and most perfect houses up the river. Princess Alexis Dolgorouki has been her own architect, and the residence has been built entirely after her own designs.

THE Nottingham Corporation have agreed to construct a new outfall sewer for Sherwood which (inclusive of the reconstruction of sewers in old streets) will involve an outlay of 21,000*l.* The total acreage to be drained by the sewer is 546 acres, much of which is still unbuilt upon. The total length of the outfall sewer will be 2,550 yards, and that of the smaller sewers at Sherwood 2,300 yards.

THE Hertfordshire county education committee recommend to the County Council that an offer be made to the governors of the Watford Grammar School of 9,000*l.* for their buildings in Derby Road, and that 1,000*l.* be spent in converting the buildings into a higher elementary school. It is further proposed to make a grant of 7,250*l.* towards the erection of a grammar school on the Cassiobury Park estate.

THE Accrington Corporation distress committee report that of those unemployed for whom work was found by the Corporation thirty-four have been discharged for laziness and not earning their pay, sixty-nine have left, twenty-six have returned to their former employment, or have found other work, and two have died. One of the latter had been off a few days drinking, and died when returning to his work. The other died after having done one day's work.

THE Manchester Corporation are bound by agreement to supply electric current for lighting and power purposes in the urban district of Droylsden. A considerable outlay on cables will be entailed, and before proceeding with the work the Corporation are desirous of ascertaining the number of probable users. The District Council maintain that under any circumstances the city authority must carry out its obligations, and the general purposes committee has decided to make representations to that effect to the Corporation.

DURING the summer a number of tests have been made in mines and quarries with a new explosive known as "Mitchellite," and the announcement is now made that a company is to be formed for the manufacture of this explosive. Already a site for the factory, extending to thirty acres, has been secured on the farm of Clay Knowes, near Bonnybridge and Greenhill Junction. Machinery will be installed capable of manufacturing 20,000 lb. per day.

THE Mayor of Paddington has stated at the Borough Council, in regard to the refusal of the London County Council to sanction a loan of 10,000*l.* for paving works which it was decided to undertake now in the interests of local unemployed workmen, that a communication had been received from the President of the Local Government Board intimating that he would be disposed to consider favourably any appeal made to him against the decision of the County Council.

THE Whitley Bay and Monkseaton Urban District Council recently instituted a competition for a public shelter to seat 1,000 persons, and promenade for 400, to cost 1,200*l.*, a premium of 20*l.* being offered for the best design. Over thirty designs were received, many of which could not be carried out for the amount stipulated. The design submitted by Mr. Edward Cratney, of Wallsend and Sunderland, has been selected by the Council, and the above premium awarded to him.

THE London County Council, replying to the Stepney Borough Council, which passed a resolution urging the employment of labour in productive works in order to relieve the unemployed, state that they have decided to ask Parliament for authority to construct, at an estimated cost of 75,000*l.*, a bridge over the Waterworks river at Quartermile Lane and an approach to the bridge from New Temple Mills across Hackney Marsh.

A LOCAL GOVERNMENT BOARD inquiry was recently held at Watford into the application of the Urban Council to borrow 16,500*l.* to purchase 50 acres of the Cassiobury Estate for a people's park. The Local Government Board have now

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written stating that they consider the price charged too high, as the vendor's profit would be 60*l*. per acre. The Urban Council have appointed a deputation to interview the Board.

THE Greenock Dean of Guild Court have granted warrant to the trustees of the arch-diocese of Glasgow for the erection of a combined elementary and higher grade Roman Catholic school, four storeys in height, at the corner of Patrick and Houston Streets. The new school, which will accommodate 1,000 children, is to cost about 10,000*l*. The work of building will begin at the end of next month, and is expected to occupy about nine months. Mr. Walter R. Watson, Glasgow, is the architect.

THE committee of Colwyn Bay National Eisteddfod have opened negotiations with the Manchester Syndicate which has acquired land in Colwyn Bay for the purpose of erecting, at a cost of 40,000*l*. a large pavilion, which will include skating rink, billiard hall, &c., with the view of securing the use of the skating rink, which will seat 6,000 people, for the purposes of the Eisteddfod. The committee tentatively have offered the syndicate a rent of 1,000*l*. for the use of the rink during the Eisteddfod week.

FOR the position of borough engineer and surveyor of Middlesbrough 129 applications have been received. The streets committee have reduced the number to the following nine:—Mr. Leslie Roseveane, chief assistant engineer and surveyor of Birmingham; Mr. Frederick Beaumont, deputy borough engineer, Wolverhampton; Mr. Nelson F. Dennis, West Hartlepool; Mr. A. T. Gooseman, Bootle; Mr. Thomas W. Joyce, Dartmouth; Mr. Frank Latham, Penzance; Mr. H. B. Bongley, Manchester; Mr. Edmund S. Pinkerton, Belfast; and Mr. S. E. Burgess, South Shields. Mr. S. E. Burgess was appointed on Wednesday.

THE Colne Town Council have agreed that in cases where private street works are carried out by the owners of property in pursuance of notices served under Section 150 of the Public Health Act, 1875, and the Corporation are requested to superintend the execution of the work, a commission of 2 per cent. on the cost be charged to the respective owners, this sum to be in lieu of the 5 per cent. commission which the Corporation are entitled to charge in cases where the whole of the work is carried out by them out of money borrowed for the purpose in pursuance of sanctions to loans granted by the Local Government Board. This resolution will apply to all private streets, whether front or back streets.

A BILL has been deposited for introduction into Parliament next session under which power is sought to incorporate a statutory company under the name of "The Brighton Casino and Marine Palace Company." It is proposed to erect a pier beginning in the esplanade nearly opposite West Street and extending over the foreshore and into the sea for a distance of about 8 chains. At the termination of the pier it is proposed to erect "a marine palace, pavilion, casino and winter garden with assembly, concert, refreshment and other rooms." The capital to be raised for these purposes is 250,000*l*.

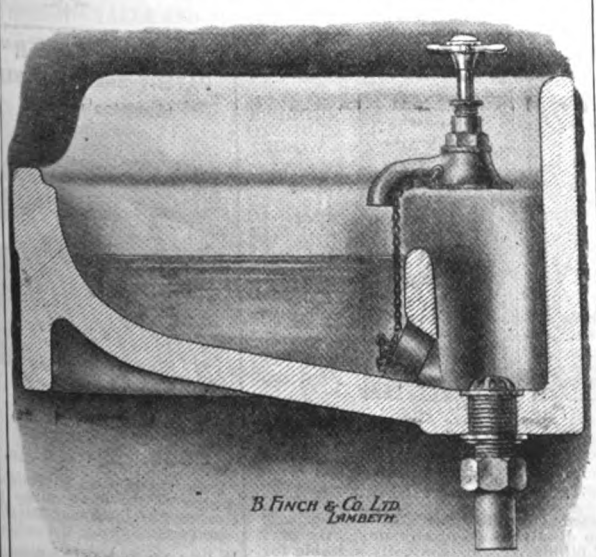
IN 1908 the Local Government Board sanctioned 4,630 loans, amounting to 11,664,212*l*., for purposes other than those of the Poor Law Guardians. Compared with 1907 this is an increase of 2,303,423*l*. Already this year eighty-two loans, for 187,920*l*., have been approved. Between August 1 last and January 1 475 applications were made for the sanctioning of loans for works by which employment would be afforded to the unemployed. The amount involved was 2,325,247*l*. In the corresponding period of 1907 the number of applications was sixty-eight, and the total involved was 223,602*l*.

THE village institute at Robertsbridge, Sussex, which was designed by Mr. George Hornblower, F.R.I.B.A., of London, was opened by Lord Brassey on January 6. The building comprises a large hall, arranged for theatrical performances and capable of seating 200 persons comfortably; a large billiard room, games room, library, &c. The building conforms with the style of the bulk of the houses in Robertsbridge, and the roof is covered with hand-made local tiles. Mr. Samuel Harvey, of Rye, was the builder, and Mr. James Gray, of Chelsea, provided the heating installation.

DR. REGINALD FARRAR has issued to the Local Government Board his report on the sanitary and administrative affairs of the Whitby rural district, dealing especially with those portions of the district resorted to by summer visitors. He considers that on the whole the cottage property in the rural district is in a fair structural condition. The con-

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struction of villa residences in the villages described as places of resort for visitors illustrated, however, in numerous instances the urgent need of the adoption by the Rural District Council of a proper code of building by-laws.

FROM the report of the roads and bridges committee of the Herefordshire County Council it appeared that the county surveyor (Mr. Jack) did not favour the tar-painting of the roads as a lasting success. He had lately seen some roads in Breconshire constructed under a new process, which affected the whole of the crust and not the surface only. There was no oil or tar in the process. He was much impressed with the appearance of the roads after much motor and other traffic. He was informed that the life was at least three years, and the cost from 1½*d.* to 2*d.* per yard over and above the cost of a water-bound road. If this were so it would be much more economical than tar. It could be laid down in any weather, and overcame the great difficulty of slipperiness, which were two very important considerations. The committee resolved to give no rural or urban districts consent to their tarring the roads.

A LOCAL Government Board inquiry was opened in the Workhouse, Castlerea, Ireland, by Mr. J. P. Hannigan, inspector, in connection with a scheme of the Castlerea Rural District Council for the erection of labourers' cottages, under the Labourers' Act, 1896, under the third improvement scheme. The number of applications for the erection of labourers' cottages was 182, and the estimated cost 32,494*l.* There were upwards of 100 objections by owners and occupiers of land to the erection of cottages on their lands. The Congested Districts Board objected in every case in which it was proposed to put a cottage on their lands, because they did not want the two Acts, which were passed for different purposes, brought into conflict.

AT the monthly meeting of the executive of the Edinburgh, Leith, and District Building Trades Association held at 61 Lothian Road recently, several members reported that during the past month they had had a good many inquiries for the purchase of property. The news was gladly received as being an indication that in the near future much of the property at present unoccupied would be taken up by investors. The present tendency is to hold up the property rather than sell at a loss, and as wages have remained the same during the past period of depression, while material has in some cases gone up in price, new property cannot be put up at the same price as the houses that are at present in the market. Altogether, in the new year builders are hopeful that better times are in store for them. Four new members were admitted to membership.

THE housing committee of the Liverpool Corporation have put down 10,000*l.* for the purchase and demolition of insanitary property on capital account. On capital account the committee require 30,000*l.* for buildings. The following note appears at the foot of the estimates:—"The housing committee desire to call the attention of the City Council to the fact that schemes under the Housing of the Working Classes Act, 1890, for dealing with six unhealthy areas and the erection of dwellings for the dispossessed, have been approved by the Local Government Board's provisional order. When the loans for carrying out the schemes in question are sanctioned by the Board, the housing committee propose to ask the Council for a supplementary estimate, in order that the work may be commenced as soon as possible. Meanwhile the acquisition of the various properties is being proceeded with."

BAKEWELL Urban District Council at their last meeting again had under consideration the plans for the proposed baths and pump room, as adopted a month or so ago. Messrs. Bryden & Walton, of Buxton, the architects, submitted alternative designs for the erection of a somewhat more attractive and imposing building than that contained in their original scheme, and after some discussion one of these was accepted, and it was resolved to submit same for the approval of his Grace forthwith. No alteration is contemplated in the internal arrangements, which provide for a swimming bath with sixteen collapsible dressing boxes, a pump room, &c. As soon as the plans are received back from the Duke of Rutland, a meeting of the Council will be held with a view to instructing the architects to get out the quantities, specifications, &c., as the necessary preliminary for obtaining tenders and the sanction of the Local Government Board.

THE Clyde Navigation Trustees have accepted the tender of the Clyde Structural Company, Ltd., for the erection of sheds for the west basin at Yorkhill, amounting to

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16,877*l.* 13*s.* 11*d.* (being the lowest). Acceptance was also authorised of the offer of Messrs. Somervail & Co., Ltd., for the erection of four sheds at Prince's Dock Timber Storage at a total of 2,133*l.* (being the lowest). The traffic committee agreed to recommend the trustees to erect a single-storey shed, 1,370 feet long by 100 feet wide, along the Riverside Quay at Yorkhill at an estimated cost of 26,000*l.* This recommendation was adopted.

THE Tower of London will henceforward be lighted with municipal electricity supplied by the Stepney Borough Council, in whose statutory area it lies. For the past three years it has been supplied by the City of London Electric Lighting Company, with the permission of the Office of Works. The Council ascertained that even the representatives of the Crown are not legally empowered to dispense with the restrictions imposed upon the company by Act of Parliament. Proceedings are not available against the Crown authorities, having regard to the constitutional maxim that "the King can do no wrong." The Council commenced legal proceedings, but now the company has agreed to withdraw its supply.

MR. BANISTER FLETCHER commenced on January 11 a course of twelve lectures on the Renaissance Architecture of Germany, Belgium and Holland, Spain and England, at the London University, Imperial Institute Road, South Kensington, S.W. The lectures will be amply illustrated with lantern views and those historical events which have influenced the style will be discussed. The peculiar character of Continental Renaissance will be considered with reference to the principal buildings erected since A.D. 1500. The English Renaissance will include the Elizabethan and Jacobean styles, and the more important examples will be fully illustrated. The colleges of Oxford and Cambridge will be referred to, as well as the furniture and internal decoration. The later period includes the principal works of Inigo Jones and Sir Christopher Wren—St. Paul's, the City churches, Hampton Court, &c.—and the large number of country mansions erected during the Georgian period.

THE education committee and the York Corporation met specially on Monday to consider a report by the higher education sub-committee to the effect that the large hall of the Exhibition Buildings, which has for some years been largely used for concerts and various fêtes and functions, was unsafe and in danger of collapsing. Mr. W. H. Brierley, architect, stated in a report that the hall, which was erected for temporary purposes thirty years ago, had outlived the period during which it was intended to be used, and might collapse without any warning and should be taken down. A report was also read from the city surveyor (Mr. F. W. Spurr), suggesting the expenditure of a few hundred pounds in order to make the buildings last a few years longer. The large temporary hall of the buildings will accordingly be closed to the public at once.

THE Somerset County Council at their last meeting decided to apply to the Local Government Board for their consent to the borrowing by the County Council of the following sums for capital expenditure in respect of schools, the amounts to include costs attending the raising of the loans:—Elementary schools: Chard, High Street—new partitions, improvements to ventilation, infants' urinal, new fireplaces, and removal of galleries (borough of Chard and parish of Chard), amount 400*l.* Ilminster, Horton—new drainage, refitting offices, tar-paving, &c. (Ilminster and Ilminster Without), 200*l.* Ilminster, Ditton Street—new offices, drainage, tar-paving, &c. (Ilminster and Ilminster Without), 375*l.* West Bradley—refitting closets, improvements to drainage, asphalting playgrounds, &c. (West Bradley and East Pennard), 320*l.* Treborough—new classroom (Treborough), 200*l.* .Charlton Musgrove—enlargement of playground, new offices and partition (Charlton Musgrove), 365*l.* Woolavington—enlargement of classroom (Woolavington), 450*l.* Ashcott—site and new school buildings (Ashcott), 80*l.* and 1,500*l.* respectively.

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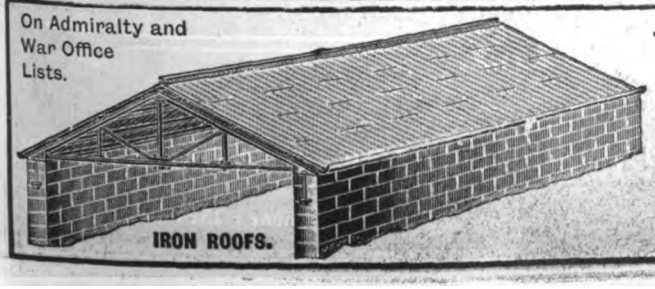
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MESSRS. REDPATH, BROWN & CO., LTD., have issued what may be regarded as an illustrated supplement to their free Handbook of Constructional Steelwork; for the pamphlet consists of single sheets of photographs showing steel structures and completed buildings for which they supplied the framework. The sheets are corded together and placed in a tasteful cover to which extra sheets may be added. The first three illustrations are of the steelwork for the Wallpaper Manufacturers' Works, Greenhithe. We notice that a New York architect was entrusted with this work. The Westminster Trust Buildings is an important block of eight storeys in Great Chapel Street, S.W. They are also supplying the steelwork for the Westminster Electric Power Station. Among the completed London buildings shown are the University College Hospital, the Scottish Provident Institution Buildings, Lombard Street; Harcourt House, the Cannon Street Fire Station, New Scotland Yard and United University Club. All the photographs are admirably reproduced and they testify to the important work which Messrs. Redpath, Brown & Co., Ltd., have carried out in London.

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WHAT THE PLUMBER SAW.

BY AN OCCASIONAL CORRESPONDENT.

HE was called to the house to do the usual little job, and was all over the house to find it. The "desirable residence" was of the usual modern semi-detached type with "every convenience" as part of its description. Possibly it had been awarded first prize in a competition organised by some technical journal in which the elevation with its pointed gables and Chinese-puzzle roof had appeared. The plumber had a vague recollection of seeing that picture on the other side of some paper which the office had once used when sending him the sizes and weights of some pieces of sheet lead. The house differed little from the usual house. Inside there were omissions and evidences of many afterthoughts; but the staircase had not been forgotten until the roof was on—which is saying something for the completeness of the plans. The external appearance, however, differed somewhat from the reproduction of the elevation the plumber had seen. This showed a sketch of a gentleman in an out-of-date tall hat standing at the gate, and a lady preceded by a child with a hoop coming down the garden walk. These were to "give life" to the picture. Perhaps the architect had put them there in reality when the house was first built, but they had left before the plumber arrived in search of the little job. The toy trees in the foreground, the rockery in the corner, and the mountain and woods in the background shown on the drawing were not there either. Still, these details apart, the house looked like its picture. Musing thus the plumber leisurely approached, followed by the usual boy carrying a bag containing the tools he was least likely to require.

Having got the general bearings of the house, position of the cellar, and ascertained the quality of the beer with a small dip pipe carried for the purpose, he began to seriously diagnose his job.

The gas jumped, the cylinder cupboard and the ceiling of the room below were wet, the hot water would not heat, the wash pipes and sanitary arrangements had a series of defects that were erratic in their periods and various degrees of inconvenience, and inexplicable in their cause.

The difficulty of the plumber's diagnosis was complicated owing to the pipes being as far as possible buried out of sight. The bricks had been chased, the plaster bulged, and there

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were evidences of almost frantic expedients lest a pipe should show.

The æsthetic tastes of the architect were primarily responsible for this condition, and his orders had proved the last persuasive argument for the sub-contractor plumber, who did the work, to abandon his intention of making a good job, despite the diminished profit such a resolution involved. Unfortunately the result did not place the responsibility on the architect, but upon the plumber and his fellow craftsmen generally. The gas meter and stopcock were the handiest, and therefore the first to be tackled, but in trying to turn off the tap, the difficulties commenced. The gas and meter had been one of the afterthoughts. Hence the only available position was one that assumed it would never require to be "got at" again after it was fixed. After a journey to the shop by the boy and one by the plumber himself, he got an eccentric tool which turned off the main supply cock, but broke the crutch in the process.

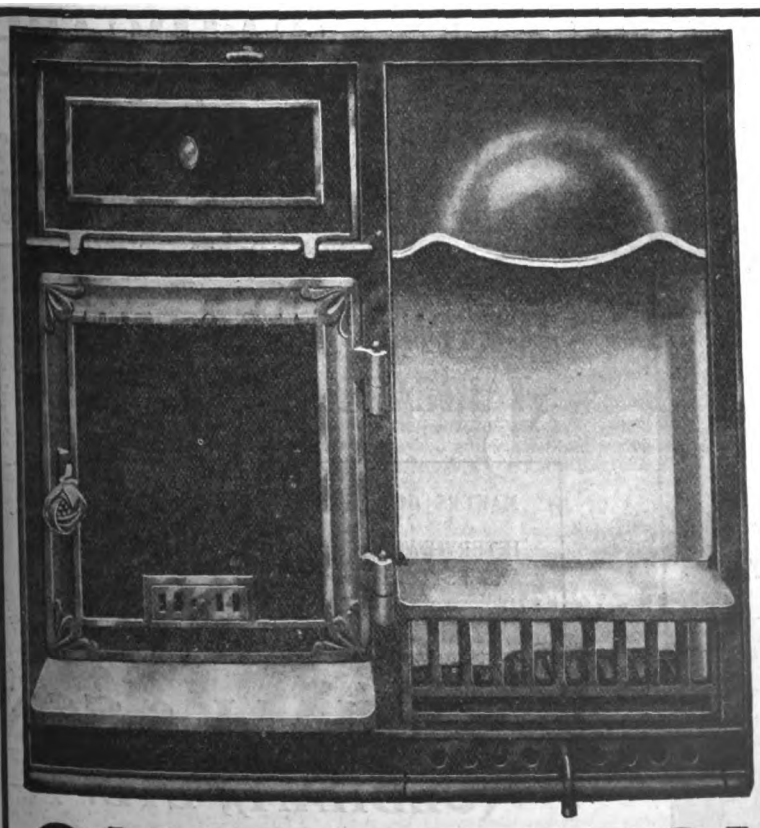
He then traced the regular festoons of the gas pipe under the cellar, and followed them under the other floors. To do this he broke holes through cellar and sleeper walls, thereby providing conveniences for future contingencies the architect had omitted. Except that in a general way it was all wrong, through the absence of wood strips on which to run the lead piping, the plumber had not yet found the exact cause of the jumps. He then got up the carpets and moved the furniture to find the gas board, under which the pipe should have run, unless the architect had pointed out some more erratic course. One of the boards was screwed, but the joiner had forgotten to cut off the tongues. So after considerable trouble and more journeys for tools, he reduced the board to matchwood, and split those immediately adjoining it. But there was no gas-pipe there.

The varied contents in the space between the ceiling and the boards would, if less common to the plumber, have been an interesting study. Dust and cobwebs galore and ample accommodation for vermin and parasites, with convenient means of ingress and egress and communication by means of the cavity walls to all parts of the building abundant. Wood shavings and other combustible materials were ready to help on the first fire. The plumber wondered why the architect (who in minor details showed evidence of his desire to provide for remote contingencies in cleanliness and ventilation) could find no cleaner way of constructing a floor than with this inaccessible catch place for filth and stale air.

As the day was getting on and the time was mounting up the plumber abandoned these reflections to pursue his search. On the way he found that a few nails had been driven into the lead gas-pipe by the mistress of the house to hang bric-à-brac and china on, and by the housemaid for other purposes, both using a flatiron to drive the points home. The plumber wondered in his clumsy way why lead and not iron had been used for the gas-pipes. Finally he found the moist place, let out the water and stopped the hole. The same thing would occur again in another place, though that was not his affair, but the architect's who originally specified the work and perhaps saw it done.

The hot-water trouble, or absence of that commodity, next engaged the plumber's attention and provided more scope for his imaginative genius to locate the trouble. The servant said the water had only become heated for a little time after the range had been newly set up, which information presupposed that the chimney-breast was not deep enough to accommodate the range, and the boiler flue was therefore ingeniously cut out of the party wall. This device had an advantage for at least a short time in so far as the fire heated the next door boiler, and in return the next door obliged with a few beetles, which came by the same way that the fire had travelled through the party wall. Of course the range and back boiler were afterthoughts, and the absence or curtailment of flue accommodation a too insignificant detail for the architect. The only remedy left for the plumber to propose was, "clean out underneath the boiler soon and often."

A contributory cause was provided by the convolutions of the lead circulating-pipes in their erratic course to reach the cylinder, the position of which, not being anticipated on the plan, was in the most inconvenient corner, with all its connections (which were made before the brickwork was built) at the back. The plasterer could not have plastered behind it even if he had remembered to do so. What the plumber saw round and about this made him wonder if the architect had ever anticipated that hot water might eventually be required when he drew the elevation. Before the



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plumber completed this investigation he was informed that when the cylinder did by any chance get hot it danced to the accompaniment of very ominous throbbing and cracking sounds; so he tried to trace the pipes up to the caverns that he knew lay beneath the roof.

Having located the assumed direction of the pipes by dint of following the cracks in the wall paper and plaster, he essayed to get into the roof space. To do this required another journey to the shop for climbing tackle, and might have necessitated a specially made man or boy to get through the diminutive hole provided apparently for access. In keeping with other incongruities this so-called manhole was nowhere near the supply tank which formed the objective of the plumber's search, but it had the advantage of being out of casual observation. Having negotiated the hole and torn his trousers in that acrobatic feat, he commenced upon his journey, crawling under purlins and intersecting valley timbers, aided by the numerous rays of light which struggled through the defective tiling where the slater could not get in a tool small enough to point or get himself near enough to reach it. These little inconveniences were the penalties consequent upon the pointed gables and tricky dormers which made a picturesque elevation. The hungry chirp of several nests of young birds disturbed the silence of the caverns—they evidently thought the plumber was a luscious worm. The dust of the hairless mortar (which had been originally thrown up under the tiles to be shaken off by the wind) lay thick around, together with a liberal admixture of soot blown through the openings. The plumber saw revealed what had often been a source of mystery to the mistress—namely, where all the dust came from, and what made the laths show through the plaster on the bedroom ceilings. This caused him to wonder why this accommodation should be provided for soot and dust and occasional snow drifts with so little convenience for its prevention or removal. He had forgotten that this was all part of the penalty of that picture, of the sacrifice of internal comfort for external appearance. A flat roof would have been inartistic and out of the question.

Directed by the hissing of the ball-tap, the plumber wormed his way to the dark corner in which the supply tank was stored, having by this time put his foot partly through the ceiling owing to the uncertain light and position of the ceiling joists, there being no boards to walk on. He eventually arrived near the tank to find that necessities of the position prevented any investigation being conducted otherwise than at arm's length. He located the leak that was responsible for the two wet floors below, and as it was impossible to repair it without either removing the roof or the ceiling of the room below, he ingeniously adopted the temporary expedient of a putty and paint bandage, securing the whole with the usual piece of twine.

About this time a second boy arrived with a message that another job had come into the shop, so he prepared to leave the many other little matters he had seen, in the confident knowledge that his early return would be assured. The plumber wondered why water tanks and other things were put by the architect in such impossible positions, and why all the jokes in the comic papers and on the music-hall stage were confined to the plumber and his work.

What the plumber will see when he comes to repair the drains will create a still more intense degree of interest.

A BILL has been deposited for introduction into Parliament next Session under which it is proposed to incorporate a company by the name of the Harwich Docks Company. Upon this company it is sought to confer powers for the construction of a dock and two graving docks at Harwich in seven years. The capital is to be 1,650,000*l.*, with power to borrow a further sum of 550,000*l.*

THE Gloucestershire County Council have adopted plans for the extension of the Shire Hall so as to bring all the county departments into one building, subject to the approval of the education committee. The committee entrusted with the matter will advertise for tenders for the carrying out of the work.

THE Bournemouth Borough Council last week approved of a scheme for the erection of a Kursaal on the site of the Belle Vue Hotel. Plans are to be prepared for a pavilion, to include a large assembly room, small hall, lounge, smoking room, reading and billiard rooms, restaurant, dining room, &c., at the estimated cost of 45,000*l.*

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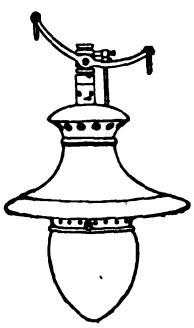
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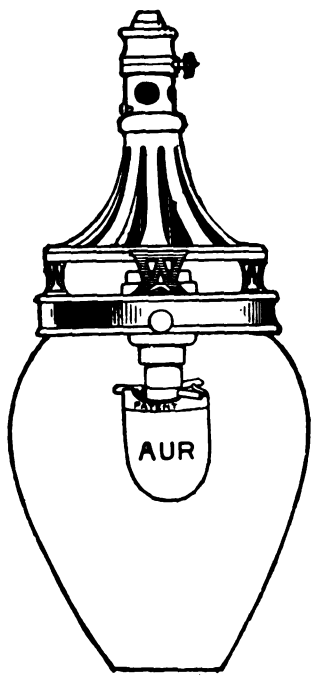
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A 70 Candle power Light

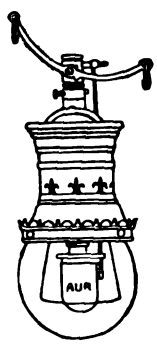
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No. 5119a. This is another pattern of miniature Arc Lamp, specially designed for more exposed Lobby Lighting. Like No. 5120, shown opposite, it is draught and dust proof. Gas consumption, about 4 ft. per hour. Lamp, 80 candle power, price 6s. By-pass 2s. extra.



For 3 feet of Gas per hour

British Made



No. 5120. The Welsbach "Aurora" Lamp, an exceedingly pretty miniature Inverted Arc Lamp, draught and dust proof, for Lobbies and Halls, 80 candle power for 4 ft. of gas per hour. Price, Brass, 5s. Porcelain instead of brass body, 5s. 6d. By-pass 2s. extra.

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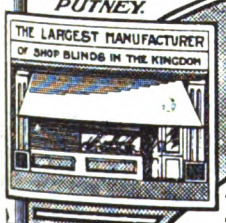
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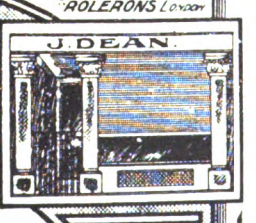
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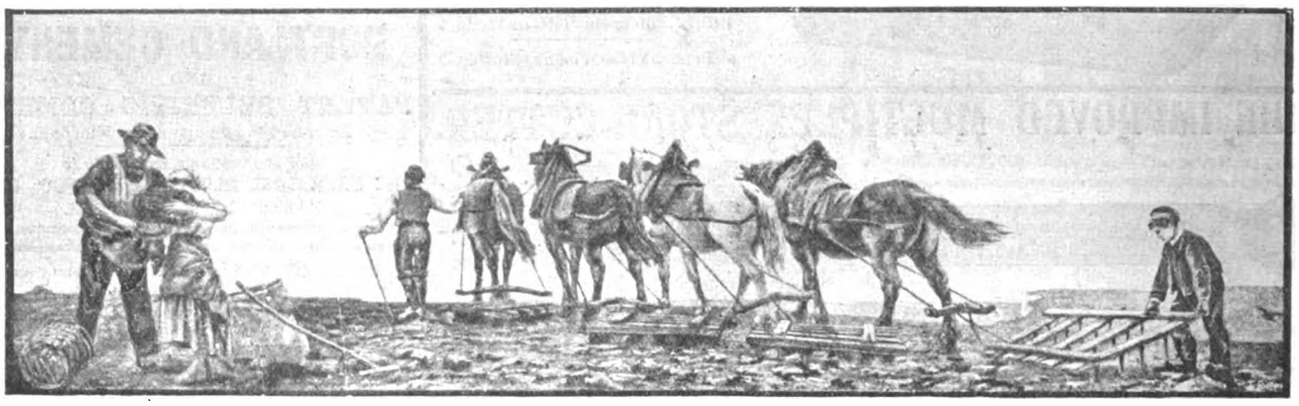
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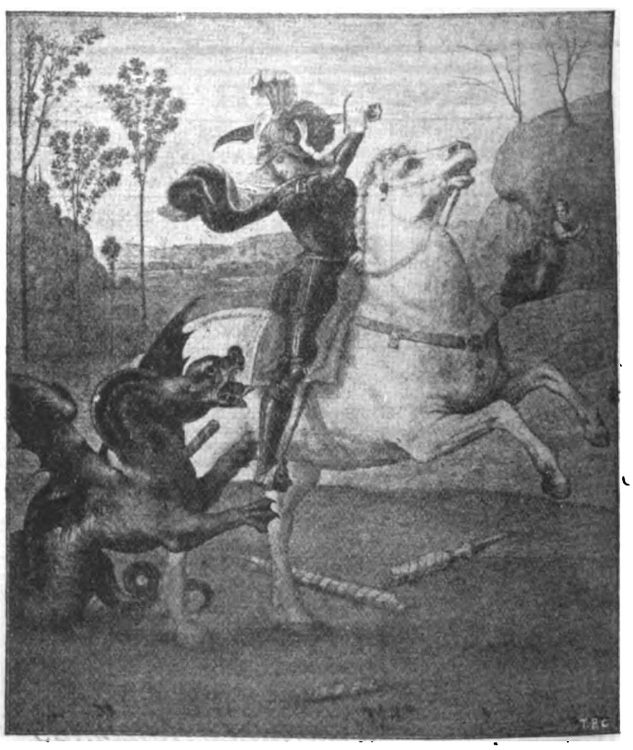
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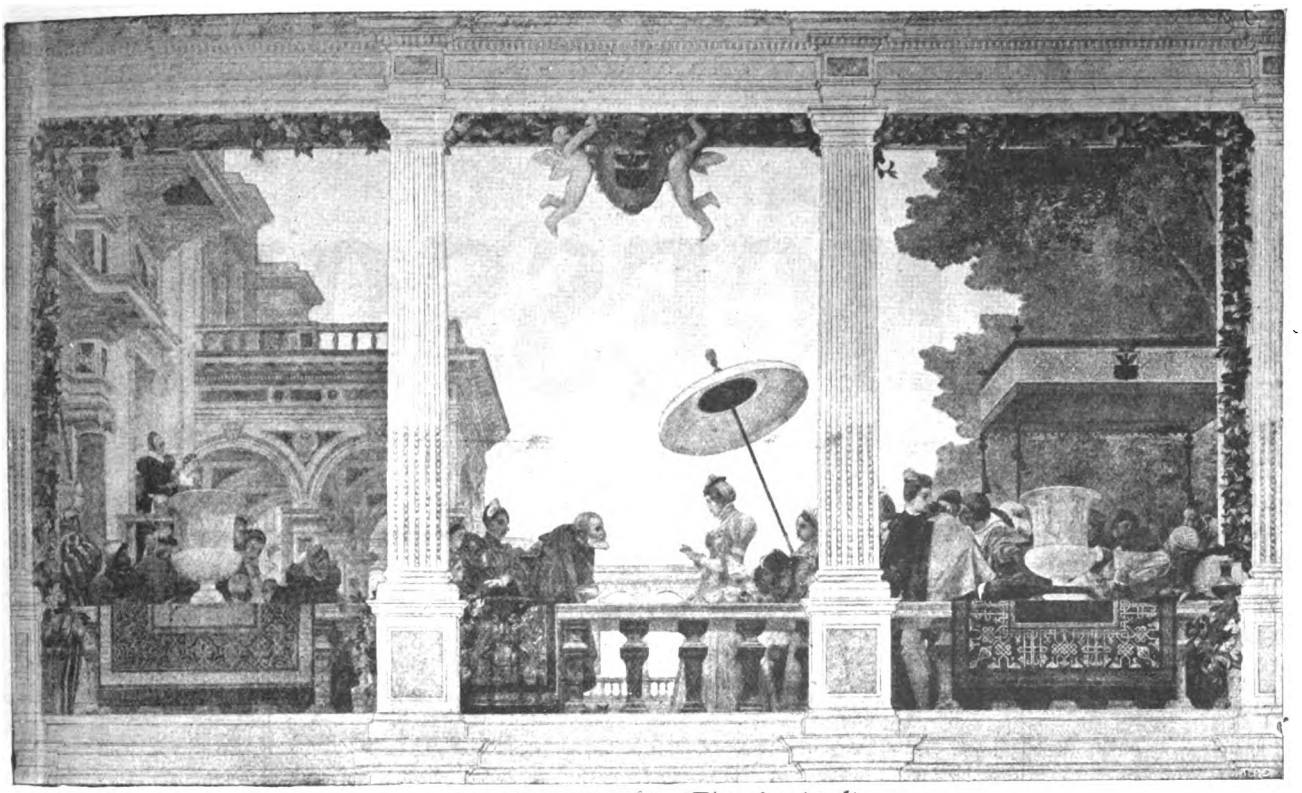
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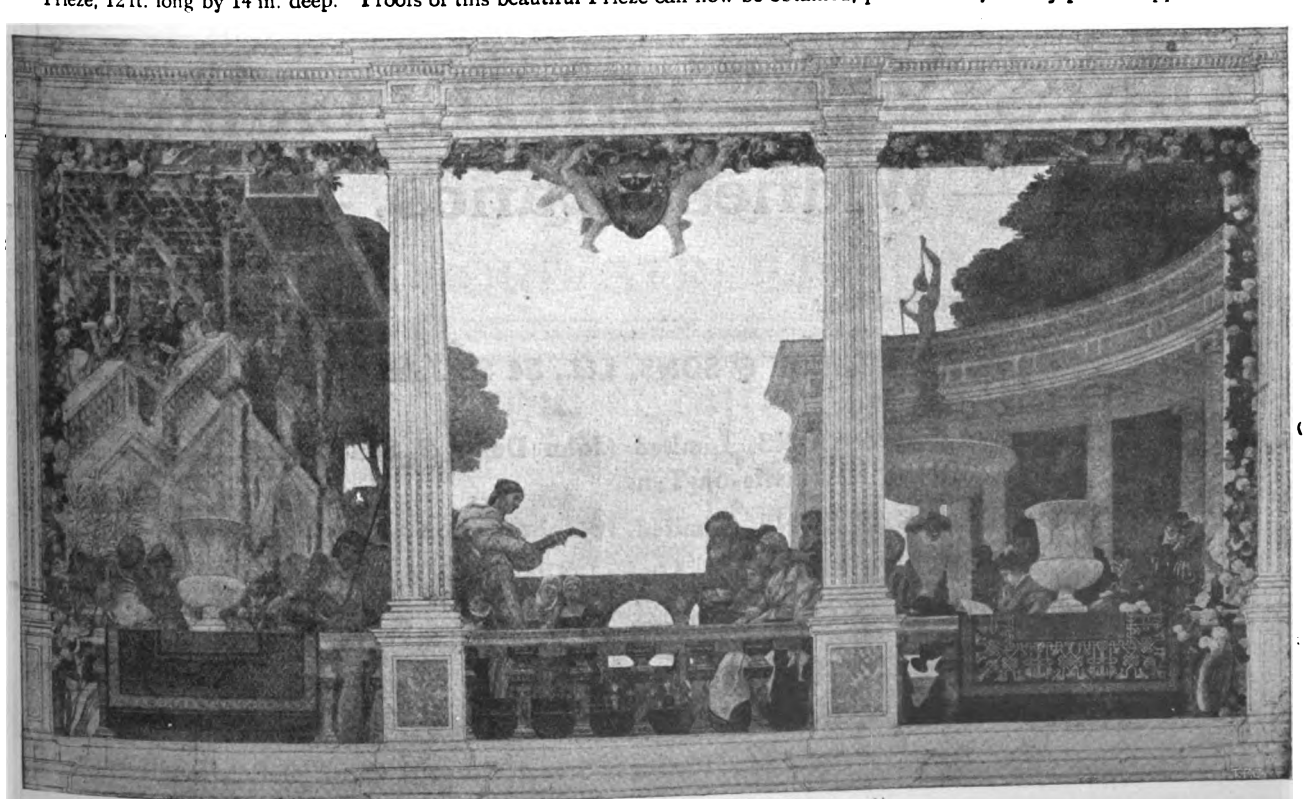
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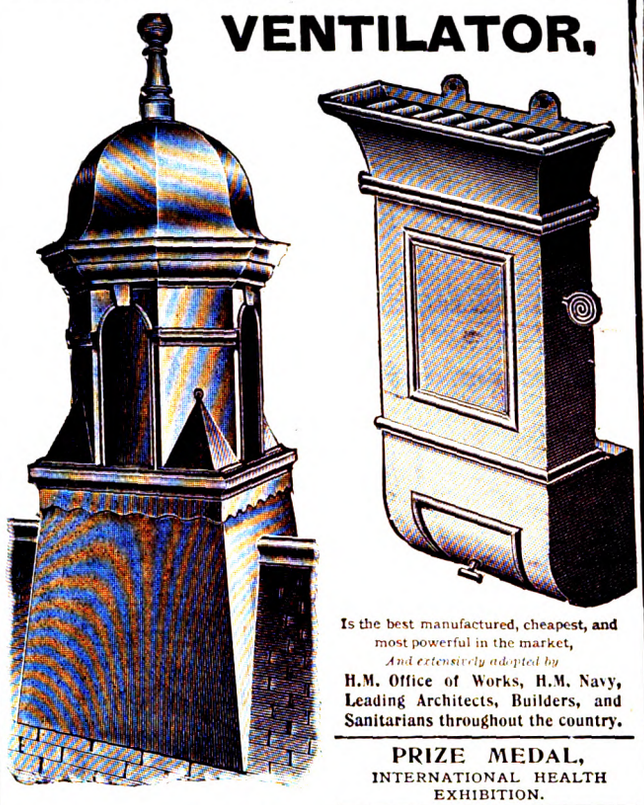
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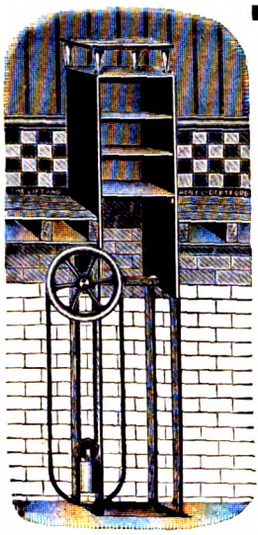
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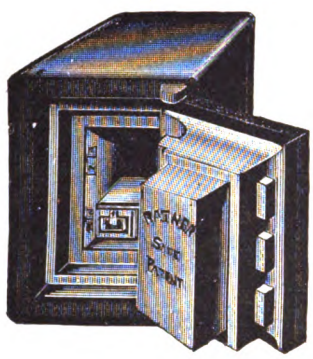
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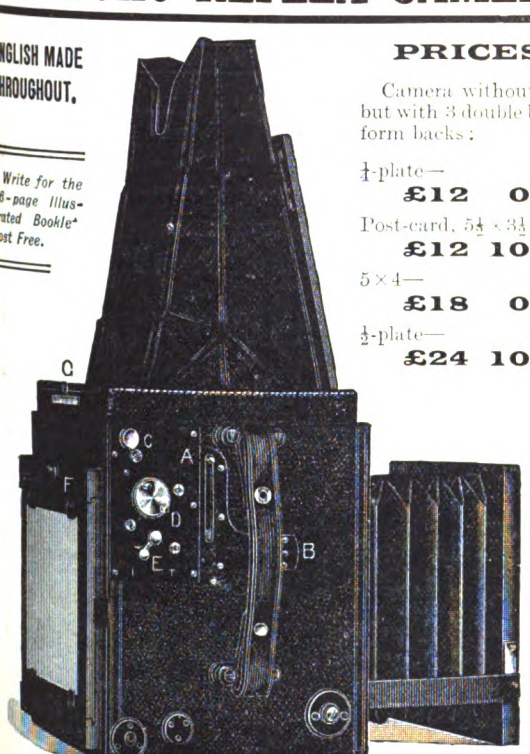
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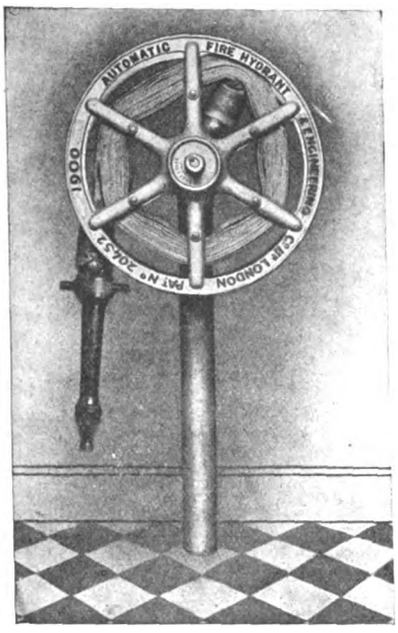
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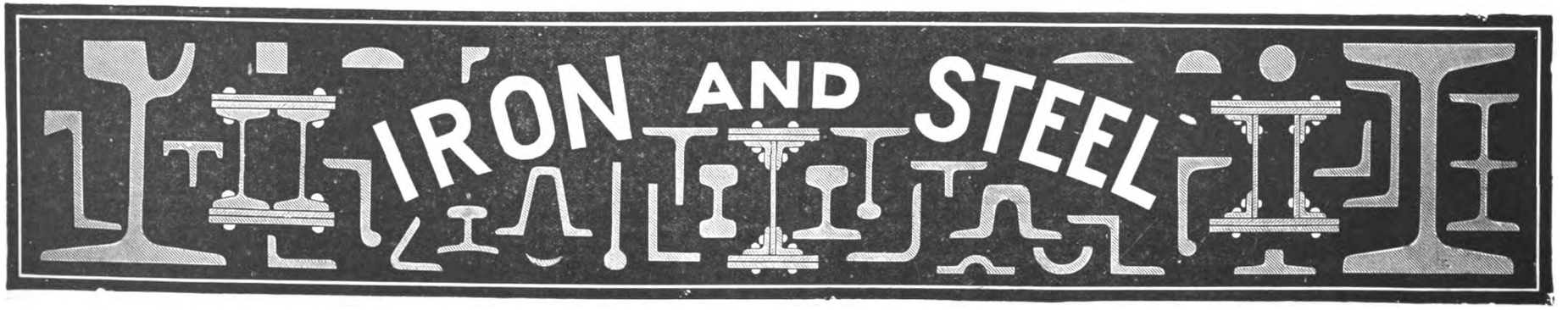
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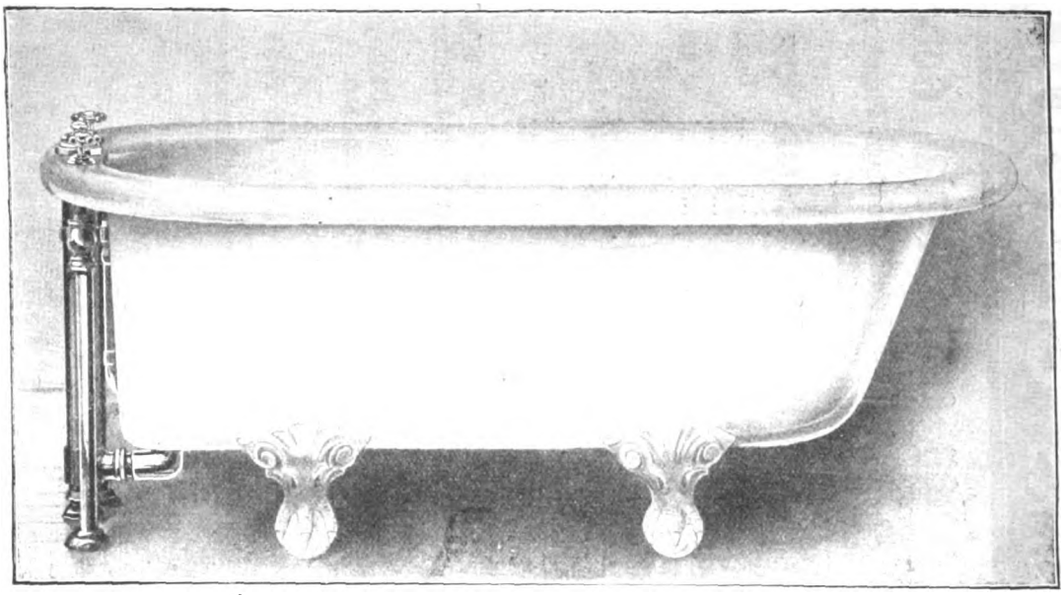


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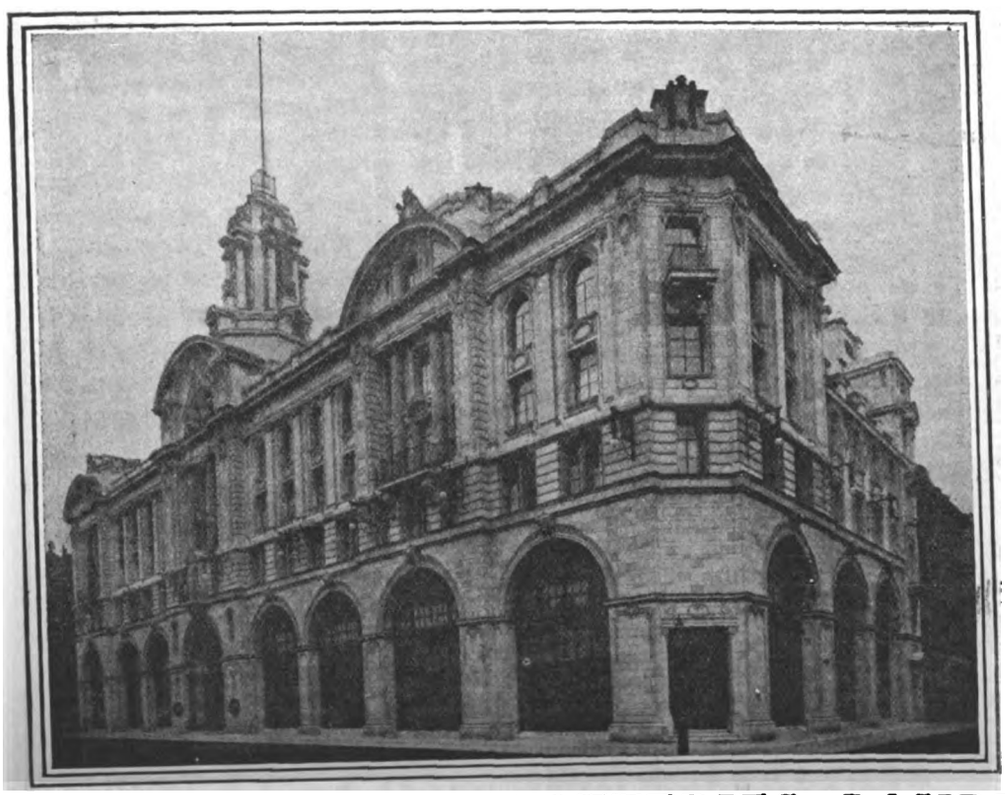


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Architect and Contract Reporter.

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EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

**** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITION OPEN.

LYNTON (DEVON).—Jan. 30, 1909.—Sketch plans to scale and sketch designs, with approximate cost for Wesleyan church and additional buildings, on land near the town hall. Design placed first will be appointed to carry out the work; 2nd premium, 7*l.* 7*s.*; 3rd premium, 5*l.* 5*s.* Deposit 10*s.*, returnable to competitors. Plans and further particulars from Mr. K. Jutsum, Clarence Terrace, Lynton.

CONTRACTS OPEN.

AMBLESTON (HAVERFORDWEST).—Jan. 30.—For erection of vicarage at Ambleston. Mr. Hugh Thomas, architect and surveyor, Haverfordwest.

ARMATHWAITE.—Feb. 8.—For erection of mixed school and master's house at Armathwaite, Cumberland. Deposit 1*l.* 1*s.* for full set of quantities, or 10*s.* 6*d.* for each separate trade. Mr. Geo. Dale Oliver, F.R.I.B.A., county architect, Carlisle.

BARNSLEY.—Jan. 23.—For mason and bricklayer, carpenter and joiner, tiler and plasterer's work required in rebuilding premises in Main Street, Mexborough. Mr. H. L. Paterson, architect, 19 St. James Street, Sheffield.

BARNSLEY.—Feb. 3.—For additions to the post office. Deposit 1*l.* 1*s.* H.M. Office of Works, &c., Storey's Gate, S.W.

BELFAST.—Jan. 26.—For erection of addition to Municipal Technical Institute. Deposit 2*l.* 2*s.* Mr. Samuel Stevenson, architect, 83 Royal Avenue, Belfast.

BELFAST.—Feb. 8.—For erection of building in Murray's Terrace and Athol Street, Belfast, consisting of three separate warehouses and laundry. Deposit 3*l.* 3*s.* Mr. James A. Hanna, C.E., architect, Ocean Buildings, Belfast.

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BRADFORD.—Jan. 26.—For plasterer and concretor works in erection of public mortuary, Wilton Street. The City Architect, Whitaker Buildings, Brewery Street, Bradford.

CHRISTCHURCH.—Jan. 25.—For erection of infirmary at workhouse, Fairmile, Christchurch, Hants. Deposit 5*l.* Mr. A. Druitt, clerk to the Guardians, Christchurch Union, Hants.

COVENTRY.—Jan. 25.—For erection of wall and other works at Frederick Bird School, Swan Lane. Deposit 3*l.* 3*s.* Messrs. G. & I. Steane, architects, 22 Little Park Street, Coventry.

DUBLIN.—Jan. 27.—For erection of ward block and boiler house, &c., at the Military Hospital, Arbour Hill. Deposit 10*s.* Director of Barrack Construction, 80 Pall Mall, London, S.W., or at Barrack Construction Office, Arbour Hill Hospital, Dublin.

ELLAND.—Jan. 27.—For erection of a four-storeyed fire mill, engine house, &c., at Springwood Mills, Holleywell Brook, Elland, Yorks. Messrs. Chas. F. L. Horsfall & Son, architects, Halifax.

EXMOUTH.—Jan. 25.—For erection of a Y.W.C.A. in Imperial Road. Deposit 1*l.* 1*s.* Mr. George Beavis, architect and surveyor, Exmouth.

GLASGOW.—Jan. 29.—For construction of steel footbridge across River Kelvin within Botanic Gardens. The City Engineer, City Chambers, 64 Cochrane Street, Glasgow.

GLASGOW.—Feb. 13.—For the excavator, brick and mason, timber and other works required in construction of superstructure of machinery buildings, &c., at Shirehall. Deposit 5*l.* 5*s.* The Office of Public Works, City Chambers, 64 Cochrane Street, Glasgow.

HAMBLEDON.—Jan. 28.—For alterations and additions to an old building at the workhouse, Hambledon, Surrey. Mr. Edward L. Lunn, architect, 36 High Street, Guildford.

HUDDERSFIELD.—Jan. 27.—For excavator, mason and bricklayer, carpenter and joiner, plasterer and slater, concretor, plumber and glazier's work (one contract preferred) in erection of Palace Theatre, Kirkgate. Deposit 2*l.* 2*s.* Messrs. Richard Horsfall & Son, architects, 22A Commercial Street, Halifax.

HYTHE.—Jan. 25.—For additions to Hythe petty sessional court, Hants. Deposit 1*l.* 1*s.* Mr. W. J. Taylor, county surveyor, The Castle, Winchester, and at the Hythe police-station.

KELVEDON (ESSEX).—For alterations and additions to Prested Hall, near Kelvedon. Deposit 2*l.* 2*s.* Mr. J. W. Start, F.S.I., architect and surveyor, Colchester.

KEMPTON PARK.—Feb. 1.—For construction of coal bays, fitting and other workshop stores, lodge, cottages, &c., at Cricklewood, and cottages, &c., at Kempton Park, Middlesex, for Metropolitan Water Board. Deposit 10*l.* with the Board's Accountant, Savoy Court, Strand, W.C. The Engineer, Staines Reservoirs Communication Works, The Firs, Southern Road, Fortis Green, East Finchley, N.

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LITHERLAND.—Jan. 25.—For erection of a cookery and laundry centre at Lander Road Council school, Litherland, near Liverpool. Deposit 2*l.* Mr. Henry Littler, county architect, 16 Ribblesdale Place, Preston.

LONDON.—Jan. 27.—For terrazzo paving and margins at the new infirmary, Bridport Road, Upper Edmonton, N. Mr. Stuart Hill, architect, 106 Cannon Street, E.C.

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MANCHESTER.—Jan. 23.—For erection of new municipal secondary school for girls, in Chorlton Street. Deposit 3*l.* 3*s.* Elementary Education Office, Deansgate, Manchester.

MARGATE.—Jan. 28.—For construction of ladies' and gentlemen's lavatories in the face of the cliff on either side of the new iron staircase at the Oval. Separate tenders are required—(*a*) for buildings and main drains, and (*b*) for sanitary fittings, tiling and mosaic flooring. The Borough Surveyor, 13 Grosvenor Place, Margate.

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PENKRIDGE.—Jan. 23.—For erection of Council school for about 150 children, and also a cookery room at Penkridge, near Stafford. Deposit 1*l.* 1*s.* Mr. Graham Balfour, director of education, County Education Offices, Stafford.

PAULTON (BRISTOL).—Jan. 29.—For erection of Sunday-school. Rev. — Clark, Rosslyn, Midsomer Norton.

REDHILL.—Feb. 20.—For erection of an elementary school at Cromwell Road, Redhill. Deposit 1*l.* 1*s.* Mr. A. Lund Newell, secretary, Municipal Buildings, Reigate.

ROTHERHAM.—Jan. 25.—For conversion of present offices at Kimberworth St. Mark's school into automatic flushing closets and also necessary drainage in connection therewith. Mr. J. Platts, architect, High Street, Rotherham.

ROTHERHAM.—Jan. 29.—For alteration of doors in Council schools to swing outwards as well as inwards. Mr. J. Platts, architect, High Street, Rotherham.

SACRISTON.—Jan. 25.—For erection of workmen's club at Sacriston, co. Durham. Mr. Geo. Thos. Wilson, architect, 22 Durham Road, Blackhill, co. Durham.

SCOTLAND.—Feb. 4.—For taking down existing timber bridge over river Annan at Woodfoot, about two miles from Beattock station, Dumfries, and supplying and erecting new steel girder bridge of three spans, for Lockerbie district committee. Deposit 1*l.* 1*s.* Messrs. Crouch & Hogg, C.E., engineers, 14 Blythswood Square, Glasgow.

SCOTLAND.—March 2.—For erection of spire for church, for Deacons' Court of United Free English Church, Stornoway. Mr. Neil Maccallum, clerk to Deacons' Court, Stornoway.

TIDWORTH.—Feb. 1.—For erection of army ordnance receiving-shed, general stores, offices, &c., also clothing, camp and mobilisation stores at Tidworth. Deposit 10*s.* The Director of Barrack Construction, 80 Pall Mall, London, S.W., or at the Barrack Construction Office, Tidworth.

TREDEGAR.—Jan. 26.—For erection of church at Dukestown, Tredegar. Mr. A. F. Webb, architect, High Street, Blackwood.

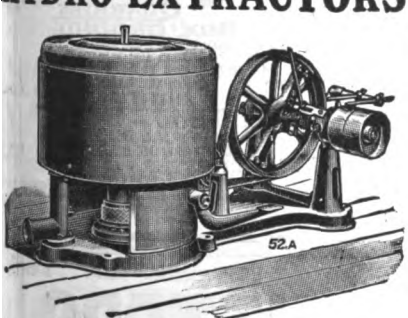
WALES.—For new shops, bakery and stables at Forestfach. Messrs. C. S. Thomas, Meager & Jones, architects, Swansea.

WALES.—Jan. 23.—For erection of twenty-eight workmen's dwellings at Cwmbach, also twenty-two at Godreaman, for the Aberdare Urban District Council. Surveyor's Office, Town Hall, Aberdare.

WALES.—Jan. 26.—For erection of large villa residence, Bolgoed, Pontardulais. Mr. W. Beddoe Rees, architect, 3 Dumfries Place, Cardiff.

WALES.—Jan. 26.—For electrical work in connection with new factory about to be erected at Cardiff, including alternatives and exciters, high and low pressure switchboards, and all necessary wiring, for the Boston Collapsable Barrel and Manufacturing Company, Ltd. Deposit 5*l.* Mr. Walter Sayer, superintendent, 79 York Road, London, S.E.

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WALES.—Jan. 27.—For erection of bridge at Temple Gate, Meline, St. Dogmells, Cardigan. Mr. Lewis, architect, Priory Street, Cardigan.

WALES.—Jan. 30.—For erection of two shops and dwelling house (attached) at Evans Street, Kenfig Hill. Mr. Aneuryn T. James, architect and surveyor, Port Talbot.

WALES.—Feb. 1.—For construction of engine house, filter bed, cottage and other works, at Llyn Traffwll, about three miles from the Valley station, London and North-Western Railway, for the Holyhead Waterworks Company. Deposit 5*l.* 5*s.* Messrs. H. Rofe & Son, civil engineers, 8 Victoria Street, Westminster.

WALES.—Feb. 4.—For erection of six dwelling-houses at Port Tennant, Swansea. Mr. Talfourd Strick, clerk, Harbour Offices, Swansea.

WALES.—Feb. 3.—For erection of a new Y.M.C.A. building, Pontypridd. The Building Committee of the Pontypridd Y.M.C.A., Taff Street, Pontypridd.

WALES.—Feb. 6.—For erection of sixty houses and six shops on the Ynysyplwm estate, Tonyrefail. Mr. Philip J. Jones, architect, Cilfynydd, Pontypridd.

WATERLOO.—Jan. 29.—For erection of Council school for 100 children at Waterloo, Hants. Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

WIGAN.—Jan. 26.—For erection of fifty cottages on land adjoining carsheds, Melverley Street. The Borough Engineer, King Street West, Wigan.

WREXHAM.—For erection of (1) a church at Hightown, Wrexham; (2) for moving existing building and forming boundary walls. Deposit 10*s.* Messrs. Prothero, Phillott & Barnard, architects, Cheltenham.

YORK.—Jan. 30.—For construction of temporary timber grand stand (to seat about 5,000 persons) in Gardens of Yorkshire Philosophical Society. Deposit 2*l.* 2*s.* Mr. F. W. Spurr, city engineer, Guildhall, York.

THE Local Government Board have declined to sanction the proposal of the Crewkerne Urban District Council to borrow 15,500*l.* for the purchase of the waterworks, on the ground that the amount was excessive.

TENDERS.

BARNSLEY.

For constructing a tunnel under the South Yorkshire Canal and laying pipes for the hydraulic sewage main. Mr. J. H. TAYLOR, borough surveyor.

BUCKLEY, Bradford (*accepted*)	£3,184 14 6

For providing pipes and castings for section of above.

STAVELEY COAL AND IRON CO. (*accepted*)	1,888 5 2

BRIDLINGTON.

For heating the Burlington schools with hot water (low pressure). Mr. J. EARNSHAW, M.S.A., architect and surveyor, Bridlington.

Unity Wood and Iron Co.	£480 0 0
King & Co.	427 0 0
Haden & Co.	410 0 0
Bailey & Sons	410 0 0
Atkinson	399 15 0
Green & Son	398 0 0
Braithwaite	395 0 0
Young & Peck	393 0 0
Leeds Marble Works	386 12 0
T. & F. Everingham	382 12 3
Woodhead	375 0 0
NETTLESHIP, Bridlington (*accepted*)	365 0 0
Dinning & Cooke (*withdrawn*)	272 0 0

For erection of the Burlington schools and caretaker's residence. Mr. J. EARNSHAW, M.S.A., architect and surveyor, Bridlington.

Dews	£9,679 17 6
Spink	9,579 5 0
Airey & Son	9,550 0 0
Quibell, Son & Greenwood	9,500 0 0
Wilson	9,149 4 0
Musk & Son	8,995 0 0
Smallwood & Shaw	8,919 1 3
Starr	8,873 4 4
Martindale	8,870 0 0
Grant	8,741 19 7
Sampson & Liddall	8,768 11 7
Postill	8,738 19 0
MOORE, Bridlington (*accepted*)	8,615 10 0

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BUSHEY GROVE.

For laying 540 yards of 9-inch stoneware-pipe sewer, &c. Mr. E. R. RYDER, surveyor, Bushey.

Mann	£376 9 8
Langley & Johnson	350 0 0
Fowler	340 0 0
Bate & Co.	308 14 0
Clark Bros.	295 10 0
Brown	289 1 11
Pitkin	285 13 3
Bliss	277 13 6
Bailey & Sons	275 0 0
Champniss & Co.	268 0 0
W. & W. Wilkins	259 0 0
Jaggard	250 5 11
BRACEY & CLARK, Watford (*accepted*)	246 5 0

CLAYGATE.

For making-up Station Parade, Claygate, Surrey. Mr. H. C. FREAD, A.R.I.B.A., engineer.

Patent stone paths.

Sheppard & Son	£636 0 0
Kavanagh & Co.	507 0 0
Free & Son	491 0 0
WHEELER & Co., Southwark (*accepted*)	437 0 0

Asphalte paths.

Sheppard & Son	£589 0 0
Kavanagh & Co.	471 0 0
Free & Son	429 0 0
WHEELER & Co. (*accepted*)	408 0 0

DUNFERMLINE.

For alterations on the County buildings.

Accepted tenders.

Clark, mason	£111 0 0
Mitchell, joiner	96 18 0
Inglis, plumber	78 10 0
H. & J. Ramsay, plasterer	78 10 0
Hoggan & Son, painter	28 17 0

EXETER.

For new mineral water factory and stabling in Belgrave Road. Mr. R. M. CHALLICE, architect and surveyor, Exeter.

Oliver & Son	£937 0 0
Brealy	902 0 0
Sleeman	899 7 0
Herbert	899 0 0
J. & J. M. Soper	890 0 0
Triggs	879 0 0
Ham & Passmore	871 0 0
Letter	870 0 0
Coles	859 4 0
Smale	835 0 0
Westcott, Austin & White	824 11 10
BAKER BROS., St. Thomas (*accepted*)	787 0 0

FENTON.

For new infants' school, Manor Street. Mr. S. B. ASHWORTH, architect, Stoke-upon-Trent.

Walters, jun.	£3,840 0 0
Grant	3,757 0 0
Young & Son	3,655 0 0
Yoxall	3,620 0 0
Mould	3,571 0 0
Tomkinson & Betteley	3,557 0 0
Godwin	3,541 0 0
Wilton, jun.	3,499 0 0
Bennion	3,459 5 0
Bennett Bros.	3,440 0 0
Chatfield	3,420 0 0
Ball & Robinson	3,400 0 0
Goodwin	3,390 0 0
CORNES & SON, Hanley (*accepted*)	3,195 0 0

GLASTONBURY.

For erection of an annexe to the engine house on Wellhouse Reservoir. Mr. G. ALVES, borough surveyor.

Gleed Bros.	£288 16 2
Dunthorn	267 10 0
Wright & Son	263 2 0
STEAD, Glastonbury (*accepted*)	251 10 0

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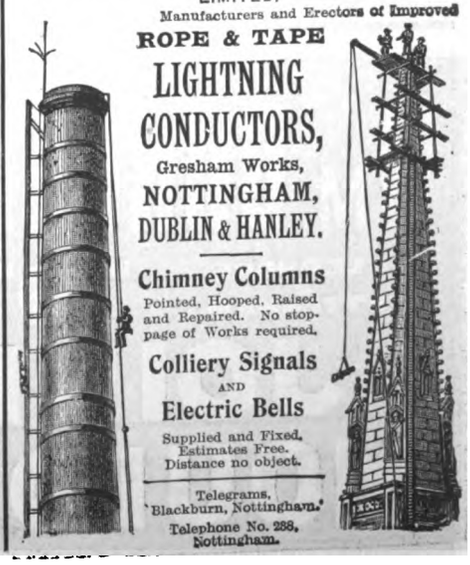


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HULL.

For concrete paving to playgrounds, alterations to latrines, &c., at the Grammar School, Leicester Street. Mr. J. H. HIRST, city architect, Hull.

Lister	1,565 13 0
Bilton	1,133 0 0
Levitt	1,060 0 0
Jackson & Sons	1,049 0 0
Kettlewell	974 0 0
Walker & Son	969 0 0
HARPER, Brunswick Avenue (*accepted*)	947 0 0

For erecting a heating vault, &c., at South Myton Council School, Adelaide Street.

Kettlewell	£205 0 0
Lison & Son	175 13 4
Bilton	174 6 8
Jackson & Son	172 10 0
SOUTHERN (*accepted*)	156 2 6

LONDON.

For the erection of a police-station at Highbury Vale. Mr. J. DIXON BUTLER, F.R.I.B.A., surveyor, New Scotland Yard, S.W. Quantities by Messrs. THURGOOD, SON & CHIDGEY, 8 Adelphi Terrace, Strand, W.C.

Dove Bros.	£13,587 0 0
Ansell	13,500 0 0
Treasure & Son	13,351 0 0
Cubitt & Co	12,950 0 0
Shurmur & Son	12,650 0 0
Higgs & Hill	12,430 0 0
Willmott & Sons	12,381 0 0
Leslie & Co.	12,223 0 0
Mowlem & Co.	11,990 0 0
McCormick & Son	11,987 0 0
Lovatt	11,967 0 0
F. & H. F. Higgs	11,927 0 0
Patman & Fotheringham	11,923 0 0
Prestige & Co.	11,900 0 0
Godson & Sons	11,725 0 0
Sabey & Son	11,690 0 0

LONDON—*continued.*

For carrying out alterations and additions to the meeting hall of the West End Baptist Chapel, King Street, Hammersmith. Messrs. GORDON WILSON & Co., architects, 667 Fulham Road, S.W.

Myring & Co.	£1,475 0 0
Gray	1,280 18 2
Beaven	1,189 0 0
Bishop	1,168 0 0
Bailey	1,098 0 0
Dorey & Co.	1,079 0 0
Hicks	1,077 10 2
Acock	1,067 7 11
LOWE (*accepted*).	1,015 0 0

For the execution of work in connection with additional lavatory accommodation at the workhouse in Prince's Road, Kennington Road, S.E.

Newman	£147 0 0
Bagshaw	145 10 0
Crick	136 14 8
Shanks & Co.	131 8 7
Bland	130 0 0
Wall	124 12 0
Hough	123 0 0
Bragg & Sons	122 10 0
Newman & Manning	120 11 0
Jennings	114 16 10
Knight	110 15 0
Renwick	108 0 0
Doulton & Co.	104 11 0
Newell & Lusty	100 0 0
Chamberlain	98 10 0
INNS, 30 Camomile Street, E.C. (*accepted*)	86 0 0

For making-up and paving that part of Fallsbrook Road, Streatham, which is not already a parish road, for the Wandsworth Borough Council. Mr. P. DODD, borough engineer.

Mowlem & Co.	£750 0 0
Harringdon & Co.	735 0 0
E. & E. Iles	679 12 0
Lane & Co.	635 0 0
Harber & Co. (*recommended*)	515 16 4

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LOWESTOFT.

For new secondary school (accommodation 300).

ROPER, Ipswich (*accepted*)	£9,143 0 0

NEWBURY.

For new buildings at the girls' school, for Berkshire education committee.

Bosher & Sons	£10,558 12 4
Silver & Sons	9,994 0 0
Collier & Catley	9,699 0 0
Hoskings Bros.	9,400 0 0
Chivers	9,350 0 0
Creed	9,324 0 0
Hughes	9,095 0 0
H. Elms	9,009 0 0
C. Elms	8,989 15 6
Cox & Sons	8,988 0 0
Houghton & Hitchman	8,974 0 0
SEWARD, Wokingham (*accepted*)	8,928 0 0

NEWPORT (ISLE OF WIGHT).

For the supply and fixing complete of (1) a 110-b.h.p. continuous working load suction gas engine and suction plant at the waterworks, Carisbrooke, I.W.; (2) a vertical three-throw double-acting pump of Hayward-Tyler's pattern.

110-b.h.p. suction gas engine and suction plant.

RUSTON, PROCTOR & Co. (*accepted*)	£1,116 0 0

Vertical three-throw double-acting pump.

RUSTON, PROCTOR & Co. (*accepted*)	668 0 0

NORTH TAWTON.

For construction of North Tawton waterworks, Okehampton, Devon.

Starkey	£3,409 0 0
Swainson	2,638 0 0
Turpin	2,599 0 0
Lester	2,371 0 0
Furze	2,274 0 0
Fisher & Co.	2,205 0 0
Avery	2,033 0 0
Cronson & Co.	2,103 0 0
Ellis & Son	1,898 0 0
Steer & Pearce	1,820 0 0

NUNEATON.

For the following works for the Corporation:—(1) Additions to Council offices; (2) construction of timber footbridge in Riversley Park. Mr. F. C. COOK, borough surveyor.

Additions to Council offices.

Cattell	£387 0 0
Kelley & Son	369 4 0
Smith	331 0 0
BEDINGHAM, Nuneaton (*accepted*)	328 0 0

Footbridge in Riversley Park.

Kelley & Son	103 15 7
Smith	102 0 0
BEDINGHAM (*accepted*)	96 0 0

PORTSMOUTH.

The Portsmouth Corporation have accepted the following tenders for the supply of permanent-way materials and electrical equipment for the construction of the new tramway in Goldsmith Avenue:—

Electrical Equipment.

Messrs. Watlington & Co. for the whole of the poles for 337*l.* 1*s.* 6*d.*; also for Nos. 3 and 4 pole collars, large Brooklyns, small Brooklyns, double bodies, single bodies, large globe strains, small globe strains, Clevis globe strains, insulating studs, trolley wire, $\frac{1}{8}$ telephone wire, and 2-inch fibre conduit (Key Co.'s make), for 481*l.* 2*s.* 2*d.*

Messrs. H. & W. Davis for pole finials and Nos. 1, 2, and 3 pole base rings, for 14*l.* 5*s.* 6*d.*

Messrs. W. H. Sperring & Co. for pole rings and road frames and covers, for 28*l.* 12*s.* 9*d.*

Messrs. R. W. Blackwell & Co. for No. 1 pole bands, Nos. 1 and 2 pole collars and guard wire pole bands, for 15*l.* 14*s.* 10*d.*

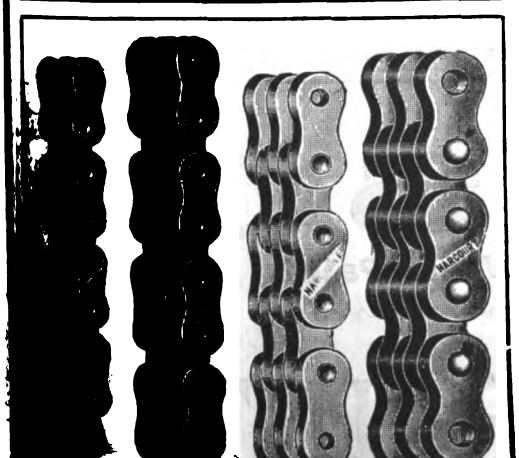
Messrs. Brecknell, Munro & Rogers for 12-inch mechanical ears, anchor ears, and terminal clamps, for 6*l.* 9*s.* 4*d.*

Messrs. W. F. Dennis & Co. for No. 8 guard wire, 7/12, 7/14 and 7/16 span wire, for 8*l.* 18*s.* 8*d.*

Messrs. the British Insulated and Helsby Cables, Ltd., for telephone-pole brackets, .5 square inch lead-covered cable, four core pilot and telephone cable, and the whole of the copper bonds, for 311*l.* 19*s.* 5*d.*

Messrs. Estler Bros. for telephone pole box, 3*l.* 10*s.*

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The Post Office, Montreal.
The New Lunatic Asylum, Bristol.
The Houses of Parliament, Brisbane.
The Holborn Viaduct Buildings, London.
The New Library, Pollokshields.
The Asylum, Letterkenny.
The Dykebar Asylum, Paisley.
The Metropolitan Carriage Works, Saltley.
The Royal Artillery Barracks, Manchester.
The Cottage Hospital, Walsall.
The Fever Hospital, Bristol.
The Stores of A.T. Stewart, Esq., New York.
The Mansion of T. Wilson, Esq., Hull.
The City Asylum, Birmingham.
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PORTSMOUTH—*continued.*

Messrs. Imeson, Finch & Co., Ltd., for six-way fuse box, 7*s.* 10*d.*

Messrs. W. T. Glover & Co., Ltd., for rubber cable, for 40*l.* 1*s.*

Tenders were also received from Messrs. Siemens Bros. & Co., Ltd., Mr. A. Wiseman, Messrs. J. Shervell, Ltd., Messrs. Edward Le Bas & Co., the Western Electric Co., the Lahmeyer Electric Co., the Union Cable Co., Messrs. Grenier & Co., Messrs. W. T. Henley & Co., the Liverpool Electric Co., the Union Electric Co., the Forest City Electric Co., and the Key Engineering Co.

Permanent Way Construction.

Mr. W. G. Privett for ballast, at 3*s.* 4*d.* per cubic yard.

Mr. F. E. Wyatt for sand, at 2*s.* 6*d.* per cubic yard.

Mr. C. G. German for Portland cement, at 1*l.* 2*s.* 11*d.* per ton.

Mr. C. G. German for granite setts, at 1*l.* 2*s.* 3*d.* per ton.

The First Anglo-Russian Oil Co., Ltd., for pitch, at 1*l.* 9*s.* 6*d.* per ton.

Mr. T. H. Harvey for creosote oil at 3½*d.* per gallon.

Messrs. Thermit, Ltd., for "Thermit" joints, at 1*l.* 4*s.* per joint.

Mr. A. Gielgud for B.S. section rails (No. 3), at 5*l.* 8*s.* per ton.

Messrs. Chas. Richards & Sons for tie bars, at 9*l.* 15*s.* per ton.

Messrs. Hadfield's Steel Foundry Co., Ltd., for points, crossings and special work, for 502*l.* 15*s.* 6*d.*

Tenders were also received from Mr. F. Bevis, Mr. H. Hunt, Messrs. Bailey & Whites, Ltd., Mr. H. A. Evans, Messrs. Hall & Co., Messrs. J. T. Crampton & Co., Mr. L. Sommerfeld, Messrs. W. Griffiths & Co., Messrs. J. Mowlem & Co., the Tilbury Contracting and Dredging Co., Messrs. Blichfeldt & Co., Messrs. Alex Brunton & Son, Messrs. A. & F. Manuelle, Mr. W. Wilson, Messrs. Sommerfeld & Lang, the Forest of Dean Stone Firms, the Enderby and Stoney Stanton Granite Co., Mr. John Glenn, Messrs. Duke & Co., Messrs. Brooks, Ltd., Messrs. Edward Le Bas & Co., the Lorain Steel Co., Messrs. Bayliss, Jones & Bayliss, and Messrs. Edgar Allen & Co., Ltd.

ST. ALBANS.

For providing and laying new sewers in the Tess, Princes and Cavendish Roads, St. Peter Rural. Mr. HENRY F. MENCE, surveyor, St. Albans.

Ford	£491 0 0
Frost	394 19 4
Palmer	370 0 0
Free & Sons	364 15 11
Woodhouse	340 0 0
Powdril	336 16 7
Bate & Co.	323 18 0
Williams	301 13 7
Deamer	300 13 4
Skelton	291 9 8
Macdonald	278 13 0
COUSINS, St. Albans (*accepted*)	226 15 8

SALISBURY.

For erection of a workshop, stores, &c., in Friary Lane, for the waterworks department. Mr. W. J. GOODWIN, A.M.I.C.E., city engineer and surveyor.

Wort & Way	£769 0 0
Collins & Son	751 18 8
Preece	750 0 0
Tryhorn	736 10 0
Smith & Bundy	725 0 0
Roles & Son	719 15 0
Harris Bros.	710 0 0
BILLETT & MUSSELWHITE, Salisbury (*accepted*)	694 19 6
Day Bros.	576 0 0

SCUNTHORPE.

For supplying a new gasholder.

C. & W. WALKER, Donnington (*accepted*) . £4,612 0 0

TUNSTALL.

For private improvements in Davenport Street.

BULLOCK (*accepted*) £224 19 8

For supplying new fire engine.

MERRYWEATHER & Co. (*accepted*) . . . £278 0 0

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SOUTHAMPTON.

For carrying out the alterations and additions to Western District School.

Nichol	£6,948 0 0
Dyer & Sons	6,778 0 0
Jenkins & Sons	6,764 0 0
Stevens & Co.	6,685 0 0
Douglas	6,449 0 0
GOLDING & ANSELL, Southampton (*accepted*)	6,327 0 0
Borough Engineer's protecting tender	7,000 0 0

For painting the railings at Hollybrook Cemetery. Mr. J. A. CROWTHER, borough engineer.

DOWDALL (*accepted*)	£150 0 0
Borough Engineer's tender	130 0 0

WALES.

For additional classrooms, manual training room, cookery centre, &c., at Alexandra Road Council school, Aberystwyth. Mr. G. DICKENS-LEWIS, county architect, North Parade, Aberystwyth.

Hayes	£7,890 0 0
Treasure & Son	7,523 0 0
Thomas	7,176 0 0
Dallow & Sons	6,950 0 0
Edwards Bros.	6,498 0 0
Humphreys & Williams	6,311 19 2
Owen Bros.	5,997 0 0
Jones & Lewis	5,495 0 0
JENKINS, Aberystwyth (*accepted*)	5,488 0 0

For erection of a receiving home at Aberdare for the Merthyr Board of Guardians.

Jones Bros.	£1,850 0 0
Rees	1,713 0 2
Davies & Francis	1,687 8 7
Hatherley & Co.	1,667 0 0
Davies	1,613 12 0
Ingleson	1,567 0 0
Brown	1,562 8 5
JONES BROS., Aberdare (*accepted*)	1,515 0 0

WEST HAM.

For converting the covered playground in the boys' department of the Hermit Road school into a manual room for forty boys.

Noakes	£450 0 0
Symes	449 0 0
Webb	399 0 0
Clemens	398 10 0
Maddison	371 0 0
HORSWILL (*accepted*)	329 0 0

WORSBROUGH BRIDGE (YORKS).

For constructing a sewer from Worsbrough Bridge to Ward Green. Mr. J. WHITAKER, surveyor to the Council.

Porter & Sons	£451 11 6
Baines & Briggs	405 0 6
Brown	369 0 0
RUCKLEGE, Barnsley (*accepted*)	350 12 0
Guest	337 12 0

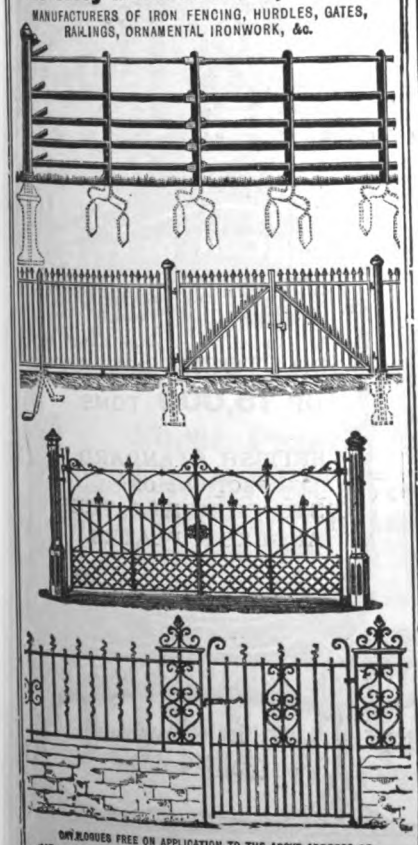
Received too late for Classification.

INDIA.

For a steel water tank with a holding capacity of 9,000,000 gallons, for the supply of water for domestic and other purposes to the city of Calcutta.

English tenders.

Piggott & Co.	£160,000 0 0
Whessoe Foundry Co.	155,000 0 0
Fraser & Son	148,000 0 0
Motherwell Bridge Co.	142,000 0 0
Westwood & Wright	128,762 0 0
Mayoh & Halley	126,445 0 0
Findlay & Co.	108,500 0 0
Newman	108,000 0 0
Heenan & Froude	107,575 0 0
C. & W. Walker	100,608 0 0
P. & W. M'Lellan	97,450 0 0
Cleveland Bridge and Engineering Co.	91,880 0 0
CLAYTON, SONS & Co., Leeds (*accepted*)	91,367 0 0

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DEAR SIRS,—The heat it throws out is enormous, and it does not burn a quarter of the coal we have hitherto been burning.
T. BROWN (Doctor).
Also by using the Patent
"SINE QUA NON"
KITCHEN RANGE.
Recent Testimonial.
DEAR SIRS,—The Range is a complete success. It is an extremely good cooker, and heats the water for bath, lavatory, &c., perfectly, and I am quite sure the consumption of coal is not *half* as much as that burnt by the old range.
W. W. HARRIS.
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TRADE NOTES.

THE Liverpool (Bank) Telephone Exchange, South John Street, now in course of erection, is from designs by, and under the supervision of, Messrs. Bromley & Watkins, architects, Nottingham. The whole of the constructional steelwork and fire-resisting floors are being carried out by Messrs. Homan & Rodgers, Manchester.

AFTER the coal fire there is nothing which can be compared with the gas fire fitted with Kern tubes, and supplied by the Welsbach Incandescent Gas Lighting Company. No fumes, no smell, and the maximum amount of heat at the smallest possible price should be sufficient recommendation for large or small users. Electric radiators give a certain amount of heat, but in comparison, from personal experience, we are enabled to testify to the advantages still of heating by gas.

IN twenty years the number of machines worked by the London Hydraulic Power Company have increased tenfold, being now more than 6,000. In 1907 they delivered over 19,000,000 gallons through their 160 miles of hydraulic main. The power available day and night throughout the year is 700 lb. per square inch. Among its applications are to motors, hydrants (in which capacity it acts as a powerful reinforcement to the fire engines), automatic pumping gear, ejectors and a vacuum cleaning system. The company's five central stations are at Blackfriars, Westminster, Wapping, City Road, and Rotherhithe, from which they serve a very wide area, including the whole of the City. The street mains are laid at the company's cost, the service pipes being provided at the consumers' expense; but if a three years' agreement is entered into these pipes are laid free. The company make special arrangements to reduce the expense to the consumer wherever possible.

THE Chapel-en-le-Frith R.D.C. have approved a scheme prepared by Messrs. Swann & Brady for the supply of water to the village of Hope, in Derbyshire. The cost is estimated at 4,280*l*.

THE project for the construction of a subway at the Elephant and Castle at a cost of 17,000*l*., as outlined in the General Powers Bill of the London County Council was approved at a public meeting held on Monday at Southwark.

FORESTRY IN QUEENSLAND.

THERE has been considerable progress made in the supervision and utilisation of the forest lands in Queensland, according to the annual report recently issued by Mr. MacMahon, the Director of Forests. Under the Forestry Acts, anyone desirous of obtaining timber on a reserve can have a block of trees marked for him, which will be then submitted for sale by tender or auction, at an upset price fixed by the Land Commissioner, and this is paid as a royalty at per 100 superficial feet on the Crown ranger's measurement. The timber industry has developed, and the revenue from it has steadily increased. Last year, Mr. MacMahon says, speaking broadly and generally, the progress of forestry in the State has shown a very distinct advance. "The permanent reservation of nearly 500,000 acres of areas as State forests marks a very great advance on anything previously attempted in the direction of permanently conserving the timber supplies of the State."

The total area of reserved timber land is 3,672,578 acres. There are seven State forests reserves, a total of 416,872 acres, proclaimed under the State Forests and National Parks Act of 1906. 91,752,076 feet of timber were cut and manufactured during the year in Queensland, an increase over the previous one of 8,950,230 feet. The railway received for the carriage of timber 136,901*l*., and used 91,033*l*. worth of sleepers.

The Government has under consideration the setting apart in perpetuity certain lands as forest lands; for, while good land, contiguous to railways adapted for closer settlement, could not very well be locked up as State forests, yet there are areas that would not pay to cultivate for agricultural purposes, and would never yield more payable returns than the timber they now bear, and these might be conserved for perpetually renewing the supplies.

THE Prestwick Town Council, N.B., have had under consideration a proposal to lay out the land along the sea front from Station Road to Grangemuir Road and to erect a sea wall to protect it. Voting papers will be issued to the ratepayers to ascertain whether they are for or against the proposal. Mr. William Cowie, architect, Ayr, has prepared plans and an estimate of the cost. The scheme embraces the laying out of an area of land extending to about eleven acres. The cost is estimated at about 5,000*l*.



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ILLUSTRATIONS.

ST. LUKE'S CHURCH, EDINBURGH.—EXTERIOR—INTERIOR.

HOLBORN TOWN HALL.—PORTION OF FRONT ELEVATION—THE COURT-ROOM.

VARIETIES.

IN our issue of January 8 we included in the list given of the principal contracts let in 1908 one for the erection of a large infirmary and workhouse for the City of London Union at Homerton. The architect for this is Mr. Albert E. Pridmore, 2 Broad Street Buildings, E.C., and not Mr. Stuart Hill, as erroneously stated. Mr. Pridmore has for many years acted as architect to the City of London Board of Guardians. We regret any annoyance our mistake may have caused Mr. Pridmore.

IT is proposed to erect a small public hall in Axminster at a cost of 1,000*l.*

ESTIMATES for the erection of the new higher grade school to be erected at Cowdenbeath, at a cost of 19,000*l.*, were disposed of at a meeting of Beath School Board on Friday.

THE Crompton Council has decided upon an extension of the sewage plant of their works at Newhey, at an estimated cost of 13,500*l.*

THE Birmingham Tame and Rea District Drainage Board have received the sanction of the Local Government Board to loans amounting to 102,717*l.* for works of sewage disposal.

THE Exeter City Council have postponed for a month consideration of a scheme for the extension of the asylum, at a cost of 10,000*l.*

THE plans prepared by Mr. H. Dudley Arnott, architect, Gorleston, have been adopted by the Yarmouth Board of Guardians for alterations at the workhouse.

THE Dundee city engineer has been instructed to ascertain the cost of erecting Corporation district halls in Hawkhill, Blackcroft, and Arthurstone Terrace.

OWING to the isolated condition of the Netherne Asylum, the Surrey County Council have decided to spend 859*l.* 16*s.* for the provision of machinery for engineer's, smith's, and joiner's shops, and making the necessary alterations.

IT has been decided to erect a new church for St. Andrew's, Droylsden, Lancs, in place of the present mission building. The site is on the boundary of Droylsden, Clayton, and Openshaw.

THE infectious diseases hospital of the Portsmouth Town Council is to be enlarged at a cost of 2,000*l.* Application for a loan of 2,300*l.* will be made to the Local Government Board.

THE Newcastle-on-Tyne education committee have agreed to erect buildings in connection with the technical institute at a cost of 6,000*l.* on a site adjoining Rutherford College. It was also agreed to establish a day technical school for sixty boys in the east end of the city.

THE Bath baths committee have decided that plans should be prepared and estimates obtained for the provision of accommodation for the drinking of the mineral waters in the Institution Gardens.

THE Bolton Town Council are recommended by their sanitary committee to direct application to be made to the Local Government Board for sanction to borrow 10,000*l.* for purposes of contribution towards the cost of converting privies or pail closets into fresh-water closets.

THE Widnes Town Council have adopted a proposal to pay the gas and water engineer, Mr. Isaac Carr, a gratuity of 250*l.* for special work done in connection with recent waterworks extensions. Mr. Carr has a salary of 900*l.* a year.

THE South-Western Railway Company have definitely informed the Southampton Corporation of their determination to construct their new dry dock, which, on completion, will be the biggest of its kind in the world, on the Wolston side of the river.

AYR Town Council have resolved to proceed with the extension of the tramways to Hawkhill. The scheme adopted involves the laying of a double line from the new bridge to the east end of George Street, and a single line beyond that to the burgh boundary at the new racecourse, and the estimated cost is 13,614*l.* Parliamentary powers have already been obtained.

THE Council of the Institution of Civil Engineers, after consideration of the papers on Indian engineering subjects

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Also of
VENTURENE WALL TILES
The new Opal Tiles of lustrous surface with clean cut edges.
SAMPLES SENT ON APPLICATION.

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published in the Proceedings for the past session, have awarded the "Indian Premium" of the Institution for 1908, of the value of 33*l.*, to Mr. F. P. Anderson, M.Inst.C.E., for his paper on "River Control by Wire Network."

THE Brentford Board of Guardians has agreed to an extension of the nurses' home and the making of alterations to the official and administrative buildings at the infirmary of the union at Isleworth, subject to the expenditure not exceeding 3,395*l.* The Local Government Board has affixed its seal to the plans.

THE Secretary of State for India has appointed Mr. George Bransby Williams to be sanitary engineer to the Government of Bengal. The appointment is for five years. Mr. Williams has since 1906 been consulting sanitary engineer to the Colonial Office, and has done important work for the Government, more particularly in British East Africa.

A NEW preparatory school is being built at Pyrford, Surrey, and will be finished in June or July, ready for the reception of pupils in September. The building will have large and airy classrooms and dormitories, and will be heated throughout with radiators as well as open stoves, and lighted by electricity.

THE Army Council have completed the purchase of four acres of land close to Hither Green Station, for the purpose of erecting a new drill hall and riding school for the 10th and 11th batteries of the 4th London Royal Field (Howitzer) Artillery. Plans have already been prepared for the building, sufficient room being allowed for mounted battery drill in the grounds.

PREPARATIONS are being made in Parkhurst Forest for beginning work on the new prison for habitual criminals decided upon by Parliament last year. Over 30 acres of forest will be appropriated for the purpose of the prison, which will be in the nature of an experiment. The prison proper will be hidden away in the forest behind the existing convict prison.

THE Notts Football Club are negotiating with the City Council for the lease of a new ground between Meadow Lane and the Cattle Market. The scheme drawn up provides accommodation at the outset for from 35,000 to 40,000 people. Provision is made for the erection of a pavilion along the London Road side, a covered stand opposite, another covered stand behind what would be the Cattle Market goal, and a bank at the Meadow Lane end.

THE Hanley borough surveyor has been instructed to prepare a scheme for extending the first-class swimming bath and to obtain tenders for the provision of new private baths at the Corporation Baths. A fire having taken place on the night of the 30th ult. in an upper storey of the town hall, the surveyor was also instructed to examine all the fireplaces in the town hall, and make such alterations as he might think necessary for the safety of the building.

LORD TREDEGAR has informed the Cardiff public works committee with respect to the development for building purposes of his estate on the Penylan side of the Cardiff Railway, that he is willing that the streets should be 70 feet wide instead of 50 feet if the Corporation would agree to 10 feet on each side being set aside for the planting of trees, &c. The part of the roadway to be macadamised will only be the usual width.

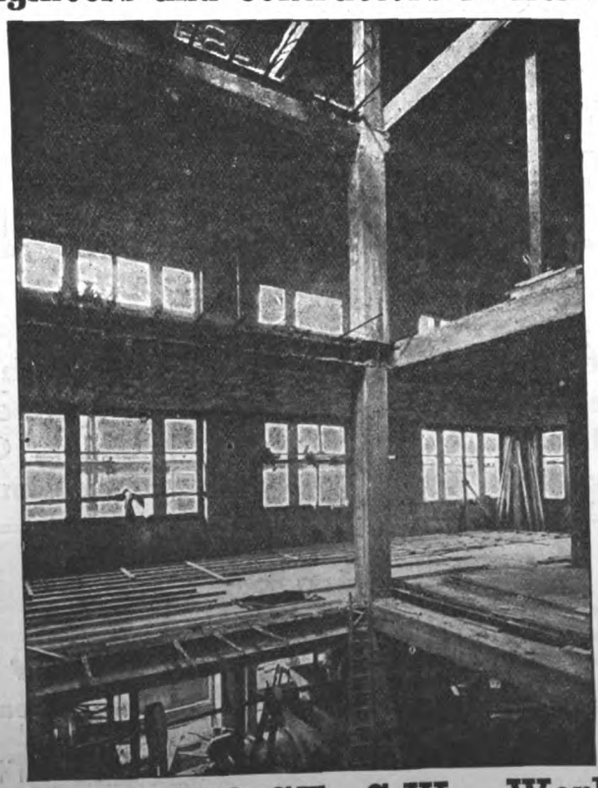
THE Derwent Valley Water Board have announced their intention to apply to Parliament for an extension of the reservoir now being constructed. It was formerly anticipated that the water would be supplied in the early part of 1910, but it was now ascertained that wing trenches would have to be made, which would prolong the time of the completion of the work, and it would probably be the spring of 1912 before a supply of water could be given.

THE Galway Harbour Commissioners are considering proposals for the improvement of the port. It is proposed to construct a pier extending in a south-easterly direction for 350 feet from the east quay wall of the entrance to the dock and the deepening of the channel into the dock. The estimated cost of the scheme is as follows:—Excavation of the inner channel, 15,000*l.*; extension of quay wall, 12,000*l.*; dredging outer channel, 3,000*l.*; gates and protecting sea gates, 6,000*l.*—total, 36,000*l.*

THE Homeland Association have brought out a second edition of their shilling handbook, "Where to Live Round London" (northern side). It is a triumph of condensed

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information. On two pages is given a general account of the place, of the railway communication with fares and price of season tickets, gas and general rates, subsoil, local authority, recreations, places of worship, banks, schools, and other details important to all thinking of settling away from London.

"THE Beginning of Things" is the title of a remarkable illustrated article in *Harper's Magazine* for this month, by Professor R. K. Duncan, who expounds a fresh nebular hypothesis which is so unlike that of Laplace as to be called by a wholly new name, the "Planetesimal Hypothesis," the authors whereof are to be congratulated upon giving to the world what is believed to be the most dramatic and consistent picture of its genesis that has ever been evolved from the mind of man.

THE Leek Urban District Council held last week a long discussion as to the erection of a wooden building in High Street, to be used as a place of public entertainment. The surveyor, in reply to inquiries, stated he was satisfied with the means of ingress and egress that had been made, and there had been no objections to the construction by inhabitants in the neighbourhood. It was therefore decided that if all sanitary requirements were complied with the Council would not object to the erection of the building.

THE gas manager at Arbroath, N.B., at the last meeting of the Town Council drew attention to the question of additional storage of gas. He had delayed making any recommendation on this subject in view of the possibility of the consumption of gas being diminished by the inauguration of the electric light, but the electric light works had now been in operation for nearly six months and the sale of gas was increasing. He now proposed that a new holder should be provided, of a capacity of 400,000 cubic feet, at an estimated cost of 3,000*l*. The Council instructed the manager to obtain tenders for the work.

THE Staffordshire Territorial Association has approved of the purchase of an extensive area of property from Messrs. Allsopp & Sons, at Burton-on-Trent, for the joint headquarters of the Staffordshire Yeomanry and the 6th Battalion of the North Staffordshire Regiment. The completion of the purchase now only awaits the sanction of the Army Council. The property is that on which stands the Bell Hotel in Horninglow Street. The scheme includes the erection of a spacious drill hall, a four-acre croft for out-door instruction, a riding school, two armouries, and no less than four miniature rifle ranges, together with the usual headquarter offices. The last will be arranged in the hotel proper.

AT a meeting of the Lancashire education committee on Tuesday, it was stated that at the present moment they were prepared to spend 200,000*l*. on new secondary and technical schools—which were already sanctioned—as soon as the higher education deadlock which has existed with the Board of Education and the Local Government Board for over two years was settled. The existing dispute is as to the County Council's desire to become guarantors for non-county boroughs and urban district councils who obtain loans for higher education.

THE joint smallpox hospital committee of the Cannock Rural and Urban Councils having decided to abandon the scheme for erecting a new smallpox hospital at Pye Green, recommended that 85*l*. be paid to Mr. H. M. Whitehead, the architect, this to include all out-of-pocket expenses in connection with the scheme. The present hospital is not suitable, and it was decided to erect a new one, which was estimated to cost about 1,200*l*., but on going into the matter with the authorities it was found that it would cost nearer 4,000*l*. It was therefore resolved that the Urban and Rural Council should join for dealing with all infectious diseases, and erect a new hospital near the present infectious diseases hospital at Cheslyn Hay.

THE York Master Builders' Association have written a letter to the City Council stating they view with considerable alarm and apprehension the renewed proposal to open a showroom for the sale of electricity fittings in the city. The prospect is a very discouraging one and the principle dangerous to all private enterprise. It is submitted that municipal authorities should never place themselves in competition with, or undertake work that will be detrimental to, the private trader. The municipal authorities should not, it is submitted, do more than supply current to the consumer. To undertake the sale and fixing of fittings (invariably at inadequate and cut rate) is unfair to the private traders who are ratepayers, and can only result in their being compelled to close their establishments.



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AT the last meeting of the Mexborough education committee Mr. Stewart, of the county architect's office, Wakefield, submitted sketch plans of a new elementary school to be erected adjoining the new secondary school now in course of erection. The school will accommodate 360 scholars at first, but provision has been made in the plans for the addition of four class-rooms when such are needed. It was resolved that the County Council should be asked not to definitely pass the plans until the secondary school governors had been approached as to whether they could not accommodate the elementary scholars.

THE baths and washhouses committee of Paddington Borough Council were recently instructed to arrange for the sale of Queen's Road (Bayswater) baths and washhouses and the site they cover, with a view to the provision of similar premises where they are deemed to be more needed. The committee now recommend the Council to enter into a provisional agreement with William Whiteley, Ltd., for the sale to them of the old buildings and site for 60,000*l*. This is more than the original cost of the baths and washhouses, erected thirty-four years ago, and their site. The provisional agreement is subject to the consent of the Local Government Board to the sale and the application of the proceeds to the erection of new baths and washhouses.

MR. S. RIDEAL, D.Sc., F.I.C., F.S.I., speaking recently at the Royal Sanitary Institute, strongly recommended the application of ozone to the purification of the London water supply. Last year, he said, he examined the installation for the sterilisation of water by ozone at the municipal waterworks in Paris, and from what he saw of the process he considered it a great success. The towns with a river water supply had at present similar conditions to those of Paris and London, and the reasons for ozone treatment seemed applicable to the Metropolis. Many other places whose conditions of supply involved the drawing on wells which might be subject to occasional pollution could by adopting this treatment ensure a guaranteed purity.

AT the last meeting of the Aberdeen Town Council the electricity committee reported that they had considered a circular from the Incorporated Municipal Electrical Association, stating that in the Association's opinion "the time had come when the Institution of Electrical Engineers should again take into consideration the question of their standard wiring rules, with a view to modifying them in such a manner as to admit of the use of a form of wiring which, whilst possessing the necessary elements of safety from fire risk, would allow of a considerable reduction in the cost both of material and labour—a system, for instance, of surface wiring, with flexible conductors mounted on suitable insulators." The committee expressed their concurrence generally with the object sought to be attained, and remitted the circular to the convener and the electrical engineer to adjust the terms of the reply.

THE Woking School Managers, at their monthly meeting held last week, confirmed the minutes of a special meeting in committee, held recently, to consider the scheme of the Surrey education committee for the erection at Woking of a technical institute and boys' secondary school. The site proposed is on the south side of the railway, has an area of 87,527 square feet, and is expected to cost under 5,000*l*. The committee would erect three buildings on the site: (1) technical institute; (2) boys' secondary school; (3) block (hall, laboratory, &c.), common to both. The three need not be erected at once; if thought advisable the secondary school or common block could stand over. No plans or estimates have been prepared by the architects, but the approximate costs are stated as follows:—The whole cost of the scheme, including site and the provision of one building in three blocks (consisting of the technical block, the secondary school block, and the central block common to both), between 20,000*l*. and 21,000*l*. If the technical and the central block alone were provided in the first instance, the cost would be about 9,000*l*.; and the secondary school block alone would be about 7,000*l*.

GAS AND ITS USES.

NATURAL light has been one of the potent influences in the history of architecture. The fierce glare of the Egyptian desert, no less than the mysteries of religion, prompted the erection of cavernous temples on the banks of the Nile. The interior of the Parthenon and other Greek sanctuaries was screened from the Mediterranean sun as well as the vulgar

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gaze of the populace. Christianity was founded on other ideals, so that by the fourteenth century, under the constructional genius of the masons, cathedral and church walls had become little more than glass screens.

The present-day architect has quite a new problem to solve, for he must make his buildings as useful by night as by day. With many people their most crowded hours are those passed under artificial light. The importance of this new phase soon produced specialists. But scientific illumination is only a branch of what the illuminating agencies are made to perform. The day has long since gone by when the achievement of domestic gas engineering was limited to a few feeble burners on the ground floor of a building. It is now able to serve a wide variety of highly useful functions. In the kitchen of a well-equipped modern house it provides the means of cooking; the living-rooms and bedrooms are warmed by gas stoves as well as brilliantly illuminated by acetylene; while the bathroom is fitted with a properly ventilated geyser, which is ready for instant use at any hour of the day or night. Or perhaps hot water is distributed from the kitchen throughout the house by a "circulator"—a small boiler heated by gas, which is connected to the flow and return pipes from the coal-range boiler, with which it may work in conjunction or not, as desired. To warm the kitchen a coke-heated water-circulator may replace the coal range and its inevitable pollution of the air by smoke.

The tradition that gas stoves and gas fires are bound to be injurious to health is dying hard. Medical opinion has repeatedly praised them and recommended their adoption; nevertheless there seems to be still a stubborn belief that they are harmful. The chief grounds for this, no doubt, are that they may become so unless properly fixed in the first place, and then cleaned about once in six months by skilled workmen. This attention is after all a small tax compared with the many obvious advantages a gas stove or fire possesses. Two years ago an investigation was published in the *Lancet*, in the course of which it was stated that a properly constructed gas stove, with a flue sufficiently large to carry away the products of combustion, is quite as satisfactory from a hygienic point of view as a coal fire and does not in any way vitiate the air of the room, nor does it produce any abnormal drying effect, as is popularly supposed. It will carry off from about 2,000 to 4,000 cubic feet of air per hour, and this is a valuable ventilating effect.

Complaints are not infrequently raised that certain architects are apt to overlook the more practical details of house construction in their desire to produce something artistic. Drainage, hot water, ventilation, plumbing, and other necessities to a modern residence are sometimes undoubtedly no part of their original schemes. The situation is only saved by the resourceful contractor who covers as best he can the omissions. It is almost a platitude to say that the architect should think of those who are to use a building in the first place, and only in the second of those who may or may not glance at it from the outside. For instance, it is a duty that he should be cognisant of the domestic conveniences that are constantly being created to lighten the work of the householder. These improvements may perhaps be added afterwards; but under such circumstances they can rarely attain their full usefulness. The troubles of the plumber, for example (and incidentally the expenses of upkeep) are multiplied by the lack of foresight on the part of architects whose work shows many afterthoughts. It is rare indeed that we see in a new house proper provision made for the almost indispensable gas stove, or for the other uses to which gas could be put. Yet the far-seeing architect knows that it is on those points that tenants or purchasers lay most stress, and on which turns the answer "Yes" or "No." Well-appointed houses are rarer than one might be led to suppose from the frequent use of that phrase. But it is chiefly due to the culpable negligence of the designers who failed to recognise that buildings are built to be used and not to be looked at.

The financial aspect of gas versus coal is all-important. In the first place it is unhesitatingly claimed that gas is beyond question more economical than coal for cooking purposes, as also in the case of a room which has to be heated for only a short time. It is said that cooking in the ordinary kitchen range might almost be described as "a by-product of wasted heat." In a large household employing some four, five or more servants the abolition of coal fires should mean a reduction in the number of domestics by at least one. Moreover, gas has no injurious effects on carpets, curtains or furniture.

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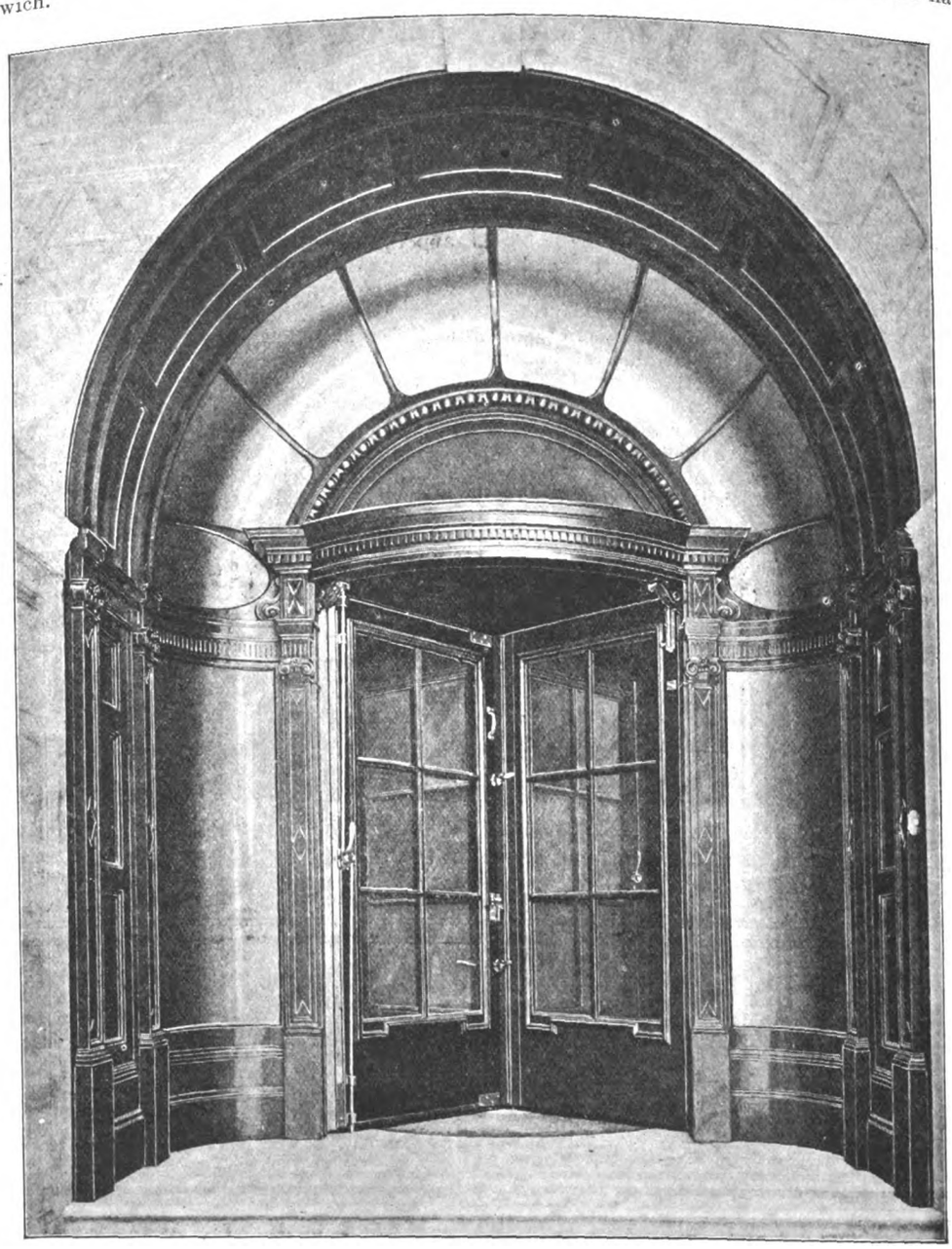
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of coal as the sole manner of heating in the primitive form of open fires is threatened. Gas as a means of lighting has staunch champions, who are confident of its ultimate triumph over all rivals.

REVOLVING DOORS.

A NEW type of revolving door has recently been patented (Buckingham's Patent No. 2,314) by Elliott's Moulding and Joinery Company, Ltd., of Newbury. The illustration shows one as supplied and fixed at the new Welbeck Palace Hotel, Wigmore Street, W., where it gives entire satisfaction. It might here be mentioned that the doors meet all the requirements of the L.C.C. A similar door has been fixed at the Shire Hall, Norwich.



A great point in its favour is the impossibility of it getting out of order. The door works on ball bearings throughout, it is therefore easy to revolve, noiseless in action, dust, draught and odour proof, always open yet always closed. The folding back to admit of bulky packages, &c., is also most easily accomplished by a few turns with a small handle fixed to one of the doors, which are then folded together and bolted top and bottom in one action.

It may be interesting to our readers to know that this revolving door will be exhibited at the forthcoming Building Trades Exhibition in April next, when architects and others are invited to compare its merits with other types on the market. In the meantime catalogues will be sent on application.

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WHAT THE PLUMBER SAW.—II.

BY AN OCCASIONAL CORRESPONDENT.

SOME time after the visit of the plumber recorded in our last issue there were a number of happenings in and about the house which proved the forerunners of a complication which made his return inevitable.

It appeared that the child of the house had fallen ill as a result. The sanitary inspector and his assistants had to be called in after the patient had somewhat recovered. On their arrival they stopped the chimneys of the rooms, papered over the chinks of the windows, and made the whole neighbourhood reek with the smell of evaporated formalin. Of course the wily typhosis who was the object of this organised hunt did not try to get up the chimney nor through the chink of the window, for the cavities between the ceiling and the floor or the roof space that had before troubled the plumber were much more convenient hiding-places and quite as secure from the pungent antiseptic. The inspector returned later at the head of another procession reinforced by a wheelbarrow containing an instrument which looked like the combination of a coffee-mill and a machine bellows.

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The inspector held an open consultation in the back yard, illustrating his points by hieroglyphic sketches made with a walking-stick on the gravelled path. At the conclusion of his summing-up he stuck his stick in the ground, saying there should be a junction or a D.T. here. This was the signal for digging operations, and a gigantic excavation was soon made in the loose-filled earth. As no trace of drain was found there, the perplexities of the inspector began and his look of absolute assurance vanished. A plan of the house had been procured; but the drains shown thereon were only to satisfy the requirements of the building authority, and were obviously impossible as connections to the visible gratings and gullies. After several more trial excavations, which gave the surroundings of the house the appearance of a hastily constructed military entrenchment, it was decided to trace the drain. A commencement was made at a gully intended to receive the water from a diminutive bay window sheltered beneath the overhanging eaves above, on which no rain by any chance could fall. This was unearthed and the coffee-mill cum machine-blower put in operation at the exposed end of the drain. After relays of men had turned the handle of the smoke machine for some hours there was still no evidence of the evil-smelling fumes except in the vicinity of the machine itself It was decided to further trace the drain, so two drain-pipes were taken out; these at once explained the trouble, for the temporary slate stopper had been left in when the drain was laid. This was no doubt one of the contributory causes to the perfection of the test when it was first made by the building authority for the purpose of granting a certificate for habitation.

After this discovery the rest was easy. In spite of the fact that the house had recently been built, the notice subsequently served by the inspector specified that the drains were all wrong and required relaying. Although the draining had been originally apportioned by the architect to the bricklayer, excavator and drainer when the house was built, the owner sent for the plumber to redo the work under the supervision of the sanitary inspector, who combined with his other duties the assumption of sanitary expert.

Consequent upon the general upset and annoyance of the several visits by the sanitary inspector and his return to the house the patience of all the occupants was exasperated almost beyond endurance, leaving little room for toleration to bestow upon the plumber when he arrived to complete the work. This condition of mind fortunately did not unnerve the plumber, who approached the several problems involved with that stolidity which is characteristic of his kind.

The plumber had experience of similar cases, and he rapidly diagnosed the situation without necessity to add to the earthworks the sanitary officers had left. The typed specification of defects supplied by the department conveyed little information of value. The wonder was that it was so limited in detail.

A casual inspection showed that the site upon which the house stood had been originally low compared with the level of the road; and as the architect wished the elevation to be commanding he put in the foundations and issued a general invitation of a shoot for the deposit of rubbish. After such consolidation as this loose earth would receive from the runs of the hod carriers and wheelbarrows, the drains had been laid on a few feet deep of this material and more earth tipped on the top to raise the bank about the house. Of course, they were earthenware pipes without any special foundation. But the joints were well made with Portland cement, though this assisted the pipes to break off at the collars where any settlement took place. They had answered a smoke test previous to being covered up, and when tested afterwards there was sufficient earth on the top to condense the smoke before it got to the surface. Possibly a slate stopper or so left in helped the process.

There was certainly a considerable number of gullies, one wherever a pipe of any size came down to the surface, in addition to several others that received no pipe, but were required to make up the number described in the quantities. To reach these gullies at finished ground level it was necessary to provide a bend and several pipes piled Ossa-Pelion like to reach and support the gully, and to make these more secure they reclined at a slight angle against the wall of the house.

These were some of the details which the plumber saw or assumed in his casual inspection preparatory to devising a scheme to prevent any recurrence of danger from defective or unnecessary drains. Having, with the assistance of a navvy, opened out a few of the drains, he ascertained that most of the liquid, fouled or otherwise (which after negotiat-

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ing the gully grate and disconnecting channel had made its way into the drain pipe) did not get far inside, but found a bad joint or broken pipe and filtered into the loose filled earth. This was indicated by its blue-black colour. His surmise was confirmed by an examination of the 6-inch drain near the intercepting trap, which showed no traces that drainage had ever gone so far through.

Although these pipes were clear, the stench was abominable as the stopper in the cleaning arm of the intercepting trap was out, having been displaced by pressure of air in the main sewer during a flood, and as there were no vent shafts in the main the air was forced to get through the seal of the trap or blow the stopper out. Possibly it did both. There being no mention of the public sewer being defective in the medical officer's report, the vile condition of this important and possibly most culpable portion of the drainage system was no concern of the plumber's. He contented himself with an endeavour to protect the house against its own drainage being retained long enough to putrify, and left the local authority to look after its own responsibilities.

As previously stated, the ground was bad. To bury the drains at the low and unnecessary level they had previously occupied would necessitate props and wood sheeting to keep up the ground, as well as the removal of earth from the excavation and carting it back, there being no room to stack it safely. The plumber decided to put in iron drains, and commenced with 3½ inch from the intercepting trap manhole, keeping them up to allow him a fall of 1 in 60 to the lowest connection from the house. By using 9-feet lengths of pipe the joints were few on the straight, and these were made with spun yarn and lead well caulked home. By this means the little earth there was to shift could be thrown back on top of the iron pipes as they were laid. He tested the work as he proceeded with air at a pressure of 20 lb. to the square inch, knowing no leakage would ever occur if it stood that; the pipes were strong enough to support their own weight and that of the small depth of earth that covered them.

By the provision of about three inspection chambers with air-tight covers the necessity for any future digging was removed, even if the domestic did put down the soil pipe a few bars of soap, bunches of flowers and mop rags, as these, when the lowest gully overflowed and indicated some stoppage, would be found in the inspection chambers. For the fifteen large gullies which the plumber found he substituted two small ones and brought all the unfouled water pipes to discharge over them without intervening traps, and placed them in such position at the head of drain or branches as to insure their filling the drain to its utmost capacity when the bath was used or a fall of rain occurred. The bath and sink pipes were placed under instead of over the gully grating, and made to flush the gully out every time they discharged, instead of splashing all over the grating and trickling down the inside or outside of the brick eye.

About this time the sanitary inspector called round, and with his stick pointed out that much of the work the plumber had done was not in accordance with the by-laws, and that on no account would he allow a pipe to discharge under a grating. In vain the plumber produced his text-book of elementary science for plumbers' work. The inspector was obdurate; he did not attempt to refute the argument whereby the plumber sought to vindicate his work, but took a firm stand on the by-laws. The plumber knew from past experience and common sense that the by-laws were wrong, and the inspector's interpretation was worse; but officialism prevailed aided by the knowledge that, if a worse job, it possessed potential advantages in the probability of providing another visit later. So the plumber made the alteration to comply with the by-laws.

THE Governors of the Derbyshire Royal Asylum have approved of a scheme for the erection of a children's block. A donor has given 8,000*l.* for the purpose. The governors will endeavour to raise 5,000*l.* in addition to cover the cost of other work involved.

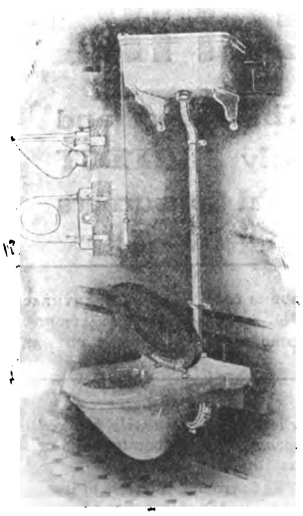
THE Dudley Board of Guardians have received a letter from the Local Government Board, stating that they would be prepared to approve of the plans for the proposed male classification ward and other extensions, subject to certain alterations indicated. It was decided that the plans be amended as suggested, and that the remuneration to be paid to the architects, Messrs. Nicol & Nicol, be a commission of 5 per cent. on the total cost of the works executed.

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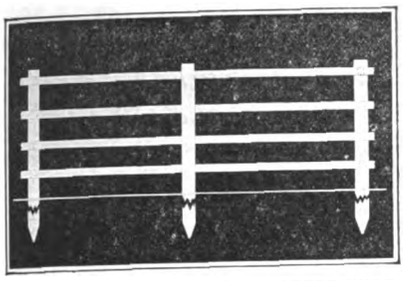
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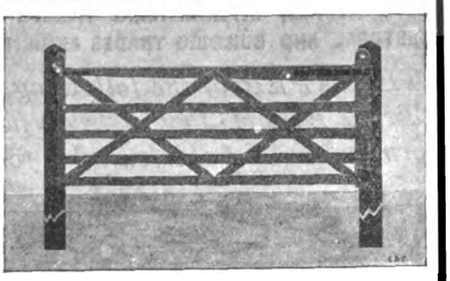
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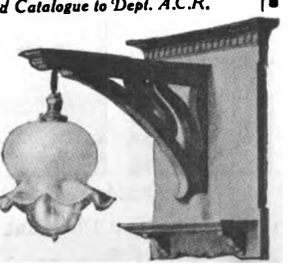


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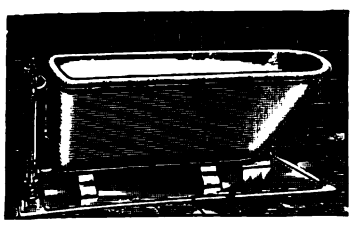
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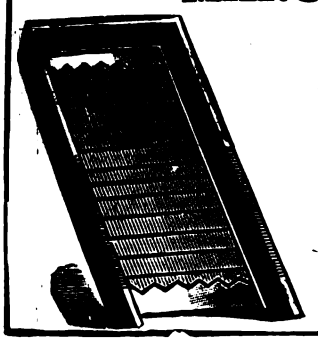
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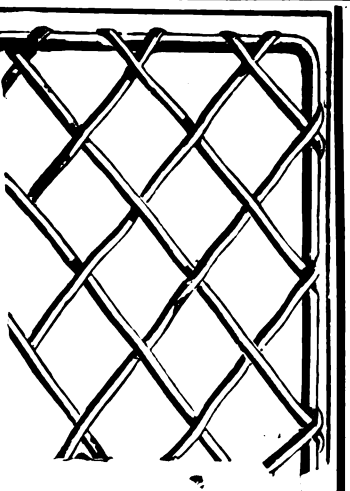
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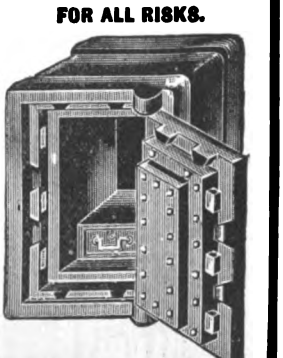
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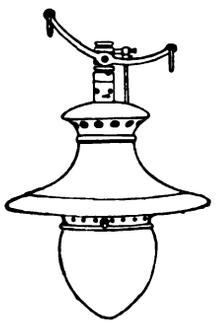
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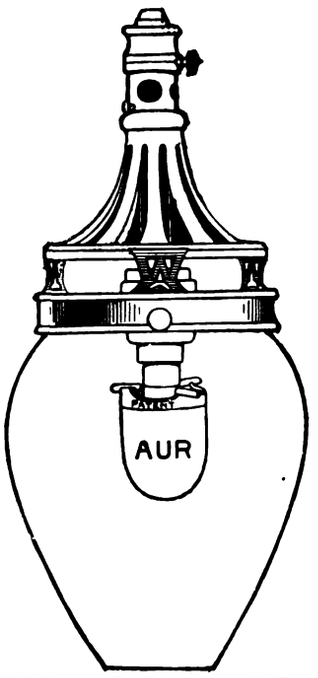
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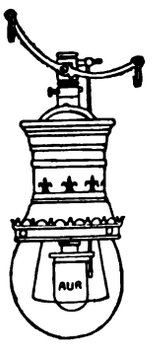
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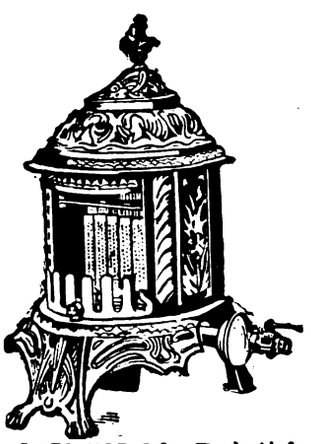
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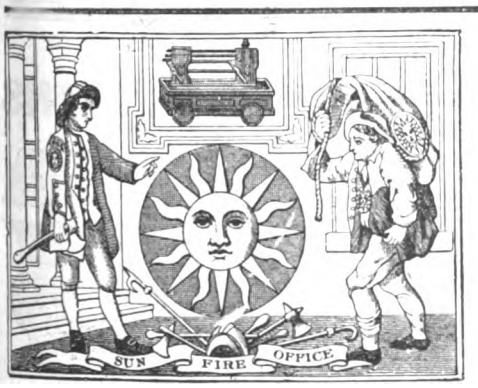
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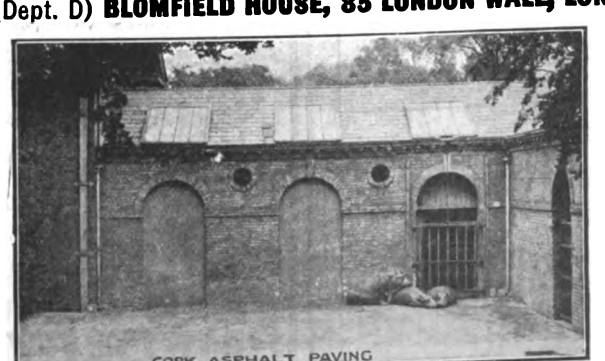
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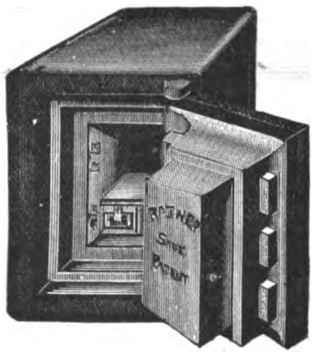
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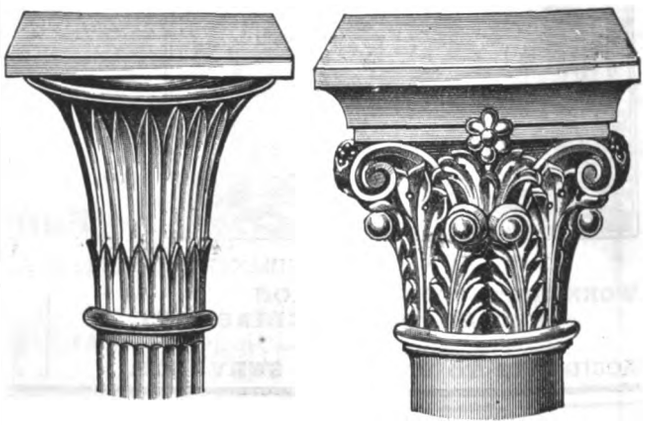
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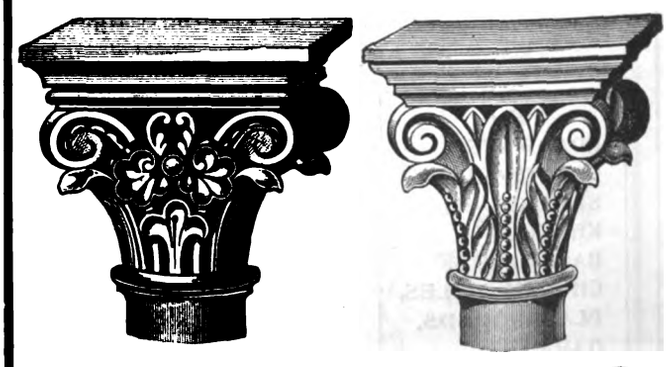
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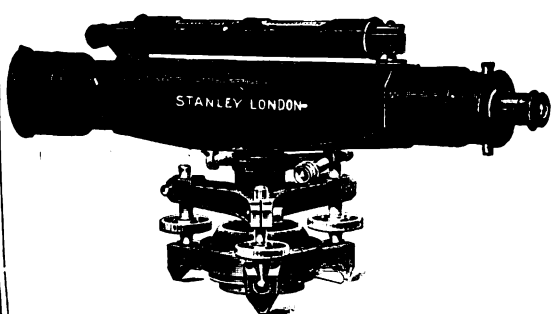
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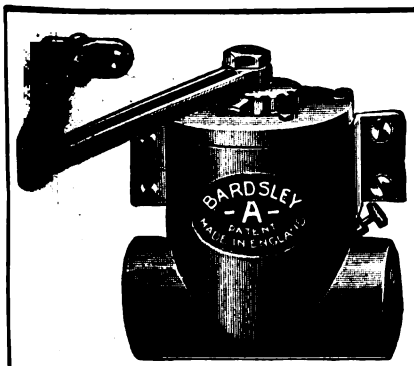
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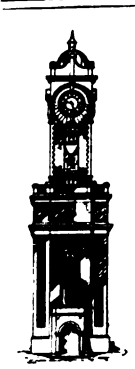
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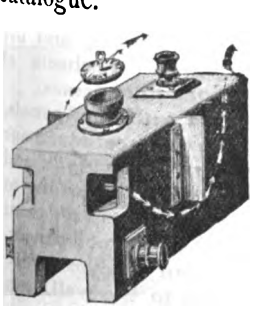
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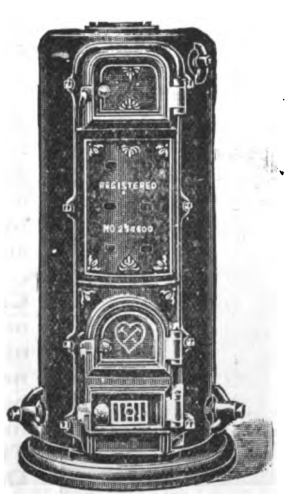
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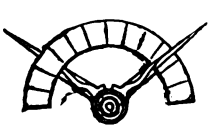
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Architect and Contract Reporter.

FRIDAY, JANUARY 29, 1909.

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P. A. GILBERT WOOD,

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Under no circumstances whatever can the Proprietors of this Journal guarantee alteration of copy if received after the first post on Tuesday mornings, and no proofs can be submitted if copy arrives later than first post on Saturday mornings.

EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

*** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITION OPEN.

LYNTON (DEVON).—Jan. 30, 1909.—Sketch plans to scale and sketch designs, with approximate cost for Wesleyan church and additional buildings, on land near the town hall. Design placed first will be appointed to carry out the work; 2nd premium, 7*l.* 7*s.*; 3rd premium, 5*l.* 5*s.* Deposit 10*s.*, returnable to competitors. Plans and further particulars from Mr. K. Jutsum, Clarence Terrace, Lynton.

CONTRACTS OPEN.

AMBLESTON (HAVERFORDWEST).—Jan. 30.—For erection of vicarage at Ambleston. Mr. Hugh Thomas, architect and surveyor, Haverfordwest.

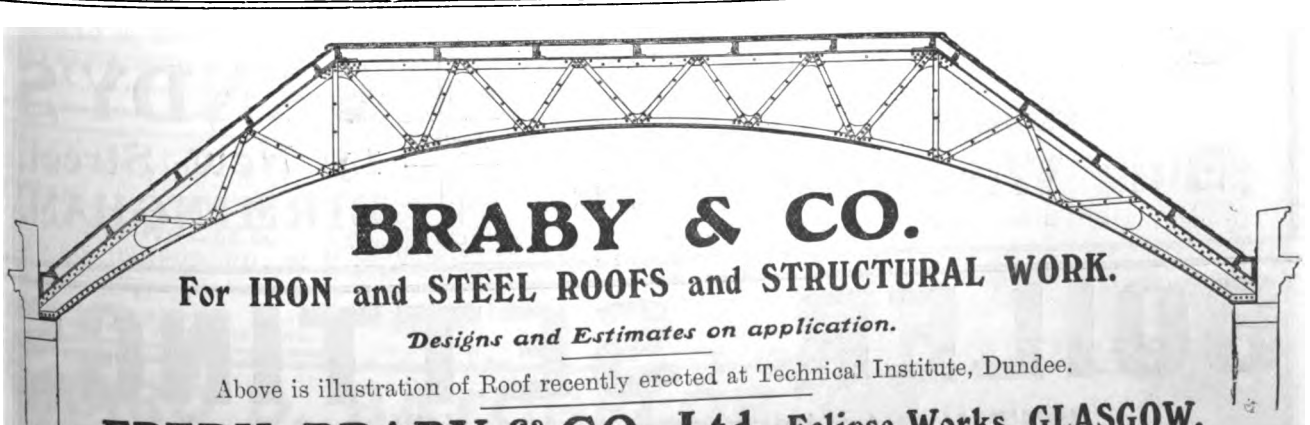
ARMATHWAITE.—Feb. 8.—For erection of mixed school and master's house at Armathwaite, Cumberland. Deposit 1*l.* 1*s.* for full set of quantities, or 10*s.* 6*d.* for each separate trade. Mr. Geo. Dale Oliver, F.R.I.B.A., county architect, Carlisle.

BARDSEA.—Feb. 11.—For erection of police station at Bardsea, near Ulverston, Lancashire. Deposit 2*l.* Mr. Henry Littler, county architect, 16 Ribblesdale Place, Preston.

BARNSLEY.—Feb. 3.—For additions to the post office. Deposit 1*l.* 1*s.* H.M. Office of Works, &c., Storey's Gate, S.W.

BELFAST.—Feb. 8.—For erection of building in Murray's Terrace and Athol Street, Belfast, consisting of three separate warehouses and laundry. Deposit 3*l.* 3*s.* Mr. James A. Hanna, C.E., architect, Ocean Buildings, Belfast.

BIRKENHEAD.—Feb. 15.—For erection of extensions to infectious diseases hospital, Flaybrick Hill. Deposit 1*l.* 1*s.*



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Mr. Charles Brownridge, M.Inst.C.E., borough engineer and surveyor.

BIRSTAL.—For taking down Popeley House, Birstal, Yorks, and erection of outbuildings. Messrs. Joseph F. Walsh, F.S.I., & Graham Nicholas, F.R.I.B.A., architects, Museum Chambers, Halifax.

BRADFORD.—Feb. 3.—For work required in alterations to cottages, Broad Lane. The City Architect, Whitaker Buildings, Brewery Street, Bradford.

BRISTOL.—Feb. 2.—For construction of new engine-shed and other works at St. Philip's Marsh, for the Great Western Railway Company. The New Works Engineer, Paddington station.

BRIXHAM, &c. (DEVON).—Feb. 2.—For erection of stables at Brixham, Tavistock and Princetown, for the Great Western Railway Company. The Office of the Engineer, Plymouth (North Road) station.

BROUGHTON MOOR.—Feb. 13.—For erection of smallpox hospital, consisting of ward, pavilion, administration block, mortuary, &c. Mr. H. B. Williams, architect, Oxford Street, Workington.

BUDE.—Feb. 6.—For building block of Sunday-school buildings and caretaker's house adjoining Wesleyan church at Bude, North Cornwall. Mr. Ernest Wise, M.S.A., architect, Launceston.

DONCASTER.—For alterations to Prince of Wales Hotel, Baxter Gate. Mr. H. Beck, architect, Dolphin Chambers, Doncaster.

DUBLIN.—Feb. 8.—For restoration of ornamental plaster ceiling, cove and cornice of Council Chamber of City Hall, and for necessary repairs to plaster of walls of Council Chamber. City Architect, Municipal Buildings, Cork Hill, Dublin.

EAST STONEHOUSE (DEVON).—Feb. 3.—For alterations to No. 1 St. Mary Street, No. 1 Clarence Place, and the workhouse premises, East Stonehouse, for the Guardians. Messrs. Thornely & Rooke, architects, 11 The Crescent, Plymouth.

GLASGOW.—Feb. 13.—For the excavator, brick and mason, timber and other works required in construction of superstructure of machinery buildings, &c., at Shirehall. Deposit 5*l.* 5*s.* The Office of Public Works, City Chambers, 64 Cochrane Street, Glasgow.

GOOLE.—Jan. 30.—For work at secondary school being erected in Boothferry Road, Goole, Yorks:—Caretaker's cottage, play sheds, cycle sheds, boundary walls and railings, paving to playgrounds and drives. Deposit 1*l.* 1*s.* Mr. W. T. Silvester, clerk to the governors, Goole.

HEATHFIELD.—Feb. 6.—For erection of class-room, offices, &c., at Maynards Green public elementary school, in the parish of Heathfield, East Sussex. Mr. F. J. Wood, county surveyor, County Hall, Lewes.

HISTON.—Feb. 12.—For erection of mortuary and shelter at isolation hospital at Histon, Chesterton, Cambs. Mr. John F. Symonds, clerk, 9 Bene't Street, Cambridge.

IRELAND.—Feb. 6.—For erection of national school for 520 children at the Convent of Mercy, Nenagh, co. Tipperary. Deposit 3*l.* Messrs. Moynan & Gill, architects, Courthouse, Nenagh, co. Tipperary.

IRELAND.—Feb. 16.—For erection of Crown Post Office at Attey. Deposit 1*l.* Mr. H. Williams, secretary, Office of Public Works, Dublin.

KEMPTON PARK.—Feb. 1.—For construction of coal bays, fitting and other workshop stores, lodge, cottages, &c., at Cricklewood, and cottages, &c., at Kempton Park, Middlesex, for Metropolitan Water Board. Deposit 10*l.* with the Board's Accountant, Savoy Court, Strand, W.C. The Engineer, Staines Reservoirs Communication Works, The Firs, Southern Road, Fortis Green, East Finchley, N.

KENDAL.—Feb. 6.—For re-fronting, converting into two shops and extension to rear of 17 and 19 Finkle Street. Mr. Stephen Shaw, F.R.I.B.A., architect, 45 Highgate, Kendal.

LAINDON.—Feb. 3.—For erecting iron buildings and making additions and alterations to existing buildings, and other works at Laindon branch workhouse, Essex. Deposit 3*l.* 3*s.* Messrs. J. & W. Clarkson, architects, 136 High Street, Poplar, E.

LAMBOURN.—Feb. 2.—For erection of station building at Lambourn, Berks, for the Great Western Railway Company. The Engineer, Paddington station.

LEDSHAM.—Feb. 1.—For erection of four single houses and six semi-detached houses, with 16 sets of farm buildings, on the Ledsham estate, near Ledsham Station, Cheshire. Deposit 1*l.* County Estate Office, Northgate Street, Chester.

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LONDON.—Feb. 3.—For alteration of workhouse at 5 Woodfield Road, Harrow Road, W. Deposit 3*l.* Mr. E. Howley Sim, architect, Mowbray House, 14 Norfolk Street, Strand, W.C.

LONDON.—Feb. 12.—For enlargement of Western District Parcel Office and Mayfair Telephone Exchange (second contract). Deposit 1*l.* 1*s.* Mr. J. Wager, A.R.I.B.A., H.M. Office of Works, &c., Storey's Gate, S.W.

MANNINGHAM.—Feb. 10.—For works required in erection of store in Westfield Road, Manningham, Bradford. Mr. William Rycroft, architect, Bank Buildings, Manchester Road, Bradford.

MARGATE.—Feb. 11.—For construction of ladies' and gentlemen's lavatories in the face of the cliff on either side of the new iron staircase at the Oval. Separate tenders (*a*) for buildings and main drains and (*b*) for sanitary fittings, tiling and mosaic flooring. The Borough Surveyor, 13 Grosvenor Place, Margate.

MELTON MOWBRAY.—Feb. 1.—For alterations and additions to cattle market, consisting of new open shed, offices, stables, alterations to existing buildings, paving and ironwork to roofs, pens, &c. Deposit 2*l.* 2*s.* Quantities for the following sections of work, viz.:—No. 1 builder, No. 2 ironfounder, No. 3 painter, can be obtained on application to Mr. Edmund Jeeves, surveyor, Melton Mowbray.

NEWTON.—Feb. 6.—For erection of two houses at Newton, Porthcawl. Mr. Thos. Henry, The Bungalows, Newton.

NORTH BRANCEPETH, &c. (DURHAM).—Feb. 16.—(1) For erection of schools at North Brancepeth (Langley Moor) and New Brancepeth (Sleetburn), and for alterations at Ouston, Wingate, Hawthorn, Rowlands Gill and West Stanley. Mr. F. E. Coates, Shire Hall, Durham. (2) For erection of schools at Medomsley Edge. Mr. J. J. Eltringham, architect, Blackhill. (3) For enlargement of Langley Park infants' Council school. Mr. W. Rushworth, Shire Hall, Durham. Sole tenders are invited.

REDHILL.—Feb. 20.—For erection of an elementary school at Cromwell Road, Redhill. Deposit 1*l.* 1*s.* Mr. A. Lund Newell, secretary, Municipal Buildings, Reigate.

SCOTLAND.—Feb. 2.—For mason, carpenter and slater works at following cottages:—(1) Loanhead of Savoch, double cottage; (2) Skilmafilly, double cottage; (3) Wardford, double cottage; (4) Crichie, single cottage; (5) Stoneyfield, single cottage. Haddo House Estates Office, Aberdeen.

SCOTLAND.—Feb. 4.—For taking down existing timber bridge over river Annan at Woodfoot, about two miles from Beattock station, Dumfries, and supplying and erecting new steel girder bridge of three spans, for Lockerbie district committee. Deposit 1*l.* 1*s.* Messrs. Crouch & Hogg, C.E., engineers, 14 Blythswood Square, Glasgow.

SCOTLAND.—March 2.—For erection of spire for church, for Deacons' Court of United Free English Church, Stornoway. Mr. Neil Maccallum, clerk to Deacons' Court, Stornoway.

SUTTON-IN-ASHFIELD.—Feb. 2.—For foundations to retort house, culverting stream, boundary, &c., in connection with gasworks extension. Deposit 3*l.* 3*s.* Messrs. Corbet, Woodall & Son, Palace Chambers, Bridge Street, Westminster, S.W.

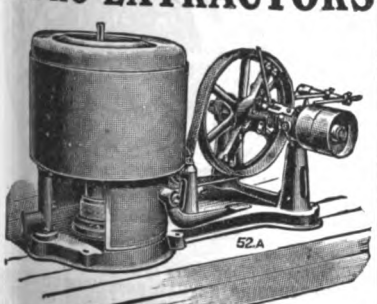
TIDWORTH.—Feb. 1.—For erection of army ordnance receiving-shed, general stores, offices, &c., also clothing, camp and mobilisation stores at Tidworth. Deposit 10*s.* The Director of Barrack Construction, 80 Pall Mall, London, S.W., or at the Barrack Construction Office, Tidworth.

WALES.—Jan. 30.—For erection of two shops and dwelling house (attached) at Evans Street, Kenfig Hill. Mr. Aneuryn T. James, architect and surveyor, Port Talbot.

WALES.—Feb. 1.—For construction of engine house, filter bed, cottage and other works, at Llyn Traffwll, about three miles from the Valley station, London and North-Western Railway, for the Holyhead Waterworks Company. Deposit 5*l.* 5*s.* Messrs. H. Rofe & Son, civil engineers, 8 Victoria Street, Westminster.

WALES.—Feb. 3.—For alterations to church of Dewi Sant, Llwynypia (Trealaw station). Mr. John W. Rodger, architect, 14 High Street, Cardiff.

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WALES.—Feb. 3.—For erection of a new Y.M.C.A. building, Pontypridd. The Building Committee of the Pontypridd Y.M.C.A., Taff Street, Pontypridd.

WALES.—Feb. 2.—For erection of sixty-eight houses at Penywern, Dowlais, Merthyr Tydfil. The Borough Surveyor, Town Hall, Merthyr Tydfil.

WALES.—Feb. 4.—For erection of a villa, &c., at Abernant Road, Aberdare, for Mr. H. Powell, Danygraig, Aberdare. Mr. T. Roderick, architect, Clifton Street, Aberdare.

WALES.—Feb. 4.—For erection of six dwelling-houses at Port Tennant, Swansea. Mr. Talfourd Strick, clerk, Harbour Offices, Swansea.

WALES.—Feb. 4.—For rebuilding the Old Castle Inn, Brynmawr, Mon. Mr. T. Roderick, architect, Clifton Street, Aberdare.

WALES.—Feb. 5.—For erection of detached house at Abercynon. Mr. William Dowdeswell, architect, Treharris, and Mr. D. Evans, Greenfield House, Abercynon.

WALES.—Feb. 6.—For erection of sixty houses and six shops on the Ynysyplwm estate, Tonyrefail. Mr. Philip J. Jones, architect, Cilfynydd, Pontypridd.

WALES.—Feb. 6.—For erection of Baptist chapel and school at Holy Head. Deposit 3*l.* 3*s.* Mr. W. Beddoe Rees, architect, 3 Dumfries Place, Cardiff.

WINDSOR.—Feb. 6.—For work at workhouse, Old Windsor. Mr. Philip Lovegrove, clerk, 3 Park Street, Windsor.

WALES.—Feb. 6.—For large extensions at Noddfa Chapel, Treorky. Mr. Jacob Rees, architect, Pentre.

WALES.—Feb. 8.—For erection of large hall to accommodate about 1,000, a lesser hall, billiard room and institute, together with reading-rooms and library, at Ogmore Vale. Deposit 3*l.* 3*s.* Mr. W. Beddoe Rees, architect, 3 Dumfries Place, Cardiff.

WORKSOP.—Feb. 4.—For erection of offices in Carlton Road. Deposit 2*l.* 2*s.* Mr. A. H. Richardson, architect, Market Place, Worksop.

YORK.—Jan. 30.—For construction of temporary timber grand stand (to seat about 5,000 persons) in Gardens of Yorkshire Philosophical Society. Deposit 2*l.* 2*s.* Mr. F. W. Spurr, city engineer, Guildhall, York.

TENDERS.

BARNSLEY.

For the erection of class rooms at the Keir Street school for 120 extra pupils.

Accepted Tenders.

Taylor & Son, builder	£498 13 10
Owram, joiner	285 0 0
Dransfield, plumber	194 2 6
Beaumont, plasterer	35 0 0
Beaumont, painter	23 10 0
Dawber, Townsley & Co., slater	44 10 0

BECCLES.

For erection of house, Bullock Lane. Mr. A. PELLS, F.S.I., architect.

Hipperson Bros.	£375 0 0
Dunn	372 15 0
Hindes	342 0 0
JOHNSON, Beccles (*accepted*)	330 18 6

BLYTH.

For making-up various streets (total area about 5,150 square yards) within the district. Mr. R. GRIEVES, surveyor, Blyth, Northumberland.

Simpson	£930 12 6
Young	900 6 2
Henderson	896 5 6
Fisher	874 13 0
Baxter	807 6 3
ROBSON, Newcastle-on-Tyne (*accepted*)	792 3 3

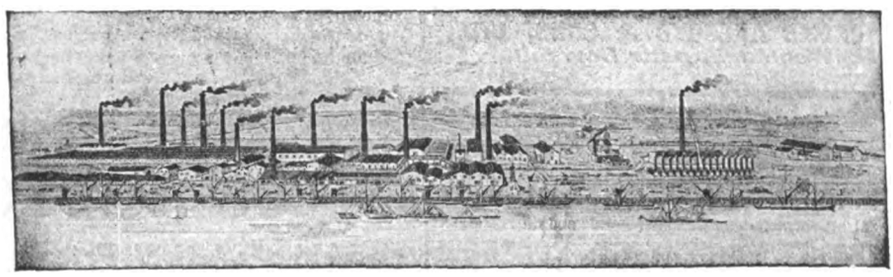
EAST PRESTON.

For repair of chimneys and other works at the workhouse, East Preston, near Worthing.

Clarke	£206 0 0
Swetman	185 0 0
Bennett	175 0 0
Smith	145 0 0
Drake	139 4 6
Linfield	137 0 0
HAYWARD, Littlehampton (*accepted*)	122 15 8

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CROYDON.

For making-up Foxley Hill Road, Purley, and Graham Avenue, Mitcham. Mr. R. M. CHART, surveyor.

Foxley Hill Road.

Starkey	£1,069 0 0
Adams	924 7 6
Mowlem & Co.	850 0 0
Free & Sons	795 0 0
Potter & Co.	780 0 0
Yewen	779 0 0
E. & E. ILES, Wimbledon (*accepted*)	779 0 0
Surveyor's estimate	797 0 0

Graham Avenue.

Starkey	1,168 0 0
Adams	831 0 0
Free & Sons	828 0 0
Harringdon & Co.	820 0 0
Yewen	819 0 0
Potter & Co.	809 0 0
Mowlem & Co.	780 0 0
E. & E. ILES (*accepted*)	725 0 0
Surveyor's estimate	756 0 0

ERITH.

For the following works for the Urban District Council:—(1) Erection of building for laundry and disinfecting chamber at the Erith Sanatorium, Little Heath, Belvedere; (2) extension of workshop at tramcar sheds building, Walnut Tree Road.

Contract No. 1.

Finnery	£554 18 1
Thomas & Edge	528 0 0
Jarvis & Sons	480 8 0
Chandler	453 10 0
Friday & Ling	449 0 0
GUNNING & SONS, Erith (*accepted*)	399 17 6
Hyde & Co.	394 0 0
Surveyor's estimate	501 12 5

ERITH—*continued.*

Contract No. 2.

Finnery	539 2 0
Thomas & Edge	535 0 0
Chandler	477 10 0
Jarvis & Sons	467 16 0
Friday & Ling	444 0 0
Hyde & Co.	419 0 0
GUNNING & SONS, Erith (*accepted*)	393 0 0
Surveyor's estimate	507 4 1

ESHER.

For making-up, &c., Hillbrow Road. Mr. H. C. FREAD, engineer and surveyor to the Council.

Blaker	£541 0 0
Free & Son	520 0 0
Kavanagh & Co.	487 0 0
Parry & Co.	480 0 0
Mowlem & Co.	468 0 0
SHEPPARD & SON, Teddington (*accepted*)	404 12 5
McLean & Co.	398 2 10

GLOUCESTER.

For the construction and removal of a temporary footbridge over the Severn at the City Quay, 60 feet span, 36 feet total width over outer girders. Alternative tenders are invited (1) to provide all materials and erect the bridge with girders loaned by the Great Western Railway Co. complete and to remove the same afterwards, the whole of the materials except the girders to be the property of the contractor; (2) to erect and remove the bridge as above, but to stack the materials, except the girders, in sizes upon the City Quay. Mr. R. READ, surveyor, Gloucester.

Contract No. 1.

Crofts & Cruickshanks	£2,450 15 6
Brebner & Co.	1,840 0 0
Leggatt & Speight	1,520 16 0
Webb & Co.	1,512 10 8
Jenkinson & Co.	1,200 0 0
Palmer	1,000 0 0
Hobrough & Co.	977 0 0
Gradwell & Co.	960 0 0

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GLOUCESTER—*continued.*

Smith	850	0	0
Byard & Sons	845	0	0
Farr	700	0	0
COOPER, Bristol (*accepted*)	698	0	0
Halls	495	0	0

Contract No. 2.

Crofts & Cruickshanks	£2,657	14	4
Brebner & Co.	1,995	0	0
Leggatt & Speight	1,929	12	0
Webb & Co.	1,712	10	8
Jenkinson & Co.	1,400	0	0
Gradwell & Co.	1,290	0	0
Hobrough & Co.	1,207	0	0
Smith	1,100	0	0
Palmer	1,069	1	6
Farr	1,040	0	0
Cooper	1,000	0	0
Byard & Sons	995	0	0
Halls	810	0	0

HOLMFIRTH.

For the construction of a road (620 yards in length, together with 264 yards fence walling, brick culvert, retaining walls, &c.), from Green Lane Mills to Dunford Road. Messrs. BROOK, DRANSFIELD & DYSON, surveyors, Huddersfield.

Jowitt	£1,336	19	0
Marsden & Sons	1,307	0	0
Turner	1,296	15	8
Graham & Sons	1,260	0	0
Crowther & Sons	1,204	0	0
Graham & Co.	1,199	0	0
Boothroyd	1,145	0	0
Garside & Whiteley	1,120	0	0
Wempenny & Co.	1,071	0	0
Turner	1,040	0	0
WARING & SONS, Huddersfield (*accepted*)	1,018	0	0

LANCHESTER.

For enlargement of the administrative block and erection of a porter's lodge at the Tanfield Hospital.

Enlargement.

Southern	£475	0	0
Collin	446	0	0
Potts	436	4	0
Duffy	421	0	0
WORLEY, Tantobie (*accepted*)	406	0	0
A. & R. Davis	393	0	0
Architect's estimate	550	0	0

Porter's lodge.

A. & R. Davis	321	0	0
Collin	192	17	0
Potts	183	16	6
Dipton	175	0	0
Duffy	160	0	0
WORLEY (*accepted*)	127	0	0
Architect's estimate	125	0	0

LONDON.

For external painting work at the workhouse, Marloes Road, Kensington.

Stone	£357	18	6
Rose	348	10	0
Wallis	324	5	8
Frost & Son	317	10	0
Holliday & Greenwood	289	0	0
Chappell	240	0	0
Rowley	216	10	0
Squire & Farrant	212	10	0
Sudds & Son	205	4	0
Oughton	198	12	0
Brown	196	10	0
Webster & Son	193	0	0
Marchant & Hunt	179	0	0
Hocking & Co.	179	0	0
Osborn & Sons	168	0	0
McCarthy	155	0	0
Inns	138	0	0
Johnson	136	0	0
WRIGHT & Co., 150 Brixton Hill, S.W. (*accepted*)	132	11	4

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LONDON—*continued.*

For the erection of 112 cottages on the third part of section C of the Totterdown Fields Estate, Tooting, for the L.C.C.

Leslie & Co.	£31,372	0	0
F. & H. F. Higgs	29,752	0	0
Fletcher	28,745	0	0
Akers & Co.	27,269	0	0
Wall	26,885	0	0
F. & T. Thorne	25,943	0	0
Smith & Sons	25 517	0	0
Roberts & Co.	25,028	5	0
Wallis & Sons	24,990	0	0
Gathercole Bros.	24,891	0	0
Carter	24,383	10	0
Rowley Bros. (*recommended*)	22.130	0	0
Architect's estimate	26,300	0	0

For the erection of a combined school for the accommodation of sixty mentally defective boys and girls and sixty mentally defective elder boys on the Harmood Street site, St. Pancras, for the L.C.C.

Ford & Walton	£6,851	0	0
Williams & Son	6,657	0	0
Patman & Fotheringham	6,538	0	0
Spencer, Santo & Co.	6,454	0	0
Rice & Son	6,353	0	0
Roberts & Co.	6 322	0	0
Leslie & Co.	6,315	7	5
L. H. & R. Roberts	6,225	0	0
McLaughlin & Harvey	5.948	6	0
Godson & Sons	5,884	0	0
Lawrance & Sons (*recommended*)	5.774	0	0
Estimate of the architect (education)	6,091	0	0

For painting and repairs at Great Smith Street Library, for the Westminster City Council.

Haylock	£275	0	0
Coulthard	257	10	0
Hoskins & Co.	255	10	0
Jenner	245	0	0
Burton Bros.	185	0	0
Sims (*recommended*)	152	0	0

LONDON *—continued.*

For the erection on the Brook Green site, Hammersmith, of a L.C.C. school for the accommodation of eighty physically defective children.

Neal	£3,878	0	0
Glendinning	3,707	17	3
Roberts & Co.	3 642	0	0
Rice & Son	3,630	0	0
Parker	3,607	14	0
Godson & Sons	3,509	0	0
Garrett & Son	3,493	0	0
Johnson & Co.	3,367	0	0
Chessum & Sons	3.295	0	0
Triggs (*recommended*)	3,285	0	0
Estimate of the architect (education)	3,448	0	0

For the erection and equipment of a block to accommodate 113 patients and the reconstruction of the administrative centre at the Manor Asylum.

Ashby & Horner	£12,442	0	0
Holliday & Greenwood	12,215	0	0
Leslie & Co.	11,821	0	0
Perry & Co.	11,697	0	0
Lawrance & Son	11,540	0	0
Greenwood	11,428	0	0
Holloway Bros. (London)	11,400	0	0
Godson & Son	10,875	0	0
Johnson & Co.	10,790	0	0
Carmichael (*recommended*)	10,636	4	2

For supply of an electrically driven pump, for the Hackney Borough Council.

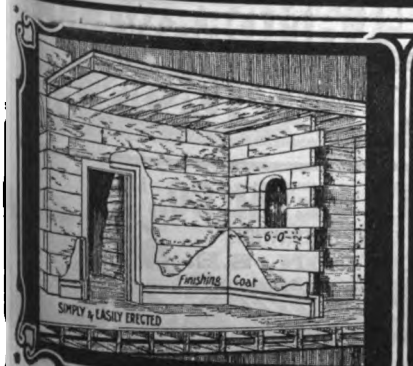
Albany Engineering Co.	£91	0	0
Rees Roturbo Manufacturing Co.	54	0	0
Gwynnes	47	0	0

For supply of electrical shop machinery for use at the tramways central car-repair depôt, for the London County Council.

Holroyd & Co.	£1,122	0	0
Ditto, alternative tender	1,115	0	0
TANGYES, Birmingham (*accepted*)	782	0	0

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LONDON—*continued.*

For repairs, &c., at the North Lambeth Library.

Hall, Beddall & Co.	£776	0	0
Parsons	553	0	0
Lapthorne & Co.	548	0	0
Hibberd Bros. (*recommended*)	543	0	0

SHOEBURYNESS.

For laying surface-water drain.

Iles	£255	0	0
Parsons & Parsons	246	6	5
Wilson, Border & Co.	233	16	0
Ventris	231	5	5
Cranston & Co.	236	0	0
Bake & Co.	200	0	0
HARRIS, Shoeburyness (*accepted*)	179	11	6
Jackson	179	9	0

SOUTHEND-ON-SEA.

For the making-up of Albion Road, for the Corporation. Mr. E. J. ELFORD, M.I.M.E., borough engineer and surveyor.

Fry Bros.	£853	0	0
Buxton	831	0	0
ILES, Southend (*accepted*)	808	0	0
Parsons & Parsons	816	0	0

WHITBY.

For alterations and additions to the end block of tenements in the middle yard of the Seamen's Hospital, Church Street. Mr. E. H. SMALES, A.R.I.B.A., architect, 5 Flowergate, Whitby.

Kidd & Son	£828	0	0
Nelson	806	2	11
Palframan	784	19	10
Lawson	771	2	1
Braim & Sons	764	0	11
Chapman	756	14	0
Lennard & Sons	743	19	0
WILSON, Whitby (*accepted*)	721	1	0

WATFORD (HERTS).

For erection of pair of semi-detached villas on Nascott Estate. Mr. S. E. GOMME, architect.

Clifford & Gough	£1,469	0	0
Eames	1,346	0	0
CLARK BROS., Watford (*accepted*)	1,272	0	0

TRADE NOTES.

ALL manufacturers interested in export business should subscribe to *The Mercantile Guardian*, edited by Mr. Walter Lindley Jones, whose campaign against the fraudulent trader has proved of eminent service repeatedly to merchants engaged in business which has always proved difficult, in consequence of the fact that in most cases exporters do not require commodious offices and a large staff of clerks.

THE Ilford Isolation Hospital has been supplied with Shorland's warm air ventilating double-fronted patent Manchester stoves with descending smoke flues by Messrs. E. H. Shorland & Brother, of Manchester.

MESSRS. JOHNSON BROS., earthenware manufacturers, of Tunstall and Hanley, whose Alexandra Pottery, Tunstall, was recently burnt out, are now having same rebuilt in a more thorough and up-to-date manner. They are also building a new flint mill in Tunstall, their architects in both cases being Messrs. A. R. Wood & Son, of Tunstall and Burslem. The whole of the constructional steelwork, fire-resisting floors and asphalte flats to both jobs are being carried out by Messrs. Homan & Rodgers, Manchester.

A NEW large clock has just been erected in Magdalen College Tower, Oxford, which strikes the hours upon the largest bell of the peal of ten, and plays the Oxford quarter chimes on the other bells. There is no external dial and in some respects it is a copy of the old one. The new clock has been made generally to the designs of the late Lord Grimthorpe and is guaranteed by the makers to keep very accurate time. The work has been carried out by Messrs. John Smith & Sons, Midland Clock Works, Derby, who are also at the present time making a large chiming clock for Selby Abbey, Yorkshire.

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BUILDING AND BUILDERS.

THE plans prepared by Mr. D. Edwards, A.M.I.C.E., borough surveyor, Taunton, for the extension of the Taunton Public Library, in Corporation Street, at a cost of 1,500*l.*, have been approved.

THE Great Western Railway Company have decided to erect a new station at Abingdon. The premises were wrecked by a runaway train last April, and have since been temporarily repaired.

THE Shropshire education committee have adopted a recommendation for the erection of a boys' secondary school at Oswestry, to accommodate 120 pupils, at a cost not exceeding 6,000*l.*

ARRANGEMENTS are being made for the rebuilding of the wireless telegraph tower at Machrihanish station, N.B., which collapsed in December 1906, during a gale. The old tower was 450 feet in height at the time of its fall. The company interested is American.

MR. JOSEPH DAVIES, of Woodbank, Mersey Road, Rock Ferry, Cheshire, and of The Cottage, Llanengan, Pwllheli, Carnarvon, builder, who died on September 21 last, aged sixty-six, left estate valued at 49,771*l.* gross, with net personalty nil.

AT the last Coatbridge Dean of Guild Court the Coatbridge Co-operative Society, Ltd., was granted lining to erect a new bakery department in Muiryhall Street, at an estimated cost of 2,300*l.* Mr. M. Brown Russell and Messrs. Penman Brothers were granted lining to erect cottages at Old Monkland and Coatdyke respectively.

OWING to Torquay Town Council refusing its sanction to a pavilion scheme involving an expenditure of 12,000*l.*, the promoters of the latest proposal, who advocated the erection of a building which, with furnishing, would have cost 9,300*l.*, have dropped the matter. It is understood that it is probable that the Town Council will now again take up the subject themselves.

AN expenditure of nearly 350,000*l.* for the erection of new and the improvement of old buildings was sanctioned during last year by the Wesleyan Methodist chapel committee, whose annual report has been issued. The sum is about 150,000*l.* above the total for an average year. The number of new chapels to be erected is sixty-four, with 10,969 sittings.

THE Southend-on-Sea education committee have decided to carry out extensive alterations and additions to the boys' department at the London Road schools, and have approved of the plans. The extra accommodation will be increased by 131 places, and new cloak rooms and lavatories will be added. Messrs. Cabuche & Hayward, of Westcliff-on-Sea and 18 Eldon Street, E.C., are the architects.

ON July 1 next there are to come into force thirty-two regulations made by the Home Secretary under the Factory and Workshop Act, 1901, for the generation, transformation, distribution and use of electrical energy in any factory or workshop, or any place to which the provisions of section 79 of the Act are applied. Copies of the regulations can now be obtained through any bookseller, price 1*d.*

AT the meeting of the Barnsley education committee on Monday in connection with the new schools to be built in Grove Street at a cost of about 10,000*l.*, a councillor raised the question of the commission to be paid, arguing that 5 per cent. for the construction and 1½ per cent. for the quantities was too much. He thought they should ask the competing architects what lump sum they would take to do it, and eventually he moved that the commission be reduced by 1 per cent., but his resolution had no seconder.

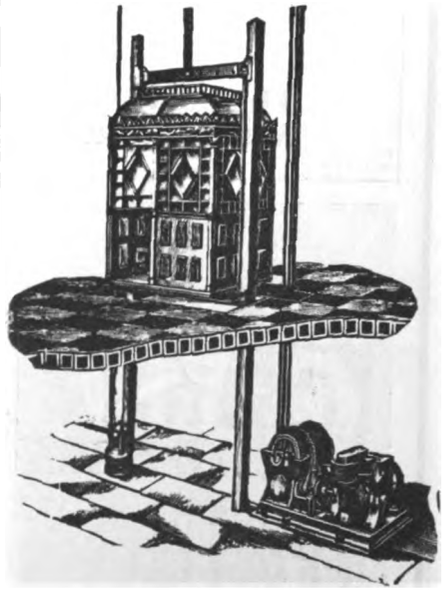
AN experimental line of concrete telegraph poles is now in use on a part of the Pennsylvania Railroad system. It is desired to be independent of any uncertainty as to the supply of wood. According to the experiments made so far, it is thought that a concrete telegraph pole will last for many generations. Importance is also attached to the increased strength of the new poles, which hold the strain of the line, even on curves, without any braces. The poles set up are about 30 feet long, 14 inches in diameter at the bottom and 6 inches at the top.

IN connection with the amalgamation of Lambton & Co. with Lloyds Bank, Ltd., the premises of the latter firm at Alnwick are to be enlarged by the acquisition of adjoining premises lately belonging to the North-Eastern Bank. Internal alterations are to be made, comprising new strong rooms, banking hall, &c., in addition to the provision of two suites of offices and a manager's house. A new front is

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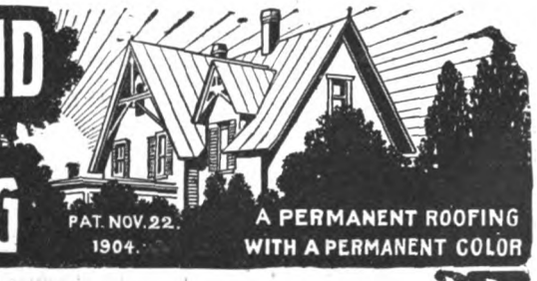
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to be erected, the chief feature of which will be an Ionic order embracing the first and second floors. The architect is Mr. George Reavell, jun., A.R.I.B.A., of Alnwick and Morpeth.

THE Master Builders' Association of Ireland held their annual general meeting at the Grosvenor Hotel, Westland Row, Dublin, last week, when the following appointments were made for the year 1909:—President, Mr. James Beckett; Vice-President, Mr. H. M'Laughlin; committee, Messrs. R. Denne Bolton, Thomas Conolly, George Goodfellow, James Kiernan, Thomas Mackey, James Martin, R. E. Mellon and Henry Pemberton; hon. secretary, Mr. John Good; hon. treasurer, Mr. S. Roberts; representative on the Board of National Federation of Building Trade Employers of Great Britain and Ireland, Mr. Richard Denne Bolton; representative on City of Dublin Technical Education Committee, Mr. H. M'Laughlin.

MR. WALTER HILL, of the well-known firm of builders, Messrs. John Thompson & Co., of Peterborough, died on the 17th inst. at the age of sixty-one. He had been associated with the company for over forty years, and became a partner in 1898. With the late Mr. John Thompson, he was associated in restoring the cathedrals of Canterbury, Hereford, Ripon, Chester, Salisbury, Llandaff, Winchester, Peterborough, Lichfield, Lincoln, Rochester, and Bangor; in the building of new churches at Chester and Arklow (Ireland), and in the restoration of St. George's, Windsor; Eton College chapel; St. Michael's, Coventry; and Macclesfield, Ludlow, Bridlington, Holyhead, and Melton Mowbray parish churches. His busy life brought him into intimate connection with architects all over the United Kingdom, and he won the deepest respect of all. He was in harness to the last, dying at Hever Castle, Edenbridge, which was being restored for Mr. W. W. Astor.

THE executive council of the Amalgamated Society of Carpenters and Joiners, in their last monthly report, deal with the decision of the judges of the Court of Appeal with reference to the payment of Labour members from trade union funds. The council remark:—"As for the time being it is ruled by the Court of Appeal to be an illegal act for a trade union to enforce the payment of levies, or use its funds in support of this object, this clearly applies to our own levy of 3*d*. per quarter. We are, however, reluctant to believe that members who are thorough in their desire to promote legislation for the benefit of our class regard this payment as a levy in the sense this term is understood, and therefore would be equally willing to contribute toward this object under any other name. . . . Difference of opinion in our ranks upon this point undoubtedly exists, and must therefore be respected; consequently the enforcement of this small quarterly payment on unwilling subscribers must not be carried out; but for the present we must rely upon the members to honourably fulfil their obligation to the Labour party by voluntarily supporting the movement until such time as the latest decision of our judges against trade unions is either reversed by the House of Lords, or the laws on which this decision is supposed to be based altered, with a common-sense interpretation of our rights." Secretaries and branch officers generally are, therefore, requested to collect voluntary contributions for this purpose from all members willing to assist.

AT the Edinburgh Dean of Guild Court the Caledonian Railway Company were last week granted a warrant to reconstruct the existing bridge over Gorgie Road at Tynecastle, Edinburgh. The new bridge will be of a single span, built on the skew, with a span measured on the square of 52 feet; the abutments will be of stonework, and the superstructure of wrought steel. The new bridge will have a headway of 17 feet from the surface of the road. In connection with the erection of the bridge a temporary bridge will be erected on the east side of the new bridge to carry the railway lines. There will be no interference with the tramway traffic which passes under the bridge.

THE Northampton highway committee will consider at their next meeting the amended plans for the construction of a hippodrome at the corner of St. Giles's Terrace and Abington Street, which are being altered to comply with all the requirements of the Highway Authority. Messrs. Milton Bode & Compton, proprietors of the Opera House, have also decided to build another music hall in the town. Two or three sites are under consideration, and as soon as one has been fixed upon building operations will be immediately commenced.

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VARIETIES.

THE Dundee water committee have adopted the recommendations of their engineer with regard to laying down new conduits at a cost of 4,977*l.* for the improvement of the Broughton water supply.

ORDERS have been given for the construction at Lorenzo Marques of a stone quay over 4,500 feet in length. It is to cost about 310,800*l.* Authority has been given for the purchase of the materials for beginning the work.

IT is proposed to expend 8,475*l.* on the erection of a new county school for girls at Winchester, in addition to the cost of the site which the county authorities had previously secured from the Ecclesiastical Commissioners.

MESSRS. ERNEST RUNTZ & FORD announce that they are removing their offices from Walbrook as and from February 1, to 62 Victoria Street, Westminster, S.W., and that their telephone number will be 7924 Gerrard.

THE Swansea Town Council last week discussed the question of the provision of a new training college, but the matter was adjourned for a special meeting. It is estimated that the cost will be about 45,000*l.* It was pointed out that the Council will shortly have to face the provision of an asylum and three additional elementary schools.

THE Local Government Board have sanctioned the borrowing by the Rugby Urban Council of 4,200*l.* for the purpose of erecting and equipping public baths on a triangular piece of land near the centre of the town, in Regent Street. The application for the loan was made in November, and the inquiry was held in December.

A PUBLIC meeting was held at the new Muncipal Buildings, High Holborn, W.C., on Tuesday, in connection with the proposed reconstruction of Holy Trinity Church, Kingsway, at a cost of 8,000*l.* The church has been closed as a dangerous structure in consequence of recent excavations.

MR. JAMES KINNIBURGH, contractor, Glasgow, has received the contract for the cutting of a part of a trench in connection with the new Clydebank waterworks. The length of the trench is five and a half miles, and the contract includes the cutting of a tunnel 700 yards long. The contract price is a little over 12,000*l.*

THE Paddington Borough Council have adjourned the discussion of a recommendation to sell to Messrs. Whiteley, Ltd., the freehold site and buildings of the Queen's Road public baths for 60,000*l.* William Whiteley propose to erect an extension of their premises thereon at a cost of 250,000*l.*

THE Local Government Board has refused to sanction the scheme submitted by the Sheppey Rural Council, under which it was proposed to spend nearly 7,000*l.* in draining the parish of Minster. They suggested a modified scheme to meet the present needs of the parish. The Chairman of the Council says that the scheme would have been of great service in the development of land on which plots to the value of 75,000*l.* have been sold.

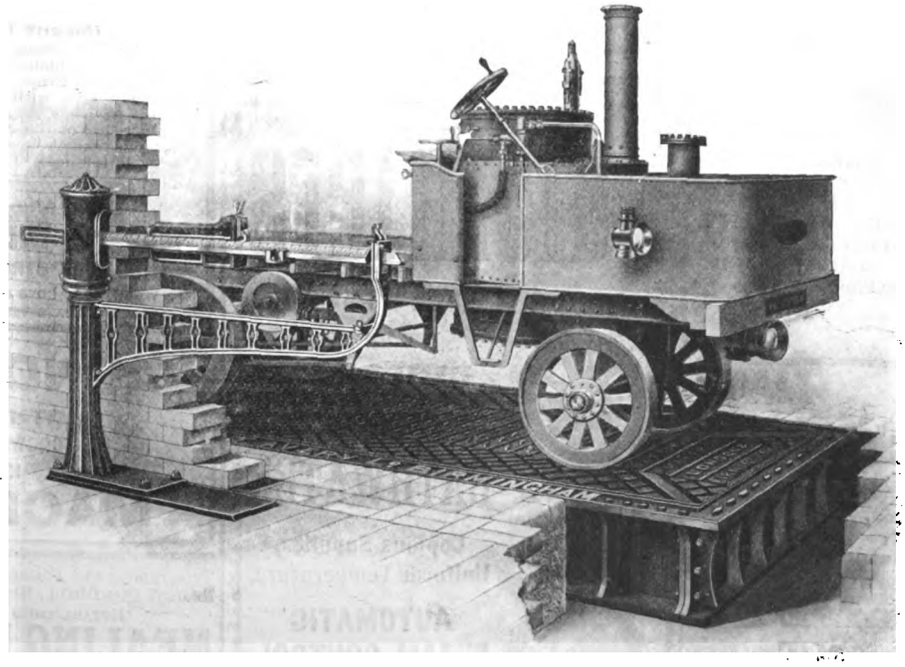
MR. A. G. DRURY held a Local Government Board inquiry on Tuesday, into an application by the Manchester Corporation for sanction to borrow 59,443*l.* for the purpose of extending the bacteria beds on the Davyhulme sewage farm. The sum of 45,943*l.* is required for the construction of second contact beds, and a further sum of 13,500*l.* for the provision of granite in lieu of clinkers for filtering purposes.

A SCHEME has been prepared for developing a part of the Alkrington estate as a garden city suburb. The estate is between Middleton and Manchester. A scheme is being prepared for the lay-out of the property by Mr. Thomas Adams, late secretary and manager of the Letchworth Garden City. A resident agent has been appointed, and the work of preparing the plan is being proceeded with. It is hoped to start next summer, and to form a co-partnership society to develop part of the estate on the lines suggested.

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THE Bridlington Town Council have passed a resolution that application be made to the Local Government Board for sanction to borrow 10,670*l.* to erect and furnish new public elementary schools in the Old Town Ward in place of the Priory Church schools, condemned by the Board of Education.

MR. R. RILEY, surveyor to the Wellington Rural District Council, has been instructed to prepare a scheme for the erection of public swimming baths. He has also been instructed to prepare the necessary specifications for carrying out a scheme of street paving, &c., in the town, for which the sanction of the Local Government Board in regard to a loan has already been granted.

THE Burslem Town Council have instructed the borough accountant not to accept any certificates for work done by any contractor unless they are accompanied by a covering note stating that the policy of insurance of workmen had been inserted by the town clerk. No contractor will be allowed to continue working who has not produced a policy of insurance.

THE Hull allotments committee at their last meeting discussed the conditional offer of Mr. Christopher Pickering, trawler owner, to sell the Corporation land fronting Hessle Road and Mill Lane for the purposes of allotments and a park. The area is 154 acres, and of this Mr. Pickering was prepared to give 34 acres to the Corporation, provided they purchased the remaining 120 acres at 400*l.* an acre, which represented a cost to the Corporation of 48,000*l.* Mr. Pickering also offered to erect twelve cottage almshouses, at a cost of 4,000*l.*, and to leave the election of tenants to the Corporation. The offer was accepted.

THE works and general purposes sub-committee of the Southampton education committee last week reported that they were unable to obtain the temporary services of a quantities surveyor for the preparation of bills of quantities in connection with the alterations and additions to Ascupart and Western District schools, except at a cost of over 200*l.*, and that the assistant borough engineer and other assistants in the borough engineer's department having offered their services, after office hours, to carry out the work, such services were accepted. A grant of 50*l.* will be made to the assistant borough engineer and those who assisted him for extra services rendered.

A HOUSING scheme on co-partnership lines is being promoted at Hereford. The site is near Barr's Court railway station, and is being laid out on town planning lines by the Hereford Town Council, who are demolishing an area of slum property in the centre of the town. The site is being developed, including the purchase of the land, at an estimated cost of 2,300*l.* A proportion of houses will be built at rents suitable for men earning from 18*s.* to 20*s.* per week, and others for men earning up to 30*s.* per week. There will be not more than twelve houses to the acre, and gardens or allotments will be provided.

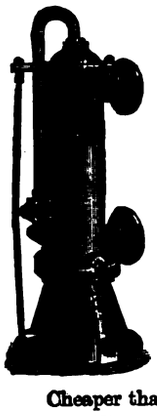
AN inquiry was held at Birmingham on Wednesday into a proposal by the City Council to extend the city boundaries. If the proposed scheme is carried out Birmingham will possess an area of 39,089 acres, with a population of 874,837, and would be in area and population the second largest city in the kingdom. The districts proposed to be included are Yardley, with a population of 58,000; King's Norton and Northfield, 78,608; Handsworth, 68,051; Aston Manor, 82,000; and Erdington, 29,250. Practically the whole of the area is within a radius of five miles of the Council House, and the land within a four miles radius is either completely built upon or is in a forward state of development.

MR. J. G. MACSWEENY, Local Government Inspector, last week concluded an inquiry at Mallow, Ireland, with reference to an application by the District Council for the erection of 229 cottages and the provision of seventy-five additional allotments at an estimated cost of 43,120*l.* The Inspector, in the course of the inquiry, commented strongly on the failure of the District Council to complete the last scheme, and suggested that a way out of the difficulty might be found by adopting a system of direct labour, and appointing a clerk of works to complete the scheme. Such a plan would probably offer a more economic means of reaching the desired end. The cost of the cottages was too high; in most parts of Ireland it was probably 10*l.* to 20*l.* less, and he could not see why the Mallow Council could not make an effort to keep within the standard laid down by the Board.

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YEAR BOOKS.

LOCKWOOD'S "Builder's Price Book for 1909" needs no better recommendation than to say that it is as excellent as its predecessors. When a work of this kind has reached maturity there is little room for marked changes from year to year. It is only possible to make minor revisions. In preparing the latest edition regard has been paid to any alterations in prices of labour and material. The preface says:—"These changes have not been very emphatic; but, for instance, the cost of bricks is, on the whole, lower than last year, and the same may be noticed in regard to lead." Thus the price given in last year's "Lockwood" for hard stocks and roughs per 1,000 was 2*l.* 5*s.* and 2*l.* respectively; in 1909 it is given as 2*l.* and 1*l.* 10*s.* One of the principal additions in the book is a note issued some months ago by the London County Council relating to means of escape under the London Building Act, 1905. This has been inserted in the Supplement, which deals in great detail with the parliamentary enactments relating to buildings in London.

It would be highly instructive to compare the ninety-second edition of Laxton's "Builders' Price Book" (Kelly's Directories, Ltd.), which has just been issued, with the original production of William Laxton. The 1909 edition is enlarged to the extent of an extract of the London County Council General Powers Act, 1908, as to the cubical extent of buildings. The valuable introductory note showing a method by which an approximate estimate of the proportion which labour bears to material may be calculated, is reprinted. The care with which the book has been produced bears out the statement that "the various prices have received careful attention, and where necessary, owing to the decline in the price of materials, the items have been duly adjusted." We might remark that the similar paragraph in the previous edition said "owing to the *advance* in the price of materials." The volume still can cause pleasure by the orderliness of its contents, which include everything that can be wanted by architects, builders, engineers and contractors.

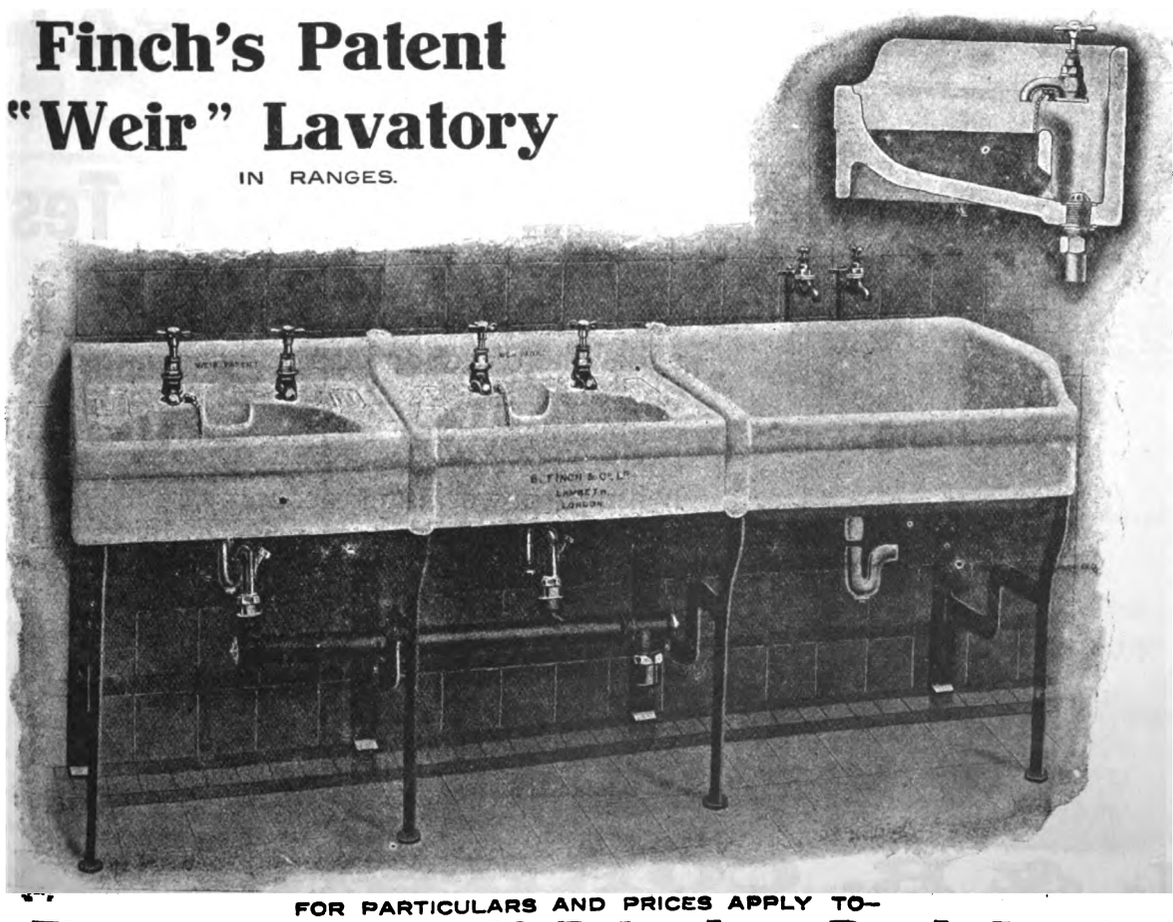
THE London Master Builders' Association have issued their diary and handbook for the current year, and as before, it includes a short glossary of electrical terms. It amply fulfils its avowed purpose of providing useful information for those actively engaged in building operations throughout the Metropolitan area. There are the same excellent series of tables.

"The Local Government Annual and Official Directory" must now have become almost indispensable to all officials of public authorities and to the public authorities themselves. It has the *imprimatur* of official correction, and has been edited by Mr. S. Edgecumbe Rogers. It is thoroughly up to date and gives an abstract of seven statutes passed in 1908 dealing with local government. The Old-Age Pensions Act is quoted at length. The first portion of the contents refer to London, and the second to the country.

MRS. D'OYLY CARTE has revived the glories of the Savoy Theatre. Plays like "The Gondoliers," "The Pirates of Penzance," "The Mikado," and "H.M.S. Pinafore," are too good and too popular to permit a question of doubt as to the advisability of again placing them before the public. The well-filled theatre at these performances is at any rate sufficient testimony to the popularity they enjoy; if further proof should be required, a visit will afford this. The hearty laughter from stalls, dress circle, pit and gallery is almost as enjoyable as the play itself. "The Gondoliers," perhaps, is the most popular, and with an excellent company and Mr. Rutland Barrington the intense interest and excitement is maintained from start to finish. A card may be obtained giving the name of play and date up to Saturday, February 6, on application at the theatre.

THE education committee of the Hampshire County Council have recommended that the County Council should be asked to approve the expenditure of 11,169*l.* on the erection of a new Council school at Eastleigh, and apply to the Local Government Board for sanction to borrow the money. The expenditure of 9,365*l.* for a new Council school at Farnborough was also recommended.

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TECHNICAL EDUCATION.—II.

By WILLIAM CHALLONER, President of the Institute of Plumbers.

(Continued from January 8.)

[IN the first instalment a very brief résumé was given of the history of technical classes before and immediately after the Technical Instruction Act of 1889. This Act proved to be a failure for the classes were attended by a quickly diminishing number of students.]

In some exceptional cases the classes were equipped and the teachers appointed by a committee who possessed little or no knowledge of the practical needs of the crafts intended to be taught, nor the value of such qualifications as the applicants for positions as teachers possessed.

The idea of any necessity to obtain the advice or assistance of a responsible organisation of employers, where one existed, or of persons engaged in any particular trade does not appear to have suggested itself, with the inevitable result of alienating an interest that was most essential for success.

Many of the syllabuses were compiled by authorities whose object tended in the direction of qualifying teachers and not craftsmen, and as the standard of practice varied considerably in different parts of the country, it frequently occurred that the principles taught in the schools bore but a slight relationship to the local practice in their application, and in not a few cases were directly opposed to them.

It is not unusual to still find a teacher who possesses the highest certificate for teaching a subject having a most elementary practical knowledge of the craft he essays to teach. They frequently follow quite another occupation in their ordinary employment or have long discarded any practical association with the subject. Notwithstanding these anomalies students persevere tenaciously throughout a course, and obtain certificates of efficiency in a trade or craft, though only in the way they are taught in that particular school. Unfortunately these certificates do not possess their intended value, and rarely secure either preferential employment or additional remuneration for the possessors of them. They are frequently of value however in obtaining an inspectorship; but in such cases there is no gain to the particular trade or craft the educational process was intended to benefit. Whilst we have no wish to deprecate the training of inspectors or their necessity, even if the system of education for craftsmen was much more practical and perfect, it is obvious that the number of inspectors might be curtailed and some economy effected if the individual workman was trained on right lines and permitted to carry out his work according to those principles.

For these and other reasons which may have a more or less local character the interest in technical schools is extremely half-hearted, and the attendance consequently is meagre and irregular. The students who attend without some compulsion on the part of either the parent or the employer are becoming more and more a rarity—they do not see the good of it. To serve as a counter attraction to cheap amusements and popular games its advantages must be made more apparent and immediate. The means of inducing the students to try the experiment, are limited, and none exist to compel their attention even if their attendance is somehow secured. As a result the attendance throughout the country is not more than 10 per cent. of those who might be expected to avail themselves of the classes. This indifference cannot be condemned as wholly inexcusable so long as the system can only offer such doubtful resultant advantages.

During the past few years one or two national organisations of employers (and in one case with the co-operation of the workmen's trades union) have endeavoured to render assistance to those authorities who exercise a control in technical education by approving the qualifications of teachers, conducting examinations and granting certificates. This assistance met with courteous approval. But in spite of the cost and sacrifice of time entailed upon the members it has failed to effect any real improvement. It certainly emphasised the many difficulties and anomalies existing, and showed that until these are brought into line it is useless to hope that the present system will attain the realisation of its ideals—at any rate in so far as the trades under notice are concerned. This is so because in no trades or crafts are the difficulties so great or the anomalies so marked as in those connected with buildings. The leaders of this movement are convinced that if they are to put the system upon a better basis, a system of sequence must be established from the elementary schools to continuation

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schools and onwards to completion by a course at the technical schools. It is also imperative that the system of indentured apprenticeship should be resuscitated in order that compulsory attendance of the apprentice may be ensured, and by this means technical education may be made to supplement workshop training instead of attempting as it does now to supplant it.

There would appear to be a weak point in our national educational system, the adverse effects of which are by no means restricted to those who try to learn a trade in connection with building. Upon its remedy the success of all attempts to get the best value from technical education will to a less or greater extent depend. Under our elementary school system the State has control over the student in so far as it compels his attendance to about the age of fourteen, or until a certain standard of the code is passed. But there is no control afterwards, except such as the parent may elect to commence, and which being thus delayed is not always effective. This control of the State, however slight, is discontinued at an age when some degree of authority is most necessary if the adolescent is to be inculcated with those habits of discipline upon the acquisition of which the future will largely depend. If this control could compel attendance and attention at continuation schools, and beyond that to the technical schools, until say the age of eighteen, there would be a hopeful prospect for the disappearance of one difficulty that mars the success of the movement.

The direct effect of filling the interregnum between the elementary school and the specialised technical course by attendance at continuation schools would ensure that the habit of study was not completely lost, and the superficial knowledge acquired of the multitude of subjects which go to make the present elementary code would not be allowed to evaporate. In addition, continuity in study would remove a difficulty with which all technical teachers have to contend in reinstructing students in those general elementary subjects which are indispensable, and that find their application in the special subjects of the technical classes. It is unnecessary to point out that a teacher who is at best only trained to give instruction in special subjects is not often qualified to take the place of the schoolmaster or teacher of pure science. His time ought to be better occupied than in teaching those subjects which, when forgotten, may be learnt better and more economically elsewhere.

The condition of mental unreceptiveness of the great proportion of students attending evening classes is also a matter which demands attention. There are usually considerable distances separating the workshop or building from the home, and again from the home to the school where the classes are held. A typical case of a student may be taken, who has been on a building or in a workshop all day, and leaves work at say half-past five. Between that time and seven o'clock (the usual time the classes commence) he must go home, wash, probably change, get his evening meal, and cover the distance that lies between his home and the class. All this in 1½ hours. The student has perhaps been in the cold all the day; the warmth of the class-room added to the often rather humdrum lecture of the teacher, makes it extremely difficult to keep awake; consequently the requisite keen attention, especially in theory classes, is quite out of the question. The remedy for this is that the employer should arrange for those of his apprentices who are attending technical classes to leave work earlier on those nights. Sufficient interest, however, will not be excited to induce such a sacrifice until the employer is better satisfied of the ultimate value of the technical schools, not to himself alone, but to the future workman, if he remains at his trade.

These criticisms by no means exhaust all that can be advanced against the existing system of technical education in so far as it affects the building and allied trades, and there is reason to suppose that they can be equally well applied (in whole or part) to many other trades and crafts not directly concerned in building.

As stated at the commencement of this article, commercial conditions are not favourable to higher technical training. This most important factor does not appear to have been understood, or, if so, not considered at its value by the idealists who sought to solve the problem of foreign competition and unemployment by this means.

Technical education in the building trades, if it falls short of all else, teaches that the best material and tools, together with a reasonable amount of time, are required in the execution of work. The classes are well equipped, so far as they go, and the work is accomplished under conditions

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that do not demand the exercise of that ingenuity on the part of the workman which is more or less inseparable from his actual work. It is often impossible to carry about a well-equipped set of tools, and therefore the efficiency of the work depends as much upon the ingenuity of the workman in the adoption of makeshifts as his technical training.

The well-designed or adapted materials, and the additional time which higher efficiency demands, have a peculiar interest to the employer, in so far that too frequently reputation and efficiency were not the deciding factors which placed the work in his hands, but the lowest tender. It is needless to say that there are difficulties in providing an equation that will fit efficiency and minimum cost to enable the contractor to price his work and come near the lowest. It may be advanced against this that reputation has some influence in the decision whereby contracts are placed. But a casual notice of lists of tenders will show that such influence is inconsiderable when placed against the lower cost. It is usual, except in the case of a well-known firm, to make inquiries as to the position of a contractor before placing any work with him; but these inquiries are generally confined to his financial position or his ability to execute the job in a short time in order to make up for the time wasted by the architect in preparing plans, or the indecision of the owner in approving them.

Numerous cases have occurred where the knowledge that the applicant for employment possessed a certificate from a technical school has prevented his having preference, the answer being "this is a cheap job and we cannot afford to employ highly-trained men." There have been a few exceptions in at least one department of the building trade, where employers have been able to withstand the financial strain which a refusal to compete at the lowest prices entailed, and who are still holding out in the expectation that some of these anomalies may in time be adjusted.

It is rather remarkable to find that the greatest eagerness for cheap work, and the greatest disregard for reputation and efficiency is on the part of public bodies. They are frequently found to be enthusiastic in one department of their administration, for greater efficiency through higher education, and yet are the keenest advocates for cheap work when they have contracts to decide. Amongst these none cry out louder for cheapness than the so-called representatives of labour, who in the commencement clamoured for free educational facilities to be provided for the advantage of their class, and who have since been either opposed or at least completely indifferent to any endeavour to assist in its success.

THE Factory Department of the Home Office issued on the 16th inst. a memorandum as to the use of water gas, suction gas, and other gases in factories, containing information of an important character regarding carbonic oxide poisoning, and recommending precautionary measures. The Department calls attention to the fact that in recent years there has been great extension of the manufacture and use of water gas and other gases of a similar nature for many industrial purposes. The particular danger associated with all these gases is that of poisoning by carbonic oxide, which isalso a constituent of ordinary coal gas; but whereas the proportion in coal gas varies from 4 to 12 per cent., in carburetted water gas it reaches 12 per cent., and in uncarburetted water gas 50 per cent. The annual reports of the Factory Department during the last eight years show a steadily increasing number of reported cases of poisoning by carbonic oxide on manufacturing premises. Thus in the five years 1899 to 1903 there are references to fifty-one cases, of which seventeen were fatal; in the two years 1904-5 to fifty-seven cases, of which eighteen were fatal; and in the two years 1906-7 to 136 cases, of which fourteen were fatal. The lessened mortality was due possibly to better knowledge of the methods of resuscitation. Instructions with regard to starting, stopping, charging with coal, testing, cleaning, and repairing are recommended to be posted in the engine-house, and certain structural conditions of general application are set out as precautionary measures with a view to the avoidance of unnecessary risk. The inspection of valves and connections at stated intervals by a competent person, to see that no leakage is taking place, is also recommended. The Department also suggests the provision of ropes for rescue purposes, and that further notices should be affixed in the works explaining the deadly nature of the gas, the symptoms of poisoning, and the means of rescue and "first aid."

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THE INDUSTRIAL DEVELOPMENT OF EDINBURGH.

AN element of prosperity which has hitherto been associated primarily with the capital of the West is to receive more attention than in the past in the case of Edinburgh. The Scottish capital's advantages as a show city, as a centre of education and as a place of residence for leisured and retired people are well known. It is possible, says the *Scotsman*, that these considerations may have overbalanced other elements of communal prosperity to their detriment. The town clerk, acting on instructions from the Town Council and the Lord Provost's committee, has drawn up a document dealing with the advantages of Edinburgh as a site for factories and other public works and other relative matters.

"Her face is her fortune," observes the town clerk, in his preliminary memorandum, is a phrase often applied to the city. Its rapid development and progress in recent times, he observes, however, prove that Edinburgh is not resting upon the traditions of the past, however great these may have been, but is keeping its place among the progressive cities of the present day. In certain aspects, however, the advantages of the city are not so fully realised as they ought to be. It is too readily assumed that the distinctive attractions and amenity of the city are inconsistent with the extensive establishment of industrial works, or that there is an absence of the resources and conditions which are requisite in the site and successful prosecution of such works. It is desirable to clear away misconception on the subject There is no reason why the prosperity and development of the city should be confined to lines which exclude the extensive establishment of manufactories or industrial enterprises. Instead of being devoid of the special requisites for these latter, Edinburgh is well endowed with them, and there is no reason why there should not be a great increase in industrial establishments without in any way interfering with or detracting from its characteristic amenity and attractions. The late Sir George Harrison, a former Lord Provost, when asked what was the leading industry of the city, replied "Education." That still remains true; but while there has been a vast increase in the educational institutions of the city in recent years, the actual extent to which industrial pursuits are already carried on is very apt to be under-estimated; and it is to be feared that the degree in which the requisites of successful industrial works are to be found in Edinburgh and its neighbourhood is very inadequately realised.

Included in the memorandum is a table showing the numbers employed in the principal trades in Edinburgh and Leith, according to the census of 1901. The building trades are easily the first, the total number of men employed being 13,175 in Edinburgh and 2,308 in Leith. The quantity of coal available is abundant; the quality is excellent; and the price, delivered in Edinburgh, is moderate, and will compare favourably with other manufacturing centres.

Edinburgh's railway facilities are enumerated. It has sometimes been said that Edinburgh could not be a large manufacturing centre owing to the absence of a navigable river. This, however, overlooks the fact that the city has direct and immediate access to the Firth of Forth, one of the best waterways which could possibly be had. The access to the firth by the harbour and docks of Leith is convenient; and the facilities for business at that port are already very extensive, and with the adjoining harbour at Granton they are capable of extension to any degree required by the increase of trade. There are thus open to manufacturers in Edinburgh facilities for transport by water to and from the ports on the east coast of Britain or on the Continent, to say nothing of more distant places.

Edinburgh has long been noted for the large number of persons who possess capital, and place it on deposit, lend it to public companies or otherwise invest it. There is really an unlimited field for raising capital if the security and prospects of the borrower are satisfactory. There is always a large number of business men who would form eligible directors for public companies of good standing. As the headquarters of the large Scottish banks and insurance companies Edinburgh, in a financial aspect, has great advantages for the development of industrial enterprise. With regard to sites available for industrial works, it is pointed out that there are many such sites in Edinburgh, where the establishment of works would not in any way injure the amenity of residential parts of the city—for instance, in the sites at Gorgie (belonging to the Corporation), Trinity Hospital lands, Craigentinny and Granton. It would no doubt

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be a misfortune, it is observed in the memorandum, if anything should be done which would diminish the present attractions of the city; but an examination of the eligible sites, in their relation to the residential parts of the city as shown upon the map, or to anyone acquainted with the locality, will, it is believed, show that no detriment need be feared from even a large increase of factories and works in those parts of the city designated as eligible for them.

These works would necessarily bring capital to the city, which would be utilised in the employment of labour, not merely in the building and allied trades for the erection of the works, but in the employment of operatives to carry on the various industries for which the works are intended. The presence of skilled and fully employed operatives necessarily involves the usual provision of dwelling-houses and all the services and numerous trades which are bound up with the prosperity of the community. In this direction may be sought the real remedy for the unemployment which is so rife at the present time. Much of the effort and expenditure now directed towards measures of relief of the unemployed in methods necessarily temporary and palliative, but not forming any real remedy, would be dispensed with. Additional outlets for capital, increased demand for labour of all kinds and the production of manufactured goods, with the consequent distribution of money in the community, would imply increased prosperity and development of the city. The new Art School, the efficient and growing technical training given by the Heriot-Watt College, the well-equipped University, the other vast educational agencies and the skilled artisans in the workshops throughout the city, might be expected to furnish a constant supply of well-trained and highly skilled employés, adequate for the demands of a great development of industrial activity in all directions. All classes and interests within the city would benefit from such a development of industrial activity as is now desired, while leaving uninjured the existing agencies and resources of the city.

By the passing of the Patents and Designs Act, 1907, a new opportunity has been provided for attention being drawn to Edinburgh as an industrial and manufacturing centre. By that Act, which was passed on August 28, 1907, it was provided that after the month of August 1908 patents registered in the United Kingdom which have been in force for four years might be revoked if the patented article or process is manufactured or carried on exclusively or mainly outside the United Kingdom. The patentee requires to show that his process is "manufactured or carried on to an adequate extent in the United Kingdom" or give satisfactory reasons why it cannot be so. The effect of this provision is that foreign inventors—and how numerous these are on the Continent and in America is well known—will lose the benefit of their patents within the United Kingdom unless they establish works here and carry on the manufacture in an adequate degree. Hitherto they have had all the benefits of a patented process, and carried on their manufactures abroad for sale within the United Kingdom. It follows that there must be a very large number of such persons who will have to look out for suitable sites in this country. This therefore provides a new and probably extensive—no one can say how extensive—opportunity to approach such persons and press upon them the claims of Edinburgh as a site for their purposes. Of course, the same means which may be taken to inform these foreign inventors of the position of Edinburgh in this matter might result in bringing it before the notice of persons throughout Great Britain.

The Town Council, it is suggested, might take steps to procure definite and accurate information bearing upon the requisites of eligible sites for manufacturers, and showing how far these are to be found in Edinburgh; details as to the sites which are in the market available for the purpose, and the rates or prices at which these are to be had, and to disseminate such information in an accessible form throughout Great Britain and in foreign countries. The co-operation of the railway companies, the Leith Dock Commissioners, the coalowners in the neighbourhood and the owners of land may be invited. Accordingly, if the Town Council approve of taking action in this matter, it is suggested that they should remit to the committee, with power to confer with these parties, to obtain such information and present it in a convenient and accessible form, with appropriate maps or tables, and to take steps to circulate the same extensively in quarters which might be deemed suitable.

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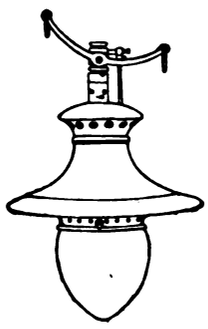
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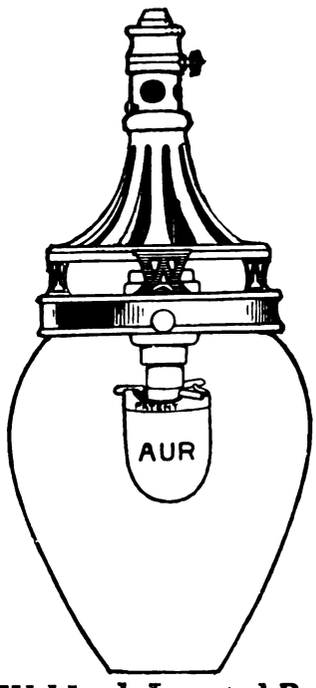
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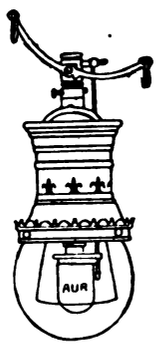
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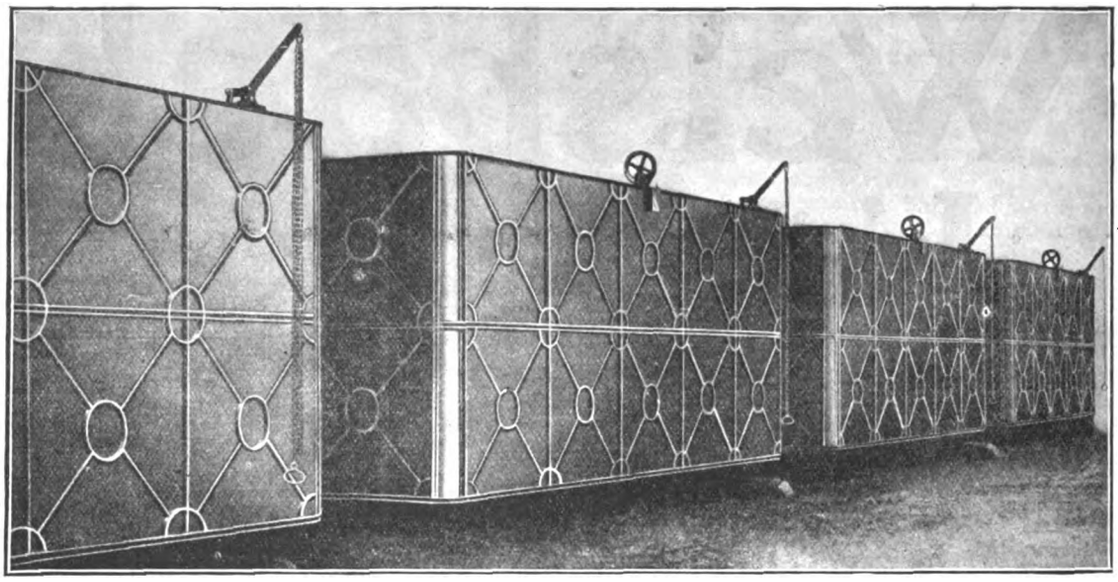
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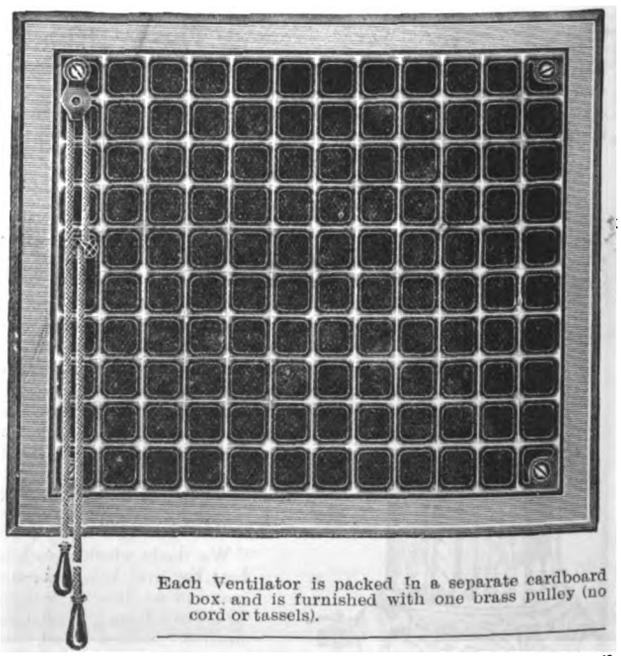
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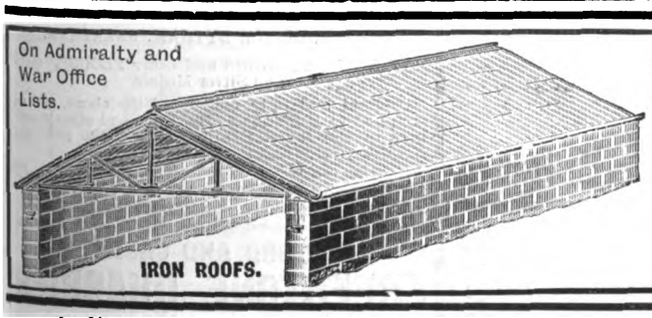
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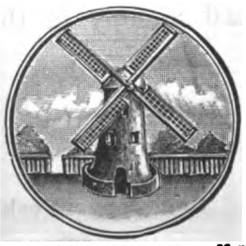
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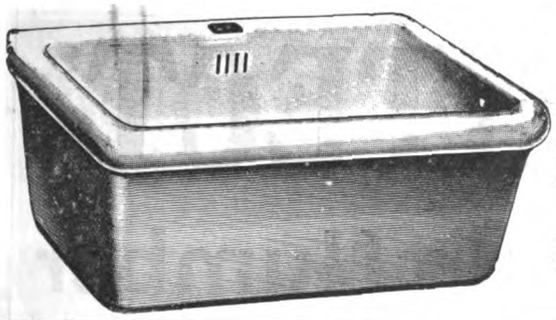
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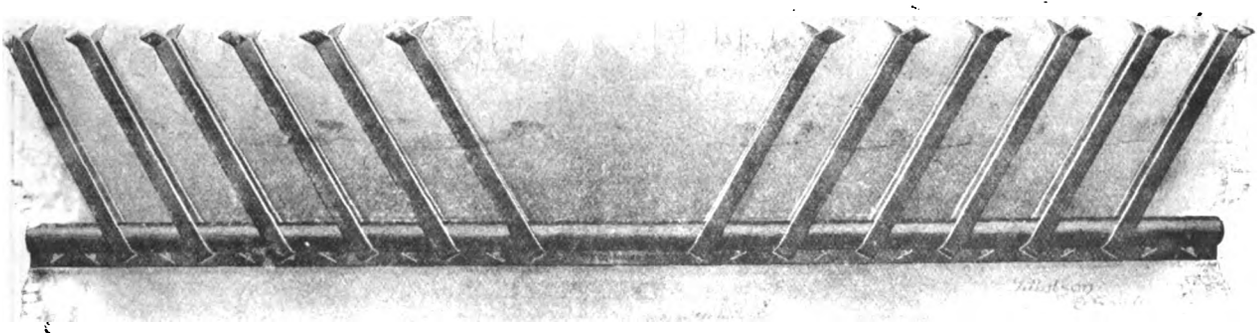
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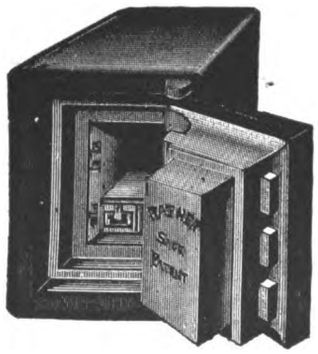
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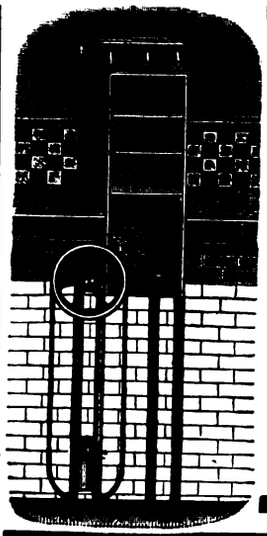


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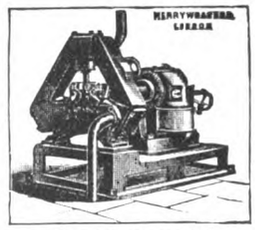
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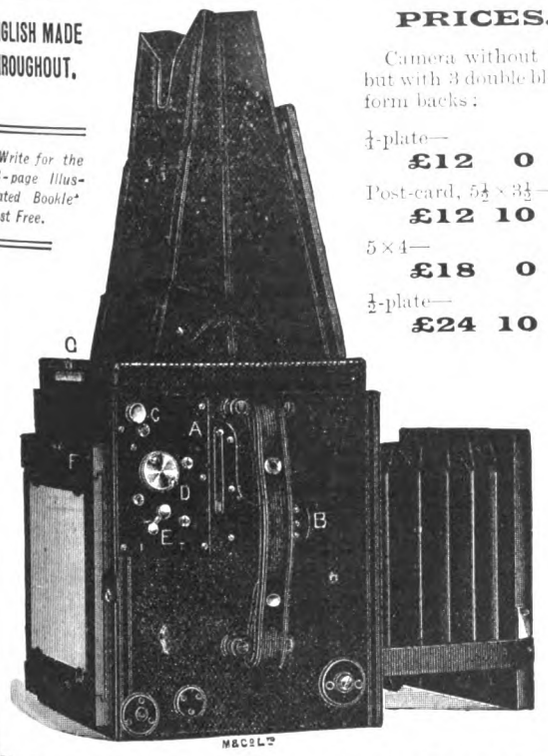
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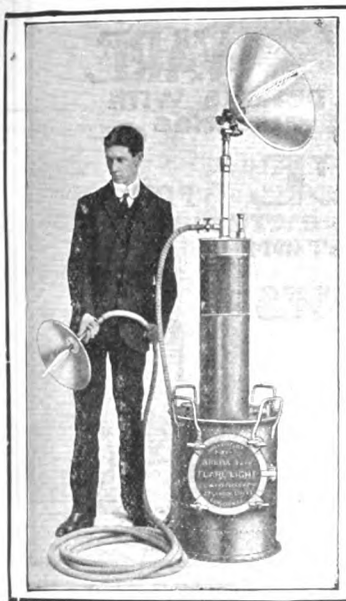
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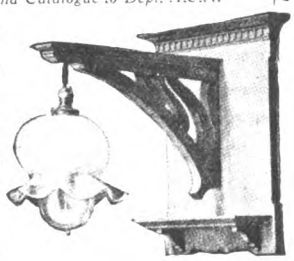
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EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

**** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITION OPEN.

WALES.—Feb. 20.—Plans are invited for a new chapel at Penclawdd to contain 800 sittings. The approximate cost of chapel, including heating and acetylene lighting apparatuses to be 3,000*l.* A premium of 5*l.* 5*s.* will be awarded the architect whose plan the committee may select. Mr. John Rees, secretary, Penlan, Penclawdd, S.O.

CONTRACTS OPEN.

ARMATHWAITE.—Feb. 8.—For erection of mixed school and master's house at Armathwaite, Cumberland. Deposit 1*l.* 1*s.* for full set of quantities, or 10*s.* 6*d.* for each separate trade. Mr. Geo. Dale Oliver, F.R.I.B.A., county architect, Carlisle.

BARDSEA.—Feb. 11.—For erection of police station at Bardsea, near Ulverston, Lancashire. Deposit 2*l.* Mr. Henry Littler, county architect, 16 Ribblesdale Place, Preston.

BELFAST.—Feb. 8.—For erection of building in Murray's Terrace and Athol Street, Belfast, consisting of three separate warehouses and laundry. Deposit 3*l.* 3*s.* Mr. James A. Hanna, C.E., architect, Ocean Buildings, Belfast.

BELFAST.—Feb. 20.—For erection of two semi-detached villas at Fruit Hill Park, Falls Road. Messrs. Young & Mackenzie, architects, Scottish Provident Buildings, Belfast.

BINGLEY.—Feb. 11.—For the various works required in erection of a detached residence in Glen Road, Eldwick. Mr. Wm. Rhodes Nunns, M.S.A., Market Street, Bingley. Yorks.

BINGLEY.—For alterations to Myrtle Grove House, all trades except slater. Mr. H. Bottomley, surveyor, Town Hall, Bingley, Yorks.

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BIRMINGHAM.—Feb. 16.—For erection of a Council school in Charles Arthur Street, Nechells, for the Birmingham education committee. Deposit 2*l.* The Architect's office at the Education Department, Edmund Street, Birmingham.

BRIDLINGTON.—Feb. 11.—For the different trades required in the erection of a dwelling-house in Cardigan Road. Mr. Joseph Shepherdson, architect, 8 Quay Road, Bridlington.

BRIGHTON.—Feb. 9.—For the erection and completion of boundary walls and entrance gates and the excavations for and the construction and completion of one covered service reservoir at North Lancing. Mr. Hugo Talbot, town clerk, Town Hall, Brighton.

BROUGHTON MOOR.—Feb. 13.—For erection of smallpox hospital, consisting of ward, pavilion, administration block, mortuary, &c. Mr. H. B. Williams, architect, Oxford Street, Workington.

BROWNROYD.—Feb. 8.—For the enlargement of St. William's schools, Bingley Street, Brownroyd, Yorks. Messrs. Ed. Simpson & Son, architects, 12 Cunliffe Terrace, Manningham.

BUDE.—Feb. 6.—For building block of Sunday-school buildings and caretaker's house adjoining Wesleyan church at Bude, North Cornwall. Mr. Ernest Wise, M.S.A., architect, Launceston.

BURY ST. EDMUNDS.—Feb. 22.—For converting the large room at the Town Hall into public offices, and certain other alterations. Deposit 2*l.* 2*s.* Mr. Walter D. Harding, A.M.I.C.E., borough surveyor, Town Hall, Bury St. Edmunds.

CHELTENHAM.—Feb. 9.—For re-decorating and repairing Wesley Church, St. George's Street. Mr. T. Malvern, architect, Winchcomb Street, Cheltenham.

CHESTER-LE-STREET.—Feb. 9.—For building the boundary walls of the playing field at the Secondary school. Mr. W. Rushworth, F.R.I.B.A., Shire Hall, Durham.

DARTMOUTH.—Feb. 15.—For erection of two houses. Mr. C. W. Veale, 2 Horsa Terrace, South Ford.

DISTINGTON.—Feb. 15.—For the various works required in erection of a pair of cottages at Distington, Cumberland. Messrs. W. G. Scott & Co., architects and surveyors, 2 Park Lane, Workington.

DUBLIN.—Feb. 8.—For restoration of ornamental plaster ceiling, cove and cornice of Council Chamber of City Hall, and for necessary repairs to plaster of walls of Council Chamber. City Architect, Municipal Buildings, Cork Hill, Dublin.

DUDLEY.—Feb. 12.—For erection of a male classification ward, and other extensions at the Workhouse. Deposit 1*l.* 1*s.* Mr. Gaius W. Coster, clerk, Union Offices, Dudley.

GLASGOW.—Feb. 13.—For the excavator, brick and mason, timber and other works required in construction of superstructure of machinery buildings, &c., at Shirehall. Deposit 5*l.* 5*s.* The Office of Public Works, City Chambers, 64 Cochrane Street, Glasgow.

HEATHFIELD.—Feb. 6.—For erection of class-room, offices, &c., at Maynards Green public elementary school, in the parish of Heathfield, East Sussex. Mr. F. J. Wood, county surveyor, County Hall, Lewes.

HISTON.—Feb. 12.—For erection of mortuary and shelter at isolation hospital at Histon, Chesterton, Cambs. Mr. John F. Symonds, clerk, 9 Bene't Street, Cambridge.

HOO ST. WERBURGH.—Feb. 8.—For the removal of a gallery at the Hoo St. Werburgh Council school, Kent. Mr. R. A. Arnold, correspondent, the Precinct, Rochester.

IRELAND.—Feb. 6.—For erection of national school for 520 children at the Convent of Mercy, Nenagh, co. Tipperary. Deposit 3*l.* Messrs. Moynan & Gill, architects, Courthouse, Nenagh, co. Tipperary.

IRELAND.—Feb. 13.—For additions to Drimcong, Moycullen, co. Galway. Mr. W. A. Scott, A.R.I.B.A., 45 Mountjoy Square, Dublin.

IRELAND.—Feb. 16.—For erection of Crown Post Office at Attey. Deposit 1*l.* Mr. H. Williams, secretary, Office of Public Works, Dublin.

KENDAL.—Feb. 6.—For re-fronting, converting into two shops and extension to rear of 17 and 19 Finkle Street. Mr. Stephen Shaw, F.R.I.B.A., architect, 45 Highgate, Kendal.

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LISCARD.—Feb. 10.—For erection of a masonic hall at Liscard, Cheshire. Mr. J. W. B. Harding, architect, 16 Cook Street, Liverpool.

LIVERPOOL.—Feb. 24.—For construction of additional buildings to the Mansfield Street open-air bath. Mr. W. R. Court, chief superintendent, Municipal Offices, Liverpool.

LONDON.—Feb. 12.—For enlargement of Western District Parcel Office and Mayfair Telephone Exchange (second contract). Deposit 1*l*. 1*s*. Mr. J. Wager, A.R.I.B.A., H.M. Office of Works, &c., Storey's Gate, S.W.

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MANCHESTER.—Feb. 8.—For the work required to be done in the taking down, removal, &c., of the roof of the B retort-house at the Rochdale Road station. Mr. C. Nickson, superintendent, Gas Department, Town Hall.

MANNINGHAM.—Feb. 10.—For works required in erection of store in Westfield Road, Manningham, Bradford. Mr. William Rycroft, architect, Bank Buildings, Manchester Road, Bradford.

MARGATE.—Feb. 11.—For construction of ladies' and gentlemen's lavatories in the face of the cliff on either side of the new iron staircase at the Oval. Separate tenders (*a*) for buildings and main drains and (*b*) for sanitary fittings, tiling and mosaic flooring. The Borough Surveyor, 13 Grosvenor Place, Margate.

NATLAND.—Feb. 10.—For the enlargement and alterations of the Natland school, Kendal. Mr. John Thompson, architect, 1 Finkle Street, Kendal.

NETTESWELL.—Feb. 26.—For widening a small bridge (known as Burnt Mill Bridge) over the mill stream in Netteswell, Essex. Mr. Percy J. Sheldon, M.I.C.E., chief surveyor, Chelmsford.

NEWTON.—Feb. 6.—For erection of two houses at Newton, Porthcawl. Mr. Thos. Henry, The Bungalows, Newton.

NORTH BRANCEPETH, &c. (DURHAM).—Feb. 16.—(1) For erection of schools at North Brancepeth (Langley Moor) and New Brancepeth (Sleetburn), and for alterations at Ouston, Wingate, Hawthorn, Rowlands Gill and West Stanley. Mr. NORTHENDEN.—Feb. 22.—For the whole of the works required in the erection of a Council school. Send names by February 10 to Mr. W. Taylor, clerk, Technical School, Sale. F. E. Coates, Shire Hall, Durham. (2) For erection of schools at Medomsley Edge. Mr. J. J. Eltringham, architect, Blackhill. (3) For enlargement of Langley Park infants' Council school. Mr. W. Rushworth, Shire Hall, Durham. Sole tenders are invited.

PROSPECT.—Feb. 12.—For erection of a dwelling house at Prospect. Mr. John Allinson, Prospect, near Allonby, Cumberland.

RAWMARSH (YORKS).—Feb. 9.—For the different buildings forming the isolation hospital, comprising caretaker's lodge, laundry, and discharge blocks, administrative buildings, scarlet and enteric fever blocks, together with all drainage, road making, fencing, &c., at Rosehill, Rawmarsh. Deposit 3*l*. 3*s*. Forward names and addresses to Mr. J. Platts, architect, High Street, Rotherham, Yorks.

ST. AUSTELL.—Feb. 11.—For the erection of a new gallery, vestry, entrances, and other alterations at the United Methodist church, Bugle. Messrs. F. C. Jury & Son, architects, Tregonissey Road, St. Austell.

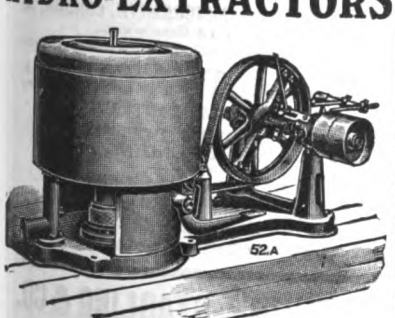
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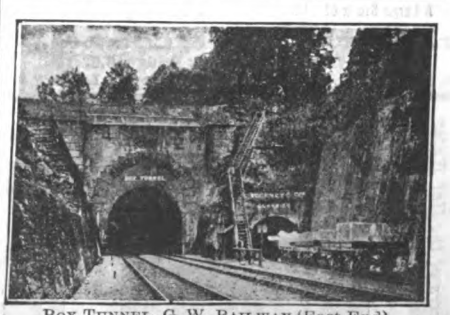
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public hall, Kennethmont. Mr. Thos. G. Archibald, architect, 27 Duke Street, Huntly.

SCOTLAND.—March 2.—For erection of spire for church, for Deacons' Court of United Free English Church, Stornoway. Mr. Neil Maccallum, clerk to Deacons' Court, Stornoway.

SILSDEN.—Feb. 11.—For erection of ten cottages. The Silsden Co-operative Society, Ltd. (Mr. R. P. Holdsworth, secretary), Yorks.

STOCKPORT.—Feb. 8.—For the labour and materials required in painting and decorating St. Petersgate baths; also for the works required in providing additional wash baths at St. Petersgate baths. Mr. John Atkinson, A.M.I.C.E., borough surveyor, Town Hall, Stockport.

TODMORDEN.—Feb. 22.—For the various trades in the erection of a secondary school on the Stile Estate. Apply after February 15 to Mr. Jesse Horsfall, F.R.I.B.A., 4 Chapel Walks, Manchester.

TRURO.—Feb. 8.—For erection of a concrete wall against the river at Malpas Road. Mr. Alfred J. Cornelius, architect, Truro.

WAKEFIELD.—Feb. 15.—For the rebuilding, in steel girders, concrete and masonry of the following bridges for the West Riding highways committee:—(1) Aldham bridge, on the Wombwell Lane main road, within the urban districts of Wombwell and Worsborough, over the River Dove, having a span of 16 feet 6 inches; (2) Rawfolds bridge, on the Leeds and Whitehall (branch) main road, within the urban districts of Liversedge and Gomersal, over Spen Beck, having a span of 22 feet. Deposit 1*l.* each. Mr. F. G. Carpenter, West Riding surveyor, County Hall, Wakefield.

WALES.—For erection of a Congregational church, Roath Park, Cardiff. Deposit 2*l.* 2*s.* Messrs. Habershon, Fawckner & Co., architects, 14 High Street, Cardiff, and 41 High Street, Newport.

WALES.—Feb. 6.—For erection of Baptist chapel and school at Holy Head. Deposit 3*l.* 3*s.* Mr. W. Beddoe Rees, architect, 3 Dumfries Place, Cardiff.

WALES.—Feb. 8.—For erection of twenty-four houses at Bryn, Port Talbot. Deposit 1*l.* 1*s.* Mr. J. Ivor Thomas, architect, 34 Penty la, Aberavon.

WALES.—Feb. 8.—For erection of large hall to accommodate about 1,000, a lesser hall, billiard room and institute, together with reading-rooms and library, at Ogmore Vale. Deposit 3*l.* 3*s.* Mr. W. Beddoe Rees, architect, 3 Dumfries Place, Cardiff.

WALES.—Feb. 10.—For the following works for the Glamorgan County Council, viz.:—(1) Erection of a school at Trebanos, near Pontardawe; (2) erection of a school at Fochriw. The County Council Offices, Westgate Street, Cardiff.

WALES.—Feb. 15.—For carrying out of alterations and renovations to Crane Street Baptist church, Pontypool. Mr. D. J. Lougher, architect, Bank Chambers, Pontypool.

WALES.—Feb. 16.—For erection and completion of three villas at Pencelli Estate, Treorchy. Mr. W. D. Morgan, M.S.A., architect, 194 Ystrad Road, Pentre.

WALTON-ON-THE-NAZE.—Feb. 18.—For the construction of a public convenience. Deposit 2*l.* 2*s.* Mr. H. W. Gladwell, F.I.S.E., surveyor, High Street, Walton-on-the-Naze.

WINCHCOMB (GLOS.).—Feb. 15.—For alterations and additions to the Drill Hall, Winchcomb (Glos.). Mr. Thomas Malvern, architect, 21 Winchcomb Street, Cheltenham.

WINDSOR.—Feb. 6.—For work at workhouse, Old Windsor. Mr. Philip Lovegrove, clerk, 3 Park Street, Windsor.

WINSFORD.—Feb. 20.—For erection of additional classrooms, lecture room, &c., at the United Methodist Free church school, High Street, Winsford, Cheshire. Messrs. Alfred Price & Son, architects and surveyors, Sandbach.

YORK.—Feb. 10.—For platform roofing at the south end, York passenger station, for the North-Eastern Railway. Mr. William Bell, the company's architect, at York.

MR. ALBERT E. PRIDMORE, 2 Broad Street Buildings, E.C., is the architect for the large workhouse and infirmary in course of erection for the City of London Union at Homerton. In our issue of January 8 the building was erroneously ascribed to Mr. Stuart Hill. Mr. A. E. Pridmore has acted for many years as architect to the City of London Board of Guardians.

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TENDERS.

BERKS.

For making alterations at premises, Sunningdale, Berks, for the London and Provincial Bank, Ltd. Mr. V. VAGNOLINI, architect and surveyor, 33 Stirling Road, Clapham Rise, S.W.

Wakelin	£755	0	0
Parsons	743	0	0
Charman	732	0	0
Groves	730	0	0
Fairhead & Son	728	0	0
RICE & SON (*accepted*)	713	0	0

BERKHAMPSTEAD.

For erecting new elementary school for fifty-six children at Whelpley Hill, Ashley Green, Bucks. Mr. C. H. RILEY, architect, Aylesbury.

Honour & Sons	£710	0	0
Parsons	698	0	0
Darlington	689	10	0
Webster & Cannon	668	0	0
Mead	639	0	0
RUST, Chesham (*accepted*)	639	0	0

EXMOUTH.

For constructing roads and sewers on the Halsdon Building Estate, Exeter Road. Mr. P. KERLEY, surveyor, Exmouth.

Pratt	£1,520	0	0
Titt	1,349	8	0
Harris	1,270	10	6
Cranson & Co.	1,256	0	0
Lacey & Co.	1,200	0	0
Lacey	1,150	0	0
W. H. Taylor	1,149	5	0
Grounds & Newton	1,085	0	0
Cooper & Son	1,062	13	10
Bate	1,019	4	4
A. W. TAYLOR, Withycombe (*accepted*)	991	18	0

CHIPPING NORTON.

For additions to house and stabling at Foxholes, Chipping Norton, Oxon. Messrs. CANCELLOR & HILL, architects, Winchester.

Burden	£5,252	0	0
Knowles & Sons	5,096	0	0
Benfield & Loxley	4,943	0	0
Cubitt & Co.	4,922	0	0
Howman & Co.	4,705	0	0
Booth & Son	4,583	10	0
G. & T. Cannon	4,544	0	0
GROVES & SONS, Milton (*accepted*)	4,495	0	0

DUDLEY.

For building alterations and extensions at the Union Offices, St. James's Road.

Smart	£312	0	0
Golding & Son	298	0	0
Kendrick	295	0	0
Pearcey & Leech	294	0	0
Webb	275	0	0
Deeley	270	0	0
Guest	268	0	0
Mark, Round & Sons	250	0	0
Willetts & Sons	239	0	0
JAKEMAN & ROUND, Dudley (*accepted*)	235	0	0

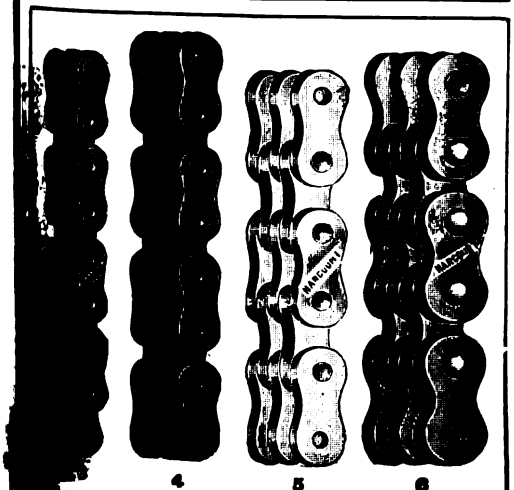
FISHPONDS.

For extension of All Saints Church. Messrs. LINGEN-BARKER, SON & ELLIS, architects, Bristol.

Cowlin & Son	£3,010	0	0
Browning	2,654	11	6
Perkins & Son	2,638	0	0
Preece	2,610	0	0
Adams & Jefferies	2,604	0	0
Forse & Son	2,596	0	0
Ridd & Sons	2,524	0	0
Gluyas	2,480	0	0
Marsh & Stone	2,460	0	0
Walters & Son	2,385	0	0
Love	2,375	0	0
Hayes & Son	2,371	0	0
Clark & Sons	2,255	0	0

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The Houses of Parliament, Brisbane.
The Holborn Viaduct Buildings, London.
The New Library, Pollokshields.
The Asylum, Letterkenny.
The Dykebar Asylum, Paisley.
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GREAT BERKHAMPSTEAD.

For the removal of the existing iron superstructure carrying the King's Road over the Grand Junction Canal and the erection of a steel bridge. Mr. E. H. ADEY, surveyor.

Somerval & Co.	£1,343 0 0
Rubery, Owen & Co.	1,270 0 0
Heenan & Froude	1,230 0 0
E. C. & J. Keay	1,222 10 0
Findley & Co.	1,110 0 0
Sands & Son	1,100 0 0
Drew, Bear, Perks & Co.	1,081 0 0
Tildesley & Co.	1,049 7 6
Rawlingsons & Co.	1,001 0 0
BRETTELL & Co., Worcester (*accepted*)	982 5 0

HEALING (LINCS).

For building an elementary school and teacher's house. Messrs. SCORER & GAMBLE, architects, Lincoln.

Mawer Bros. (*conditionally accepted*)	£2,348 15 0

INGOLDMELLS (LINCS).

For building an elementary school. Messrs. SCORER & GAMBLE, architects, Lincoln.

Elmes (*conditionally accepted*)	£1,273 0 0

KELVEDON.

For additions to Prested Hall, near Kelvedon, Essex. Mr. J. W. START, F.S.I., architect, Colchester.

Dobson & Son	£2,737 0 0
Thorn	2,735 0 0
Barrell	2,719 0 0
Kimberley	2,690 0 0
Roper	2,667 0 0
Ward	2,618 0 0
Theobald	2,601 0 0
Spencer, Santo & Co.	2,581 0 0
Mason & Son	2,476 0 0
Chambers	2,348 0 0
Deaves	2,317 0 0
Smith & Son	2,315 0 0
BEAUMONT, Colchester (*accepted*)	2,133 0 0

LITTLE COATES (LINCS).

For building an elementary school. Messrs. SCORER & GAMBLE, architects, Lincoln.

Smith	£8,671 0 0
Holmes & Richardson	8,627 0 0
Kirton	8,431 12 0
Thompson & Son	8,302 17 0
Marrons	8,179 0 0
Hickman	7,900 0 0
Elmes	7,866 9 0
Mauer Bros.	7,797 17 7
Longden	7,749 0 0
Parker & Son (*conditionally accepted*)	7,280 0 0

LIVERPOOL.

For erection of a car-shed in Speke Road, Garston.

Haugh & Pilling (*recommended*)	£3,319 0 0

LONDON.

For receiving-ward accommodation at the St. John's Road Workhouse, Upper Holloway, N. Mr. W. LOCKWOOD, architect, 12 Sherwood Street, W.

Stapleton & Sons	£3,470 0 0
Warburton & Son	3,020 0 0
Newell & Lusby	2,977 19 3
Spencer, Santo & Co.	2,970 0 0
Lawrence & Son	2,849 0 0
Kirk & Randall	2,768 0 0
Stevens & Sons	2,706 0 0
Johnson & Co.	2,695 0 0
Dearing & Co.	2,683 0 0
Hickman	2,650 4 3
Sprosson & Babb	2,649 10 3
Calnan & Son	2,637 0 0
Deacon & Son	2,598 0 0
Mallock Bros.	2,577 0 0
Hyde & Co.	2,575 0 0
A. & R. Lowe & Co.	2,519 0 0
Webster & Son	2,499 0 0
F. & G. Foster	2,488 0 0
Roberts & Co.	2,479 0 0
McLAUGHLIN & HARVEY, 13 Brecknock Road, N.W. (*accepted*)	2,291 6 3

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LONDON—*continued.*

For the manufacture, supply and delivery of 155,000 stoneware cable ducts required in connection with the electrification of certain further sections of the L.C.C. tramways.

National Fireproofing Co.	£2,967 10 0
McNair & Co.	2,925 10 5
Donington Sanitary Pipe and Firebrick Co.	2,037 10 0
Wragg & Sons	1,882 10 0
Oakes & Co.	1,824 7 6
Ensor & Co.	1,785 12 6
Sutton & Co.	1,758 10 0
Skey & Co.	1,727 10 0
Doulton & Co.	1,723 12 6
Robinson & Dowler	1,688 15 0
Stanley Bros. (*recommended*) *	1,688 15 0
Mansfield	1,688 2 1
Tugby & Co.	1,688 2 1
Ashworth & Co. (50,000)	900 0 0
Leeds Fireclay Co. (50,000) *	850 0 0
Estimate of the chief officer of tramways	1,930 0 0

* Less 2½ per cent. for cash monthly.

For the manufacture, supply and delivery of four electrically operated car-traversers for the central car-repair depôt and Norwood car-shed, for the L.C.C.

Appleby's, Ltd.	£2,713 0 0
Booth & Bros.	2,590 0 0
Heenan & Froude	2,381 10 0
Hurst, Nelson & Co.	2,330 0 0
Mountain & Gibson (*recommended*)	1,907 0 0
Estimate of the chief officer of tramways	2,450 0 0

For making alterations at 71 High Street, North Finchley, N., for the London and Provincial Bank, Ltd. Mr. V. VAGNOLINI, architect and surveyor, 33 Stirling Road, Clapham Rise, S.W.

Groves	£2,185 0 0
Rice & Son	2,098 0 0
Parsons	2,066 0 0
FAIRHEAD & SON (*accepted*)	2,048 0 0

LONDON—*continued.*

For extension and alteration of the Kilburn Grammar School, for the Middlesex County Council. Mr. H. G. CROTHALL, architect to the Middlesex education committee.

Holloway Bros.	£6,300 0 0
Minter	6,199 0 0
Dove Bros.	6,198 0 0
Dorey & Co.	6,169 0 0
Porter	6,146 0 0
Ford & Walton	6,135 0 0
Neal	5,995 0 0
Lawrance & Son	5,963 0 0
Holliday & Greenwood	5,898 0 0
F. & H. Higgs	5,879 0 0
Treasure & Son	5,869 0 0
Knight & Son	5,771 0 0
Mattock Bros.	5,739 0 0
Fairhead & Son	5,698 0 0
Lawrence & Son (*recommended*)	5,644 0 0

For the laying of stoneware ducts, repaving, &c., in connection with the electrification of certain further sections of the L.C.C. tramways.

British Insulated and Helsby Cables	£16,654 9 3
Mowlem & Co.	16,352 0 0
Ford	16,023 0 0
Ewart	15,260 18 10
Muirhead & Co.	15,204 8 3
Dick, Kerr & Co.	13,937 10 8
Westminster Construction Co.	13,816 1 11
Reid Bros. (*recommended*)	13,356 7 8
Estimate of the chief officer of tramways	12,120 0 0

For electric lighting at Caledonian Road fire station.

Leonard & Co.	£250 0 0
Comyn Ching & Co.	171 0 0
Tredegar & Co.	165 10 0
Tilley Bros.	142 7 0
Taylor & Co.	135 11 11
Lund Bros. & Co. (*recommended*)	126 6 0
Engineer's estimate	185 0 0

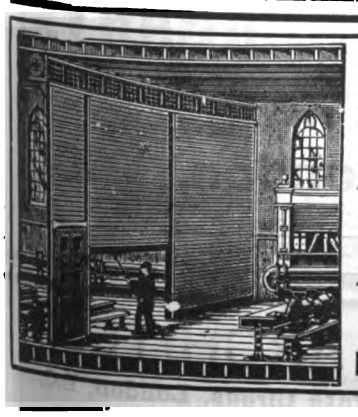
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LONDON—*continued.*

For repairs and alterations to the stables of the Dulwich fire station.

F. & H. F. Higgs	£255	0	0
Mitchell & Son	254	0	0
Marchant & Hirst	253	0	0
J. & C. Bowyer	233	0	0
JOHNSON & Co., Wandsworth Common (*accepted*)	210	0	0

For laying damp course to a coachman's quarters, separate entrance, &c., Wandsworth fire station.

L. H. & R. Roberts	£179	0	0
Marchant & Hirst	151	0	0
F. & F. J. Wood	134	0	0
Higgs & Hill (*recommended*)	124	0	0
Architect's estimate	140	0	0

For the making-up and paving of Wimbledon Road, Balham, and Springfield. Mr. J. P. DODD, borough engineer, Wandsworth, S.W.

Wall	£975	0	0
Harber & Co.	819	10	5
Harringdon & Co.	800	0	0
Potter & Co.	769	0	0
Etheridge	723	0	0
Mowlem & Co.	696	0	0
Lane & Co.	685	0	0
Dykes	680	0	0
Adams (*recommended*)	672	0	0
Borough engineer's estimate	678	12	1

OSWESTRY.

For erecting a Sunday-school, for the English Baptist church. Mr. W. J. OLIVER, M.S.A., architect, Wolverhampton and Oswestry.

Bickerton	£910	0	0
Higgins	855	0	0
Thomas	845	0	0
Jones & Evans	830	0	0
Amended tenders.			
Bickerton	688	0	0
Thomas	625	0	0
JONES & EVANS (*accepted*)	620	0	0

PADSTOW.

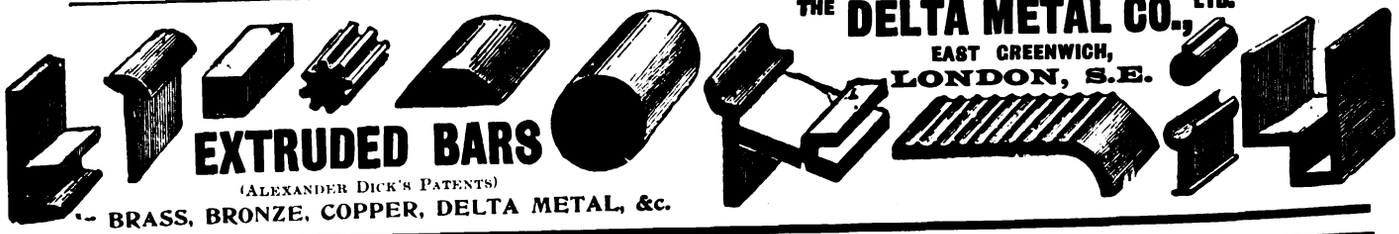
For the construction of a road 350 feet long and 35 feet wide. Mr. T. H. ANDREW, engineer, Market Hill, St. Austell.

Williams	£980	0	0
Lester	936	0	0
Shaddock	890	0	0
Williams & Son	850	0	0
Budge & Son	615	0	0
NANKIVELL & SONS, Bodmin (*accepted*)	537	7	6

ST. MARY CRAY.

For the erection of St. Mary Cray Council school, for the Kent education committee. Mr. W. H. ROBINSON, architect.

Taylor	£4,677	0	0
Jarvis & Sons	3,574	0	0
Douglass	3,506	0	0
Friday & Ling	3,410	0	0
Jones & Andrews	3,395	0	0
Nightingale	3,336	0	0
Downs	3,333	0	0
Browning	3,280	0	0
Tong	3,276	0	0
Blay	3,258	0	0
Knight	3,257	0	0
Ingleton	3,247	0	0
Lonsdale	3,199	0	0
Lowe & Co.	3,187	0	0
Wilford	3,160	0	0
Parren & Son	3,150	0	0
Somerford & Son	3,118	0	0
Cook & Sons	3,110	0	0
Wallis & Sons	3,090	0	0
Davison	3,050	0	0
Webster & Son	3,049	0	0
Crossley & Son	3,038	0	0
Bishop & Sons	3,010	0	0
Smith & Co.	2,999	0	0
F. & G. Foster	2,982	0	0
Podger & Sons	2,938	0	0
Jacobs	2,926	0	0
Skinner (*recommended*)	2,922	0	0
Hyde & Co. (*withdrawn*)	2,700	0	0



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ROMFORD (ESSEX).

For the making-up of the following streets:—Craigdale Road (part), Douglas Road (part), Osborne Road (part), Goole Road, Walden Road (part). Mr. W. J. GRANT, surveyor, Romford.

Grounds & Newton	£1,881	8	3
Griffiths & Co.	1,799	8	1
Iles	1,668	9	0
Free & Sons	1,647	5	0
Wilson, Border & Co.	1,591	17	3
Trueman	1,567	13	0
Jackson	1,535	17	9
GLENNY, Romford (*accepted*)	1,282	7	6
Surveyor's estimate	1,595	0	0

STANTON-UNDER-BARDON (LEICS.).

For erection of an elementary school to accommodate 150 children. Messrs. HARDING & TOPOTT, architects, Hotel Street, Leicester.

Shipman	£3,150	0	0
Wileman	2,998	15	0
Sharp	2,995	0	0
Chapman	2,945	0	0
Orm	2,907	0	0
Faulkes	2,885	0	0
Toone & Warrington	2,849	10	0
Fox	2,849	0	0
Moss	2,790	7	0
Marston & Son	2,744	0	0
Haddon	2,680	0	0
Harding	2,650	0	0
Dobson	2,645	0	0
Ball	2,633	0	0
Sleath (*conditionally accepted*)	2,575	0	0

SOUTHGATE.

For the erection of a new secondary school for the Middlesex County Council. Mr. H. G. CROTHALL, architect to the Middlesex education committee.

Dove Bros.	£17,320	0	0
Lawrance & Son	16,574	0	0
Holloway Bros.	16,000	0	0

SOUTHGATE—*continued.*

Minter	15,675	0	0
Holliday & Greenwood	15,555	0	0
Neal	15,545	0	0
F. & H. Higgs	15,139	0	0
Porter	14,398	0	0
Dorey & Co.	14,347	0	0
Treasure & Son	14,025	0	0
Fairhead & Son	13,959	0	0
Knight & Son	13,748	0	0
Lawrence & Son	13,670	0	0
Mattock Bros. (*recommended*)	13,493	0	0

TWICKENHAM.

For street works for the District Council.

Warwick Road.

Mears	£640	0	0
Free & Sons	613	7	6
Kavanagh & Co.	558	9	2
Catley	549	14	7
Shepherd & Sons	543	8	6
Bloomfield	534	0	0
Wimpey & Co.	530	0	0
Jarman	511	0	0
Mowlem & Co.	505	0	0
A. & B. Hanson	494	0	0
Rhodes	474	13	7

Norcutt Road.

Bloomfield	515	10	0
Free & Sons	478	5	0
Mears	474	0	0
Catley	464	0	0
Wimpey & Co.	456	0	0
Kavanagh	445	12	4
Mowlem & Co.	433	0	0
Jarman	426	0	0
A. & B. Hanson	425	0	0
Shepherd & Sons	417	9	4
Rhodes	399	6	7

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TIPTREE (ESSEX).

For erection of school at Tiptree, for the Lexden and Winstree district sub-committee. Mr. J. W. START, F.S.I., architect, High Street, Colchester.

Johnson & Co.	£2,736 0 0
Chambers	2,635 0 0
Arnold	2,589 19 0
Ward	2,555 5 0
Saunders	2,496 0 0
Parkington & Son	2,470 0 0
Pavitt & Son	2,450 0 0
Gurton	2,421 0 0
Spalding, Sons & Co.	2,418 0 0
Spencer, Santo & Co.	2,358 0 0
Smith & Sons	2,355 0 0
Grimwood & Son	2,295 0 0
Theobald	2,197 0 0
Beaumont	2,184 0 0
B. B. & M. Barrell	2,184 0 0
Everett & Son	2,130 0 0
Bennett	2,100 0 0
Thorn	2,057 0 0
Deaves	2,021 0 0

WALES.

For erection of twenty-two houses at Kenry Street, Ynyswen, Treorchy, Rhondda Valley. Mr. W. D. MORGAN, M.S.A., Pentre.

Kirkhouse & Ford	£5,170 0 0
Rees	4,730 0 0
Dwyer	4,675 0 0
Williams	4,675 0 0
Dutfield	4,543 0 0
Hallett	4,500 0 0
ROWLANDS, Treherbert (*accepted*)	4,433 0 0

For construction of works of water supply in the parish of Llangynwyd Middle, for the Penybont Rural District Council. Mr. WATKIN J. DAVIES, surveyor, Felin Fach, Tondu.

O'Brien	£2,418 3 6
Powell	2,324 17 10

WALES—*continued.*

Murray	2,276 9 6
Sutherland	2,262 6 0
Barnes & Chaplin	2,244 0 0
Rankin	2,226 10 6
Osmund	2,162 9 8
Scott	2,129 18 10
Morgan	2,121 18 5
Collins & Co.	2,088 0 0
Nunn & Co.	2,069 4 0
Sayers	2,065 6 0
Brown	2,052 11 1
Jones	2,012 14 7
W. & J. R. WATSON, Edinburgh (*accepted*)	1,913 2 1

WALLINGTON.

For the erection of a pair of cottages in Grosvenor Avenue. Mr. DOUGLAS WEIGHTMAN, architect, Croydon.

Crossley & Sons	£855 0 0
Tugwell	725 0 0
Howe & White	697 10 0
Cheshire	697 0 0
Everitt	675 0 0
Roberts & Tilbury	649 0 0
SANDERS (*accepted*)	630 0 0

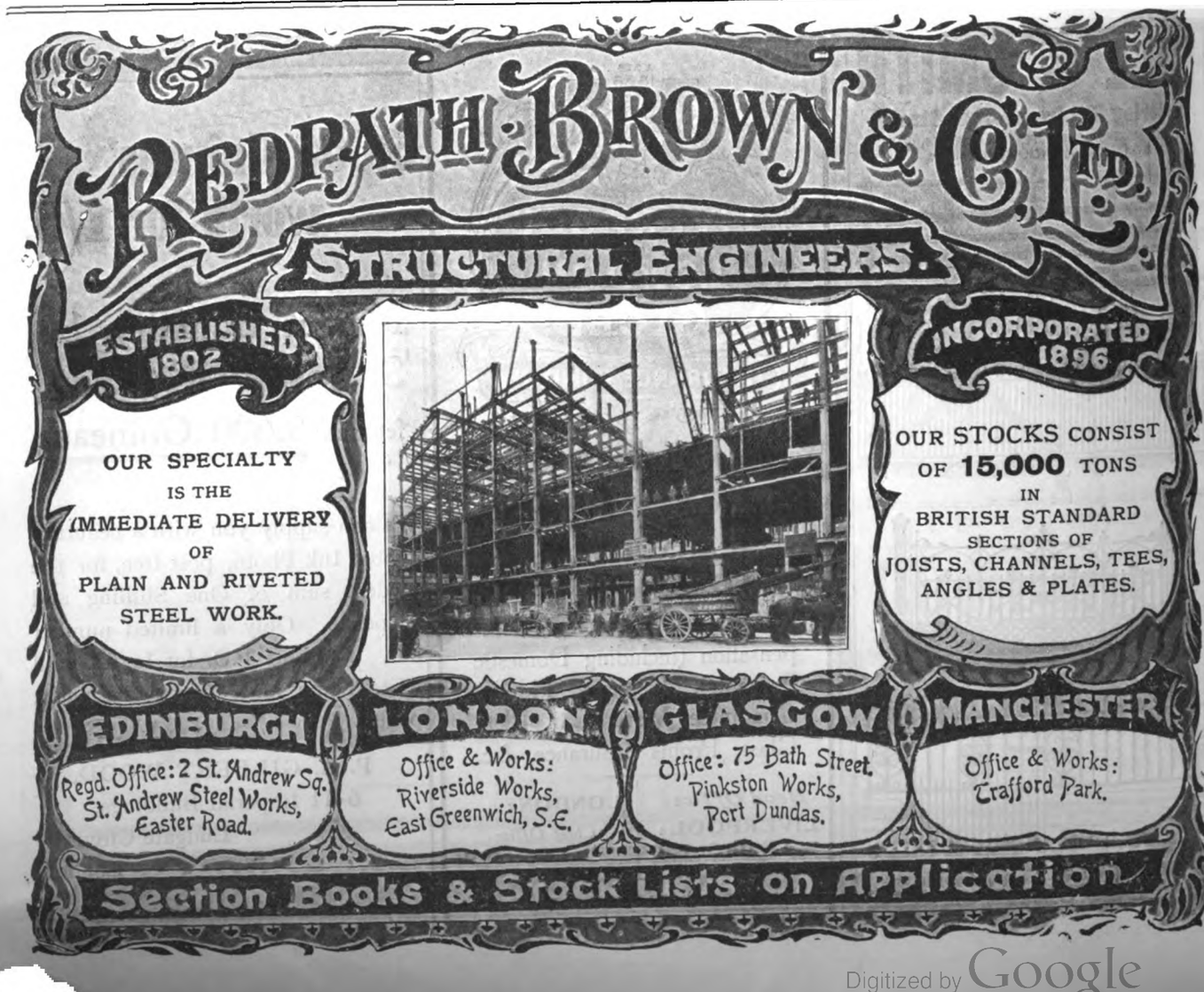
WANLIP (LEICS.).

For the construction of 314 yards of 9-inch pipe sewer, together with manholes and sewage-disposal works. Mr. H. HERROD, surveyor, Barrow-on-Soar, Loughborough.

Freer	£307 0 0
Hawley & Son	288 14 6
Walker	275 6 0
Moore & Son	275 0 0
Johnson & Sons	238 0 0
Sleath	233 0 0
Ball	230 15 0
PALMER, Leicester (*accepted*)	226 9 11

WARLEY (OLDBURY).

For erection of proposed new schools, Abbey Road, Warley, for the Oldbury Urban District education committee. JACKSON, Birmingham (*accepted*) £9,485 0 0



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UNIVERSITY OF CALIFORNIA

ILLUSTRATIONS.

SMALL COUNTRY HOUSES.—CHAMPION HILL—BAGSHOT—ROSEHILL, HENLEY—EASTCOTE LODGE, PINNER.

A COTTAGE, HARPENDEN—BATSFORD, GLOUCESTER—A HOUSE ON STREATHAM COMMON—HOUSE AT ASCOT—WOOLPITS, SURREY.

COUNTRY HOUSE, DORSET—POLES, HERTFORDSHIRE.

THE HALL AT SHIPLAKE COURT.

ROUSDON, DEVON.—SOUTH FRONT—VIEW FROM NORTH-EAST.

WATFORD.

For manual instruction centre. Mr. URBAN A. SMITH, county surveyor, architect, Hatfield.

Hale & Co.	£827	0	0
Hickman	808	13	8
Hunt & Son	793	16	4
F. & G. Foster	788	0	0
Eames	758	0	0
Ensor	758	0	0
Jaggard	755	19	8
Clark Bros.	747	6	0
Darvill	742	0	0
Haycock & Son	740	0	0
Brightman & Son	737	15	0
A. E. & C. Saw	727	17	11
W. & D. Wilkins	723	0	0
Bracey & Clarke	705	6	6
Clifford & Gough	687	0	0

WORTHING.

For the erection of the new school on the Ham Road site at Broadwater. Mr. F. ROBERTS, borough surveyor.

Potter	£6,248	0	0
Hyde & Co.	6,026	0	0
Peskett & Co.	6,015	0	0
Merry & Frost	5,725	0	0
Longley & Co.	5,637	0	0
Cook & Sons	5,595	0	0
Crane	5,532	2	2
Moat	5,490	0	0
SANDELL BROS. & BALL, Worthing (*accepted*)	5,338	0	0

TRADE NOTES.

MACKAY'S patent direct-acting ventilators, supplied by Messrs. Cousland & Mackay, the sole makers, have been used for the ventilation of the central senior school, Gourock, now being erected from the plans of Mr. Alex. Cullen, F.R.I.B.A., I.A., of Hamilton and Motherwell, N.B.

UNDER the direction of Mr. J. E. Swindlehurst, M.I.C.E., Coventry, the "Boyle" system of natural ventilation, embracing the latest patent air-pump ventilators, has been applied to Spons Street schools, Coventry.

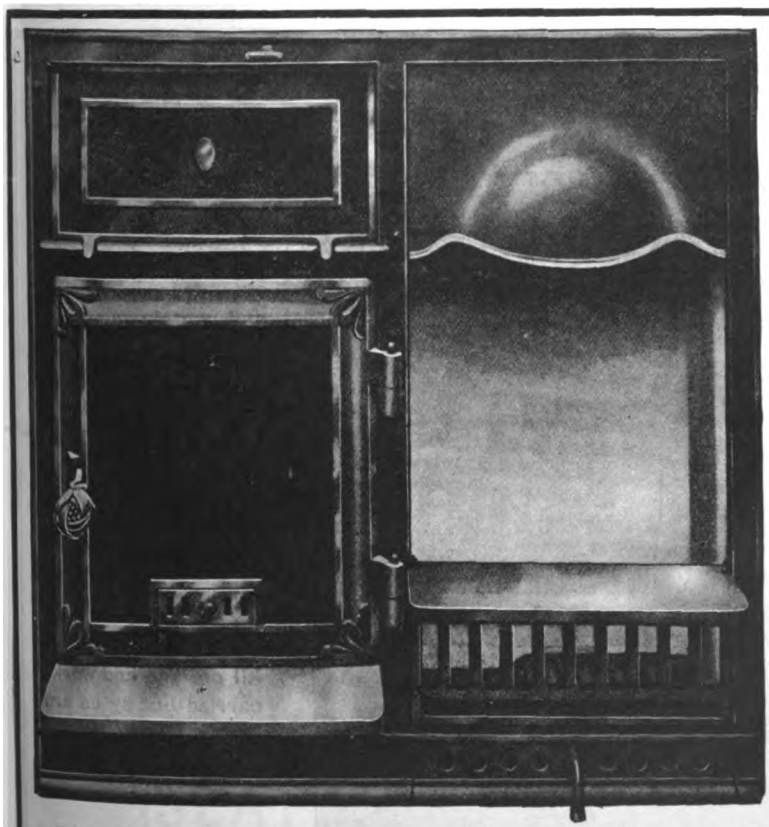
THE new Council schools, Hadfield, are being supplied with Shorland's warm-air ventilating patent Manchester grates, by Messrs. E. H. Shorland & Brother, of Manchester.

To meet the demands of their increasing business, the New Eccles Rubber Company are again extending their premises in Monton Road, Eccles, their architect being Mr. W. Canning, of Manchester. The reinforced concrete floors, with granitic finish, are being carried out by Messrs. Homan & Rodgers, Manchester.

THE two new children's wards at the Portsmouth Royal Hospital are to be brightened by the introduction of mural tiles pictures, under the superintendence of Mr. C. W. Ball, hon. architect. Wall spaces are provided for twenty-four, and of this number nine have been promised, at a cost of 25*l.* each, one of these being the gift of Messrs. Doulton & Co., Ltd., who are making this series of panels.

FOR the last few months alterations and improvements have been in progress at Dublin Castle, under the superintendence of the Board of Works. St. Patrick's Hall has been fitted with radiators for heating purposes, and hot-water pipes have been introduced into the other State apartments, which will henceforth be kept at an equable temperature. The supply is derived from two capacious Tangyes boilers, supplied by the firm of Messrs. Maguire & Gatchell, who carried out the heating and plumbing contract. An extensive addition has been made to the electric light installation.

MESSRS. T. T. GETHING & Co., quarry owners and quarry agents, Warwick Road, Kensington, W., have made arrangements with Messrs. Lamigeon & Co., Ltd., for the



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Combines in itself in a **practical** and **efficient** manner the essential features of a Cooking Range and a Sitting Room Grate.

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working of the business in this country of the famous Caen stone quarries. These quarries were originally worked by James et Cie. They are at present worked by Mr. J. B. Fouquet. The quarries are being extensively developed, and blocks of any size and any length can be obtained. Messrs. T. T. Gething & Co. hold a very large stock at Caen ready for shipment to any port, whilst they will also be keeping a large stock at their London depôt, Shepherd's Bush. The firm are ready to compete in London and at all seaports with any freestone in the market.

MESSRS. JOHN PICKLES & SON, Hebden Bridge, Yorkshire, have just completed a full equipment for a large new sawmill and joinery works in Northern India, consisting of log-frames, rack sawbenches, &c., large four-cutter planing and moulding machines, besides joinery machinery of latest types for sawing, planing, trimming, &c., with necessary grinding and sharpening tools, besides electric log-hauling tackle. This machinery is electrically driven by alternating-current electric motors. Some of the machines are direct driven with separate motors; this, besides avoiding large quantities of shafting and belting, allows of their disposition in the sawmill to ensure the greatest advantage in consecutive operation with least handling of material. This complete plant will be on view in the makers' works at Hebden Bridge for a short time. We may add that Messrs. John Pickles & Son make a specialty of designing and equipping such sawmill plants throughout, and have been responsible for the largest mills and factories in many countries.

THE Carron Company, ironfounders, coalmasters, ship owners, &c., of Carron, Stirlingshire, has now reached the 150th anniversary of its foundation. Since 1759 it has enjoyed an unbroken and continued business career. Practically the pioneers of the iron industry in Scotland, the Carron Company has well earned and deservedly holds a world-wide reputation for the excellence of its manufactures of every description of cast-iron goods, such as ranges, grates, stoves, cooking apparatus, baths and lavatories, railings, stable fittings, gas appliances, &c., suitable alike for the mansion or cottage homes of this country or the camps and bungalows of other climes. Many awards have been made to the Carron Company during the past sixty years, and at the Franco-British Exhibition in 1908 a grand prix was awarded the company for excellence in design and workmanship—a proof (if proof were needed) that after a century and a half of existence the manufactures of this old corporation still maintain their high level of excellence.

BUILDING AND BUILDERS.

A NEW theatre of varieties is to be erected at Belfast by a Scottish syndicate.

THE school management committee of the Edinburgh school are considering a proposal to erect three schools to accommodate supplementary classes.

MR. FRANK N. COWLIN has been re-elected president of the Bristol Master Builders' Association, with Mr. F. Chown as vice-president. The annual banquet will be held in March.

MR. W. H. PRESCOTT, M.Inst.C.E., M.Inst.M.E., barrister-at-law and chief engineer at Tottenham, has succeeded Professor Henry Adams as president of the Institute of Sanitary Engineers.

AT a sitting of Glasgow Dean of Guild Court Archbishop Maguire was granted a lining for the erection of a Roman Catholic church in Old Dalmarnock Road and Savoy Street, Bridgeton. The estimated cost of the church is 10,800*l.*

THE Teesside Federation of Master House Painters held their annual meeting at Middlesborough last week. This year prizes to the value of 25*l.* were given to apprentices in eleven competitions.

MESSRS. MILTON, BODE & Co. have acquired a large site in City Road, Chester, at present covered by the coach-building premises of Mr. George Barnes, upon which to erect a music-hall. Messrs. Lockwood & Sons, architects, Chester, have been instructed to prepare plans.

MESSRS. T. C. MANN & SONS are pushing forward with preparations for the rebuilding of their factory at Cogenhoe, destroyed by fire on the night of January 6. The drawing up of the plans for the new building has been entrusted to Messrs. Brown & Mayor, of Northampton.

EIGHTEEN of the county boroughs of Lancashire have replied to the invitation of the county education committee to co-operate in the scheme to build a training college for

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Specialist Engineers and Contractors in Reinforced Concrete.

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References to completed structures given.

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Glasgow: 68 Bath Street.

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150 women teachers and to send delegates to a conference to discuss the matter. The college is estimated to cost 42,000*l.*, and the Exchequer will find three-quarters of the money.

THE subscribers to the Royal Hospital for Sick Children, Glasgow, last Friday approved of a scheme for the erection of a new hospital on a site of 10 acres purchased at Yorkhill. An appeal has been made for 100,000*l.* It is proposed to commence with buildings for 200 cots. Mr. J. J. Burnet is architect and Mr. A. B. Watson measurer.

MESSRS. NEIL M'LEOD & SONS, Edinburgh, have received the contract for work in connection with Troon waterworks. The work embraces the raising of the level of Loch Braden and a conduit from Loch Braden to Grimmet. The work, which will provide employment for a large number of men, will be started at once.

THE annual meeting of the Master Masons' Association of Glasgow and neighbourhood was held in the secretary's chambers, 175 St. Vincent Street, Glasgow, Mr. George Barlas, the president, in the chair. The meeting elected the following office-bearers for the current year:—President, Councillor William M'Neill; vice-president, Mr. Malcolm Stewart; treasurer, Mr. Robert Gilchrist.

THE Brynmawr District Council have decided to apply to the Local Government Board for sanction to borrow 3,000*l.* for the purpose of extending the western sewerage scheme. Mr. Baldwin Latham estimated the cost of making the connection at 7,500*l.* The Duke of Beaufort will contribute 5,000*l.* towards that sum, leaving 2,500*l.* to be found by the Council, who will apply for 500*l.* extra for contingencies.

THE plans of the new schools to be erected at Whitehaven have been modified by Mr. G. D. Oliver, architect. The total estimate now for the mixed school, to provide for 512 scholars, is 5,070*l.*, instead of 5,385*l.* The estimate of the infant school remains at 2,069*l.* The total original estimate of the schools has been reduced from 9,315*l.* to 9,180*l.* The education committee have resolved that the plans and estimate be sent to the Town Council.

IT is expected soon to begin the building of the new church of St. John Baptist, in Byfleet, Surrey. When completed the church will hold over 600 people. It is proposed to build the nave and transepts first at a cost of about 6,000*l.*, and the chancel and spire in the future at a cost of another 4,000*l.* The materials are to be flint with dressed freestone externally; red-tiled roof and oak-shingled spire; inside walls and dressing of freestone.

IN compliance with the requirements of Parliament estimates have been deposited by the North-Eastern Railway Company showing the expenditure which will have to be incurred in the event of sanction being given to all the new lines and new works sought to be constructed under their Bill for next Session. The total is put down at 400,417*l.*, of which 35,020*l.* will be spent on new lines in Northumberland; 212,000*l.* on a railway and staiths at West Dunston, Durham; 52,263*l.* on new lines in Hull; 13,407*l.* on a widening of the Hull and Doncaster Railway; 82,789*l.* on a jetty at Salt End, Hull; and the balance of 4,938*l.* upon five new roads. To meet this expenditure it is proposed to take power to raise 450,000*l.* additional preference capital.

THE Incorporated Institute of British Decorators held their annual meeting in the Royal Hotel, Edinburgh, on Saturday. The annual report showed that the membership of the Scottish branch was sixty-three, the same as last year. Two new Fellows and one Associate had been enrolled, and two Fellows had resigned and one had died. The committee approved of the establishment of a capital fund of 150*l.* by the central executive, and remitted 27*l.* 10*s.* as the first contribution of the branch. The committee also decided to send 15*l.* in the years 1909 and 1910, in each of which years it is proposed to add 100*l.* to the capital fund. The accounts showed a credit balance of 34*l.* Office-bearers were reappointed as follows:—President, Colonel Bennett, Glasgow; vice-president, Mr. James Clark; secretary and treasurer, Mr. George J. Cameron, Glasgow.

THE annual general meeting and conference in connection with the Association of Master Painters in Scotland was held in the Royal Hotel, Edinburgh, on January 21. Between seventy and eighty members were present, and the chair was occupied by Mr. William Mackay, Dundee. The annual report of the general committee stated that there were 207 members, which figure was almost the same as last year. Seven local associations are affiliated with the National Association, viz.:—Aberdeen, Ayr, Dundee, Edinburgh, Glasgow, Girvan, and Hamilton. In addition to the

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DEAR SIRS,—The "Sine Qua Non" Range you made for us is a great success. It cooks perfectly and we get any quantity of hot water for bath, lavatory and sink, and the consumption of coal is less than half compared with the old Range.
The use of the slow combustion arrangement not only effects this saving but is a great comfort to the cook in protecting her from the heat of the fire, and in keeping the kitchen cool.
Yours faithfully, (Signed) J. T. GREEN.
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members of the affiliated local associations there are thirty individual members. So far as the Association was concerned, there had been no serious conflicts between masters and men. Although there was a balance at the credit of the general funds of the Association of 34*l*. 16*s*. 8*d*., the debit balance in connection with the apprentices' competition and travelling scholarship fund now amounts to 113*l*. 13*s*. 8*d*. Mr. George Carfrae, Edinburgh, was elected president.

VARIETIES.

THE municipal gasworks at Dunbar are to be extended at a cost of 2,500*l*.

PART of the roof of Chesterfield parish church has been declared unsafe, and is to be immediately repaired. The galleries around the church were closed to the public on Sunday.

THE works and improvements committee, Inverness, have been instructed to consider as to the advisability of erecting entirely new burgh police buildings on some other site than the present buildings.

THE Great Central Railway Company have deposited estimates showing that the works mentioned in their Bill for next session will cost 99,868*l*. The money will be provided out of the 750,000*l*. additional 3¾ per cent. second debenture stock which it is proposed to raise.

THE library committee of the Bolton Town Council have resolved that plans be invited for buildings at Astley Bridge, Halliwell, and Great Lever from architects of the borough who have been in practice as principals for the past six months. Certain conditions to be noted by the architects were submitted by the chief librarian.

THE Glasgow Corporation are organising a conference on the proposal to have electric energy carried along the various railway tracks in Scotland by the North British Electrical Power Syndicate, Ltd. If such power were granted, wayleave would not be required from landed proprietors and County Councils.

AT the Criccieth Town Council meeting last week the chairman of the finance committee stated that the cost of obtaining the Act of Parliament in connection with the water scheme was 2,276*l*. The clerk said the costs of the Act were much more than anticipated. They had to visit London three times instead of once as expected, and they had exceeded their estimates by 417*l*.

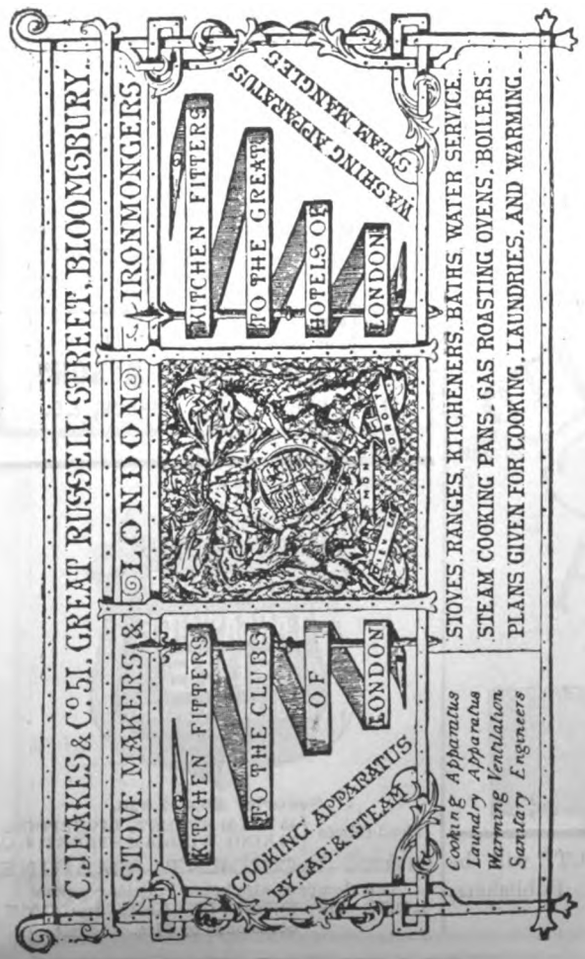
THE Metropolitan Water Board at their last meeting opposed a supplemental estimate of 37,850*l*. in respect of the construction of the covered reservoirs at Honor Oak, S.E., the cost of which was estimated originally at 160,000*l*. The bulk of the extra cost is due to the necessity of strengthening the works in view of the shaly character of the clay, but 6,000*l*. has been spent in increasing the reservoirs' capacity.

THE annual distribution of prizes at the South Norwood technical trade schools, which were founded by Mr. W. F. Stanley, J.P., took place on Saturday. Mr. Stanley, who occupied the chair, announced that the premises had been taken over by the Charity Commissioners, and that he had endowed them with freehold property of the value of 25,000*l*. He felt sure that if British manufacturers wished to hold their own they must wake up to the practical necessity of giving opportunities to lads to become proficient in their trades.

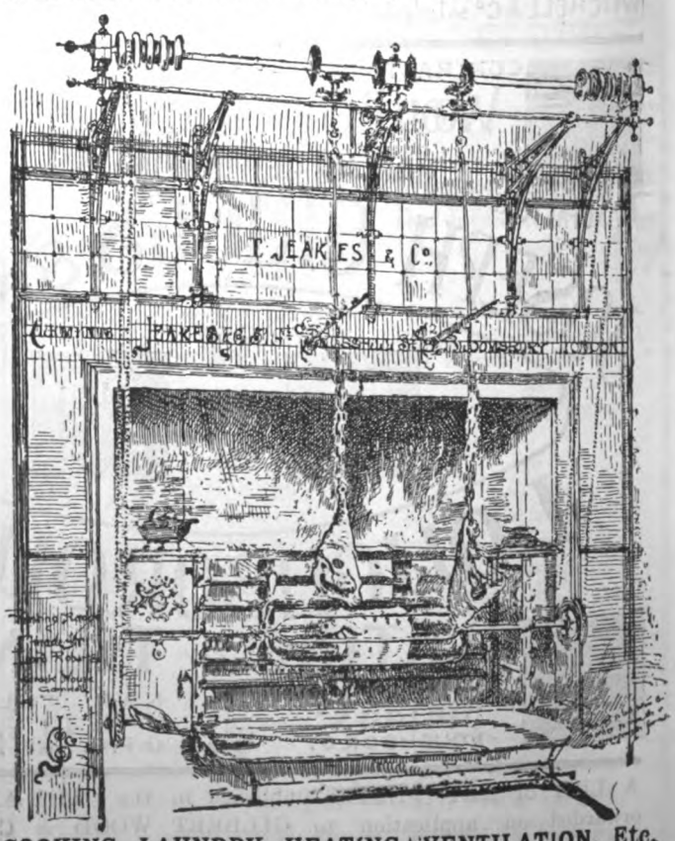
A POLL of the Folkestone ratepayers has proved by a large majority hostile to the scheme for the promotion of a Bill by the Corporation by which a concert-hall would be erected out of the borough funds and managed either by the Corporation or by a syndicate or individual, and to guarantee such persons against loss in the enterprise. The Bill had been approved by the Council and also by a common hall meeting.

AMONG the petitions presented to Edinburgh Dean of Guild Court last week was one for the erection of a riding school at the Dean Bridge. Dean of Guild Wilson said it was proposed to build the school of corrugated iron. The site was one of the best in the city, and the Court could not approve of the proposal. The building must be of stone or compressed brick, harled. The petitioners agreed to consider the matter. Two warrants were granted and two remits were made to the burgh engineer.

THE Dublin Corporation on Monday agreed to sanction an application to the Local Government Board for a loan of 17,400*l*. for the extension of the artisans' dwellings scheme at Inchicore. It is proposed to erect 110 cottages on their



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own ground, the income being estimated at 858*l*. An application is also to be made for 10,000*l*., being the cost of repairing and widening Annesley Bridge.

MONTROSE Town Council are finding great difficulty in securing a site for a reservoir and filter bed for their proposed water augmentation scheme. Mr. Bennett, C.E., Edinburgh, at first suggested a certain site on Sunnyside Asylum grounds, but on the score of danger to patients the management placed objections in the way. Mr .Bennett now suggests another piece of ground on the asylum land. It is, however, farther removed from the buildings than the other site, and it is believed an amicable arrangement will be arrived at. The scheme is estimated to cost 12,000*l*.

THE Warwick County Council have adopted the following resolution:—"That on the Midland Railway Company at their expense removing the old bridge and providing the necessary abutments satisfactorily to the county bridgemaster, and on not less than 500*l*. being provided by the landowners, the Meriden Rural Council or others, the Council rebuild Lea Marston Bridge as a one-span steel-girder bridge, 25 feet in width, with a clear waterway of 60 feet, at an estimated cost of 1,000*l*."

THE Central London Railway have deposited a Bill in Parliament to empower the company to extend their line from the Bank station to and under the Liverpool Street station of the Great Eastern Company, with a connection to the adjacent Broad Street station of the North London Company. It also provides for exchange subways to be constructed at the British Museum station of the Central London Company, and between the public subway at their Bank station and the booking-hall of the City and South London Company in Lombard Street. The Bill further provides for the raising of 330,000*l*. additional share capital, with borrowing powers of 110,000*l*.

A RESERVED decision on an important point under the Workmen's Compensation Act was given by Judge Shortt, at the Dover County Court, recently, in an action against Messrs. Pearson & Son, contractors, by the widow of John Tomlin, a fitter employed on the firm's Malta harbour contract. Tomlin had been employed by Messrs. Pearson on the Dover Naval Harbour works, and proceeded thence to Malta, where he was accidentally killed. Judge Shortt, in giving judgment for the widow, held that although the accident happened out of England the man was an Englishman and his contract was with an English company. Therefore it was only reasonable to conclude that the contract was made by all parties under the existing English law.

MESSRS. DENMAN & Co. have been awarded 38,500*l*. as compensation for the acquisition by the Westminster City Council of the front portion of No. 19 and 20 Piccadilly, with a view to setting back the line of frontage flush with the Piccadilly Hotel. After the street has been widened by the demolition of a part of the premises, a new front will be built, and they will be retained by the claimants. The frontage to Piccadilly of the part taken is 26 feet 10 inches, and the return frontage to Air Street about 28 feet, an area of 1,230 square feet; there will be left in the claimants' possession an area of 1,352 square feet. The building element in the case has been the subject of private proceedings before Mr. H. T. Steward (past-president of the Surveyors' Institution), and the amount of his award will be added to the verdict of the jury, whose inquiry was practically limited to the question of the leasehold and trade interests affected by the improvement.

THE annual report of the Bermondsey Borough Council discusses an experiment conducted at the baths by means of a special aeration and filtration plant. The system is to wash the water and put it back again in the bath, thus saving the considerable cost of refilling with fresh water. Though not good "as a drinking water," one analyst declared the washed water to be preferable to ordinary bath water. Yet the sample examined was from a bath in which 2,657 people had bathed. Dr. Eyre, of Guy's Hospital declared the filtered water to resemble the water from a newly-filled bath, although it had been in the bath ten months. Dr. Brown, the medical officer of health, says that in his opinion the chemical analysis shows a great improvement over that of the water before the filtering apparatus was started, and he considers the system to have come up to all expectations. Last year the cost of the water for the baths was only 5*l*. 17*s*., whereas before it was 243*l*. The new system shows a saving for the year of 174*l*. 18*s*. 4*d*.

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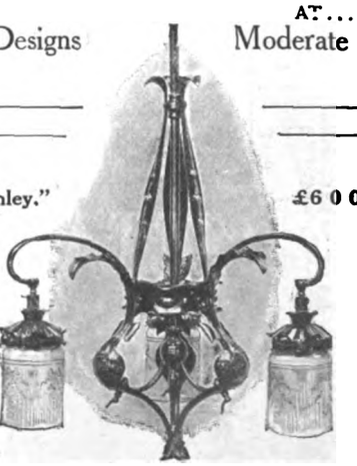
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THE Buxton Council have decided on the erection of a verandah in front of the hot baths, upon plans to be laid before the Duke of Devonshire's estate agent, and to be further considered by the Council. The probable cost will be about 800*l.*

THE Liverpool City Council have under consideration two alternative schemes for new municipal abattoirs—one the rebuilding of the present abattoirs, built by the Liverpool Abattoir Company about seventy years ago, on the present site in Trowbridge Street, and the other the erection of an entirely new establishment on vacant land in Love Lane, behind Stanley Dock. A deputation has been appointed to visit various abattoirs erected in the United Kingdom and on the Continent.

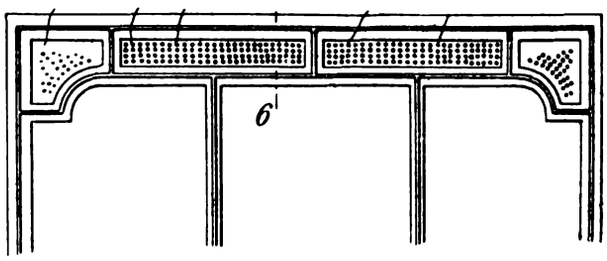
THE Hull Corporation water and gas committee have agreed to an arrangement with the Digit Disinfectant and Soap Company, Ltd., of Huddersfield, for the renting of three acres of land at Stoneferry for a soap and disinfectant works at Hull. The site has a river frontage of 120 feet. The company propose at once to lay down 5,000*l.* in plant, and in two years to lay down 10,000*l.* Building in connection with a laboratory, offices, and houses for workpeople will, it is expected, be proceeded with at once.

THE Farnham Rural District Council have resolved:—"That the attention of the Local Government Board be drawn to the insufficient powers possessed by the Rural District Councils to secure a sufficient amount of open land around new houses, and, further, that owing to the erection of houses on spaces of inadequate areas the Council has met with serious difficulties and expenses in connection with drainage schemes, and are apprehensive of further difficulties unless additional powers are granted."

THE Land Club Union suggest that Lord Carrington should instruct the Board of Agriculture "to obtain priced designs for bungalow cottages of a removable character, which could be put on small holdings, with or without the aid of the County Council." It is estimated that an annual charge of 7*l.* 4*s.* on a cottage costing 120*l.* would suffice to protect the State against loss, and that at the expiration of twenty-five years the cottages would be the property of the Council, available still in many cases for habitation or for conversion into farm buildings.

A NEW VENTILATOR.

THE patent here illustrated has not yet been placed on the market, but will be ready for sale in a week or two. It consists of panels made of glass, iron, copper, porcelain or other material, provided with a series of nipples in the form of truncated cones, each of which has a hole at the apex. Suppose one panel is placed over a shop window, as in our illustration. If it is desired to extract the foul air from inside the window, the nipples are placed on the outside, then the wind striking these cones cannot pass through, but instead extracts the air from within. If fresh air is to be admitted, the ventilating panel is reversed and the nippled surface is to the inside. A simple demonstration of the difference in the action of the two faces is afforded by



placing a lighted candle behind a panel and blowing on the other side; if the nipples are towards the blower, the flame is scarcely affected, but if the nipples are on the inside, the candle is blown out at once. This extremely simple invention promises to be particularly valuable in shops (where it would prevent window steaming) and in railway carriages. It is suggested that for the latter one or more ventilators should be used for the egress of the foul air, and a corresponding number for the ingress of pure air. The uses to which "Minnitt's New or Improved Ventilator for Windows or other Places" can be put are obviously many. The invention is the work of a warming and ventilating engineer, who knows the requirements which he has to meet. The London office of Mr. H. T. Minnitt is at 6 Cecil Court, Charing Cross, W.C.

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FORESTRY IN THE UNITED STATES.

THE United States Department of Agriculture have issued a report as to Forest Preservation. It is made evident that in the last ten years, forestry has advanced in the States from an almost unknown science to a useful growing profession. In that time the number of technically trained foresters has increased from less than a dozen to over 400. Ten years ago there was not a single forest school in the country, now there are several professional forest schools which rank with those of Europe, and a score more with courses in elementary forestry whose usefulness is steadily growing. Forest lands under management have grown from one or two tracts to many, aggregating 7,503,000 acres, scattered through thirty-nine States. The National Forests have increased from 39,000,000 acres, practically unused and unprotected, to 165,000,000 acres, used, guarded and improved both in productiveness and accessibility. The number of States which have State forests has increased from one to ten, and of those which employ trained foresters from none to eleven. The membership of forest associations has increased from 3,600 to 15,800. Ten years ago, except for a few of the foremost botanists, European foresters knew more about American forests than did the people of this country. In Europe they were then using preservatives to prolong the service of beech ties, and so adding from twenty to forty years to their life. Here, on the other hand, scarcely a treated tie had been laid, though there are now sixty treating plants, twenty-seven of which treat ties exclusively, and an engineer who recently returned from Europe reports that both in size and mechanical perfection the treating equipment of this country is ahead of any to be found abroad.

And yet American forestry has only safely passed the experimental stage and got ready to do something. Action, immediate and vigorous, must be taken if the inevitable famine of wood supplies is to be lessened. We are now using as much wood in a single year as grows in three, with only twenty years' supply of virgin growth in sight. Only the application of forest knowledge with wisdom, method and energy, in the next ten years, can prevent the starving accumulation of interest.

The application of intensive forestry to large tracts tice of forestry. It is accessible enough to allow of moderate cuttings at frequent intervals, and it may be protected from trespass and grazing and from fire, its chief enemy, without an elaborate scheme of defence; then taxation is not a great burden, because the revenue from farm supplies more than meets this item every year, and thus prevents the accumulation of interest.

The application of intensive forestry to large tracts will naturally be of limited extent for some time to come. Closer utilisation, the setting of a minimum diameter below which trees shall not be cut, to provide for a second crop, and protection from fire, are conservative measures which are steadily gaining ground. But looking into the future far enough to make provision for a third crop is not yet common, while efforts to bring forest lands to high productive capacity have as yet scarcely been attempted. In wealth of soil and high commercial value of native trees America has a decided advantage over Europe, where intensive forestry is paying well. American corporations and longtime investors, as well as the provident farmer, must go deeper into forestry to reap full reward.

The increase in the number and size of railroad treating plants during the year has been phenomenal. The scarcity of suitable timbers for railroad timbers for railroad ties, combined with the high prices which they consequently command is one of the reasons for the remarkable increase in the number of railroads which are beginning to treat and use the inferior timbers found along their own lines.

In 1902 the number of railroad treating plants was seven; last year it was twenty-seven, being an increase of twelve over the number for 1906.

Reports of the American Railway Engineering and Maintenance of Way Association show that the railroads which have been pioneers in treating timber have found it a paying investment. The Chicago and North-Western Railway erected a tie plant in 1903, and since then has been treating hemlock and tamarack at the rate of about 600,000 ties a year, and now treats also beech, birch and maple. The Santa Fe Railway has laid thirteen and a half million treated ties, and the records show the average life of those first laid to have been 10.62 years. When, in 1904, a considerable amount of main line track in New Mexico was washed out and replaced temporarily with untreated ties, treated ties were substituted as soon as they could be

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obtained, and the untreated ties were sent to the plant for treatment. According to the latest reports, a total of 12,000,000 ties annually, or 12 per cent. of the total cut, are now treated.

Delaware, Kentucky, Missouri and Mississippi are better acquainted with their forest resources by reason of forest surveys conducted in co-operation with the Forest Service. Taxation, now the most difficult problem in State forest work, is receiving thoughtful attention.

A very successful plan in Ohio of co-operating with landowners in establishing plantations and maintaining their timber tracts in such condition that they will serve as educational examples in correct forest practice has been extended until practically every county in the State has been covered. This includes the preparation of plans for managing woodlots and timber tracts and the furnishing of planting material which will be grown according to plans and instructions furnished. A total of 466 farmers are thus co-operating with the State experiment station. A State forest survey has been begun.

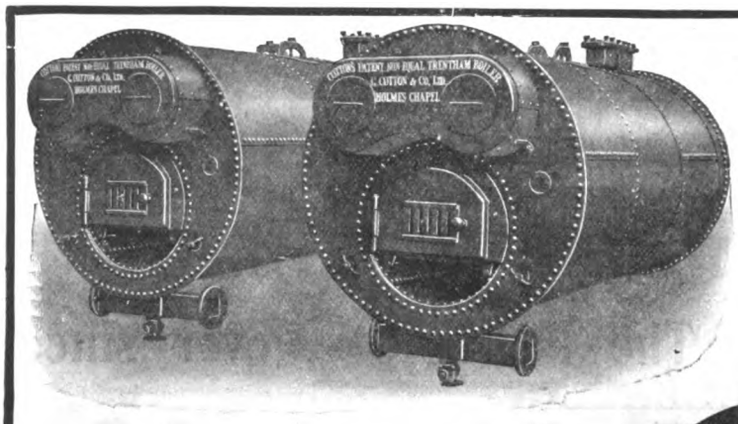
Among the varied activities of the Indiana forestry commission, none is more productive of better results than the encouragement of planting, by experiments conducted on the State reserve and by published information on forestry in general and on the success of those who are growing timber in Indiana.

In Michigan, during the fiscal year 1906-7, dead timber to the value of over $3,000 was sold from the State forest reserve. Over sixty miles of fire lines have been built. Owing to the efficiency of the fire patrol, no fires occurred last year. The plantations of the Saginaw forest farm, at Ann Arbor, are becoming a valuable object lesson, not only for school and experimental purposes, but for the general public. The Cleveland Cliffs Iron Company have increased their staff of foresters and are planning reforestation on a large scale. On the Ausable river, on Manitou island, and at Cedar Lake, landowners are carrying on extensive reforestation. Two investors at Grayling are purchasing lands and making preparations to convert these into regularly managed forest properties. The forestry commission distributed over 60,000 seedlings for experimental plantations among various landowners in the State. Forest sentiment among the people, among legislators, and with the press is steadily growing. One of the best illustrations was the enthusiastic meeting of the Northern Michigan Press Association at Traverse City, where an entire evening was devoted to forestry, and reforestation was strongly advocated.

During 1907 the most important forest work in Wisconsin was the appraising and selling of scattered and agricultural lands and the use of the proceeds to purchase other lands suitable only for forestry, so as to consolidate the main forest reserves on the headwaters of the Wisconsin and Chippewa rivers. About 15,000 acres have recently been purchased. Concessions have been granted private capitalists to store water at the headwaters of streams, the promoters to reap benefit from the sale of water power. Much interest centres in this attempt of private capital to establish reservoirs which will operate in conjunction with the forest cover in the regulation of streams.

The forest law of Minnesota of 1895 made town supervisors fire wardens under direction of a chief warden, who, among other duties, was required to make an annual report, including "important facts relating to forest interests." The annual appropriation to execute the law is $11,000. The legislature of 1907 placed Itasca State Park, at the headwaters of the Mississippi, under charge of the forestry board, appropriated $2,000 a year for demonstration work there and $1,500 for fire breaks, development, and improvements. It also appropriated $2,500 for planting on the Pillsbury Reserve the three year old Norway spruce seedlings the board had raised on that reserve. An area of 185 acres was thus planted at an expense of $6.50 per acre. In 1906 the board imported 20,000 white pine seedlings from Germany, which were planted the same spring on the Pillsbury Reserve.

THE Chester Town Council have granted the Chester Race Company a ten years' extension of the lease of the Roodee, until the year 1929. The extension was granted on the condition that the company spend 10,000*l.* on improvements, including the reconstruction of the Dee stands, the Council stipulating that the public view over the Roodee from the city walls be not encroached upon.

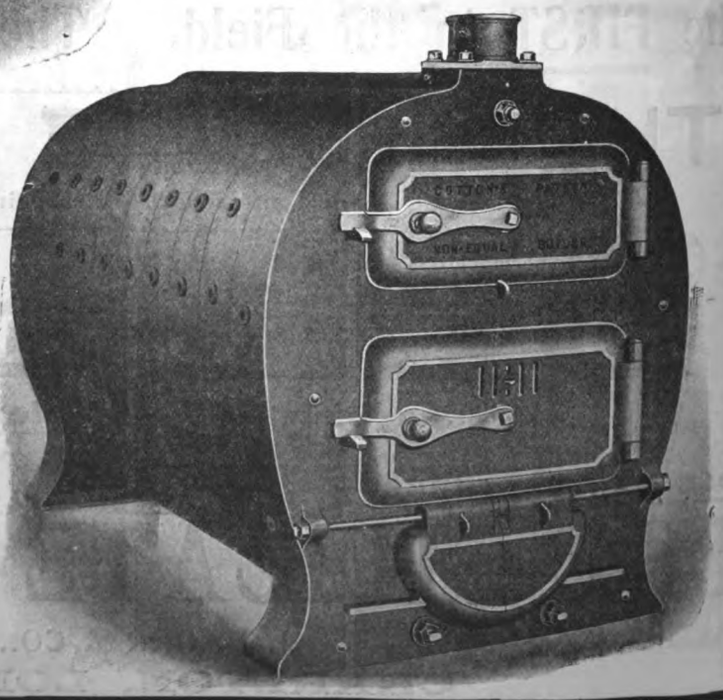


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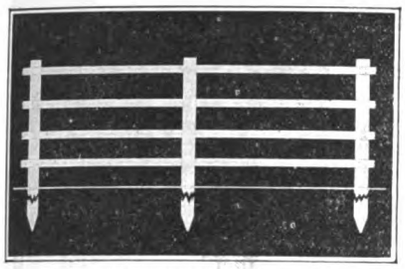
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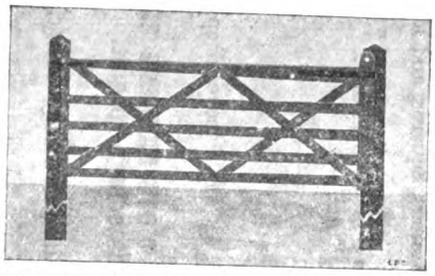
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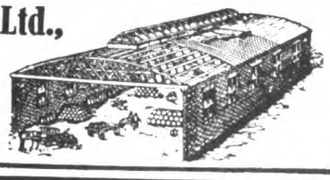
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Kruenstrate, Malines.
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Hôtel de Ville, Cologne.
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The Dome, Frankfort.
Sachsenhausen, Frankfort.
View of the Castle at Heidelberg.
Basel.
Cathedral, Ratisbonne.
View in Ratisbonne.
Ancient Building in Ratisbonne.
Old Palace, Bamberg.
View in Bamberg.
Wurtzburg, Ancient Bridge and Castle.
View in Wurtzburg.
View in Augsburg.
View in Nuremberg.
Strasbourg, with Cathedral.
View in Strasbourg.
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View in Munich.
View in Prague.
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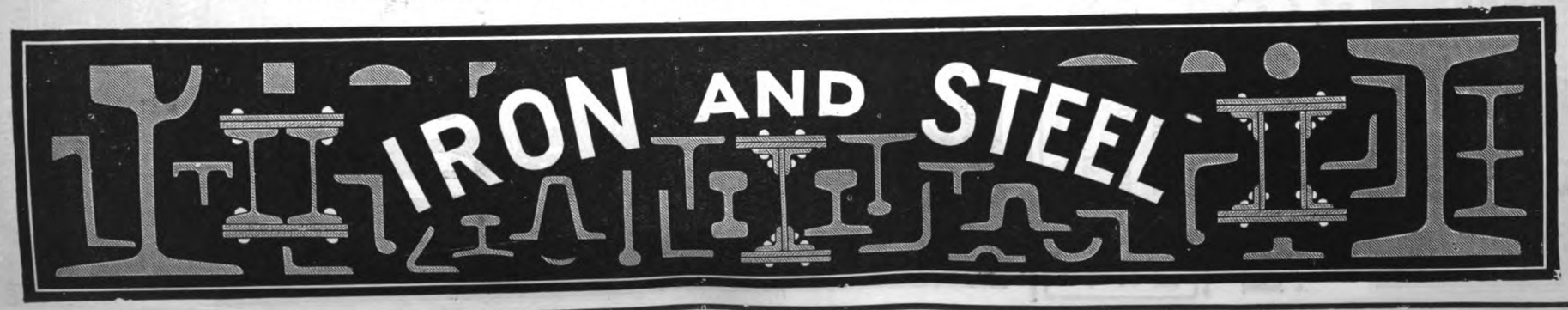
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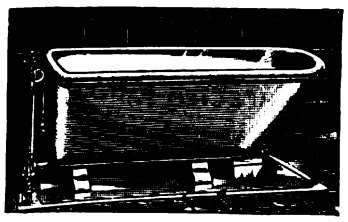
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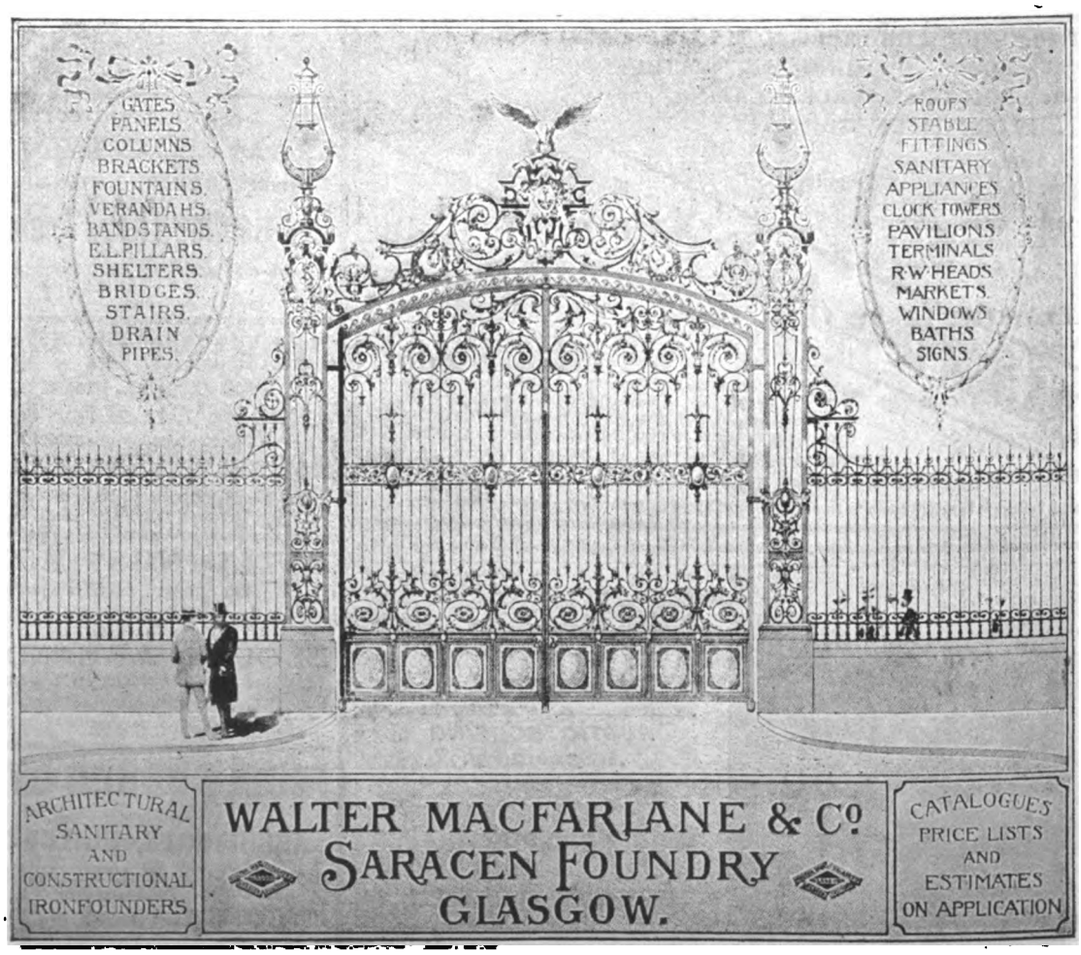
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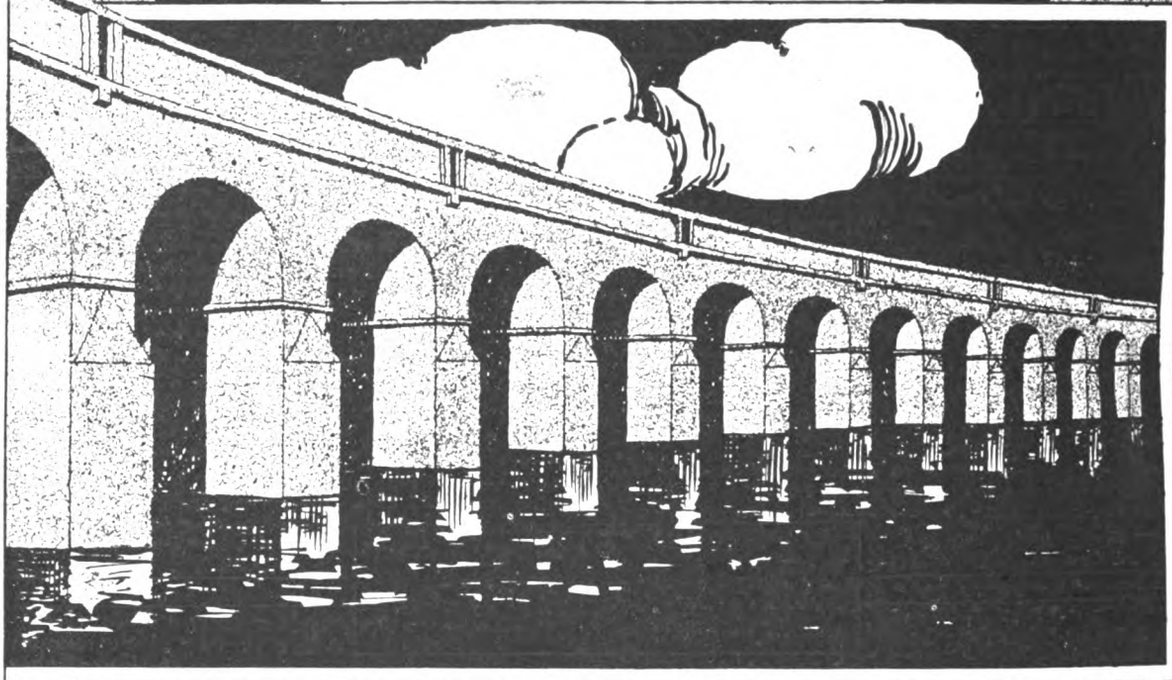
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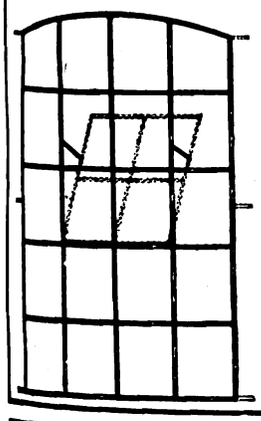
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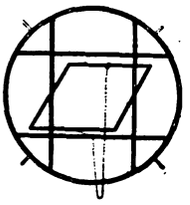
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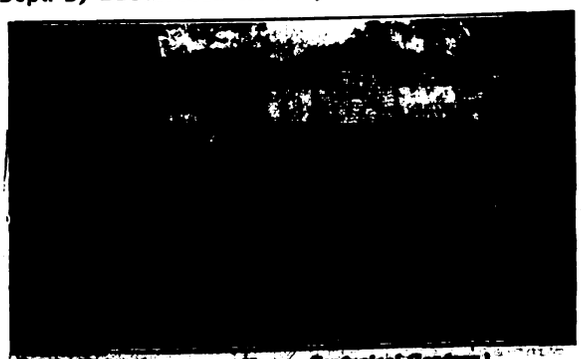
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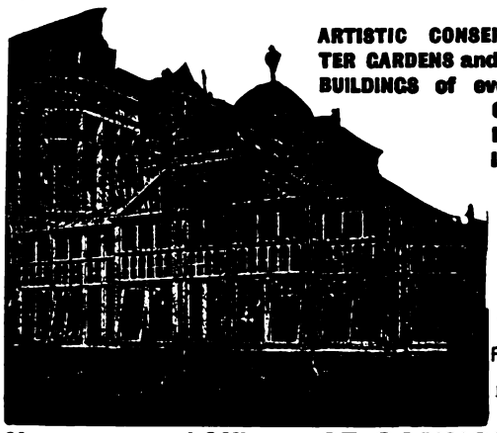
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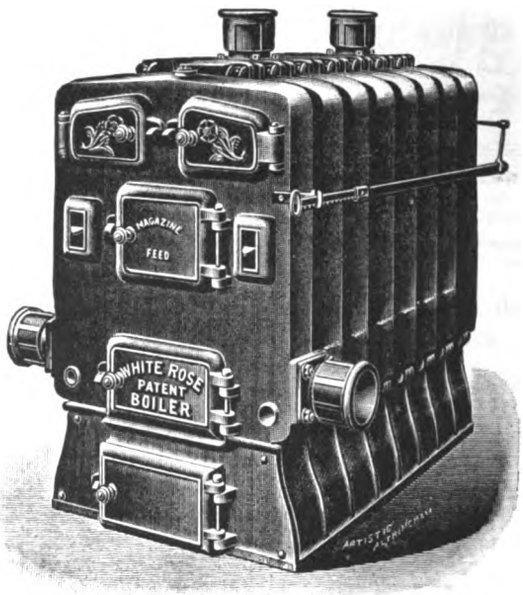
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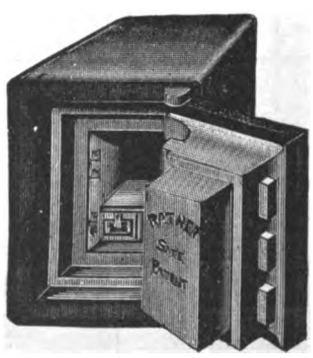
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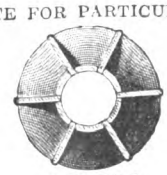
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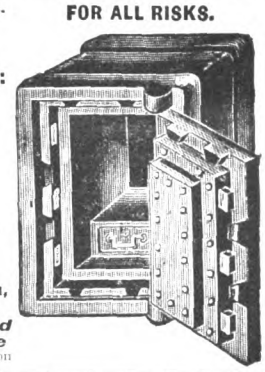
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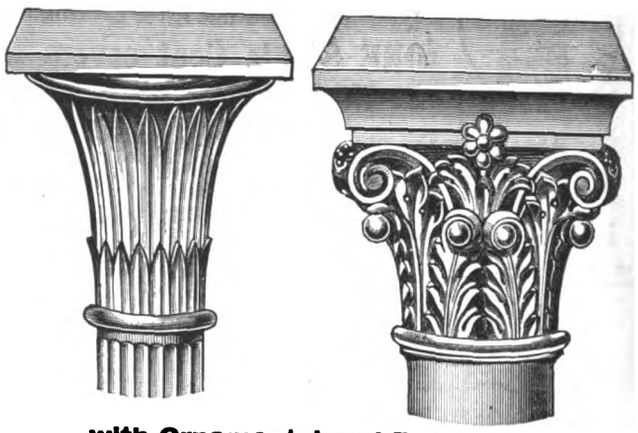
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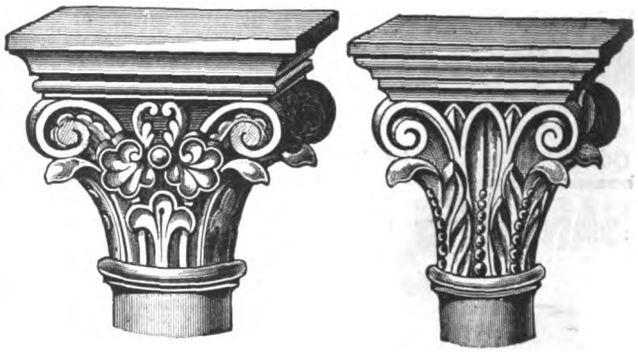
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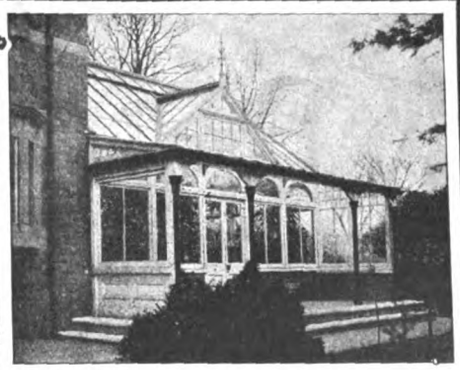
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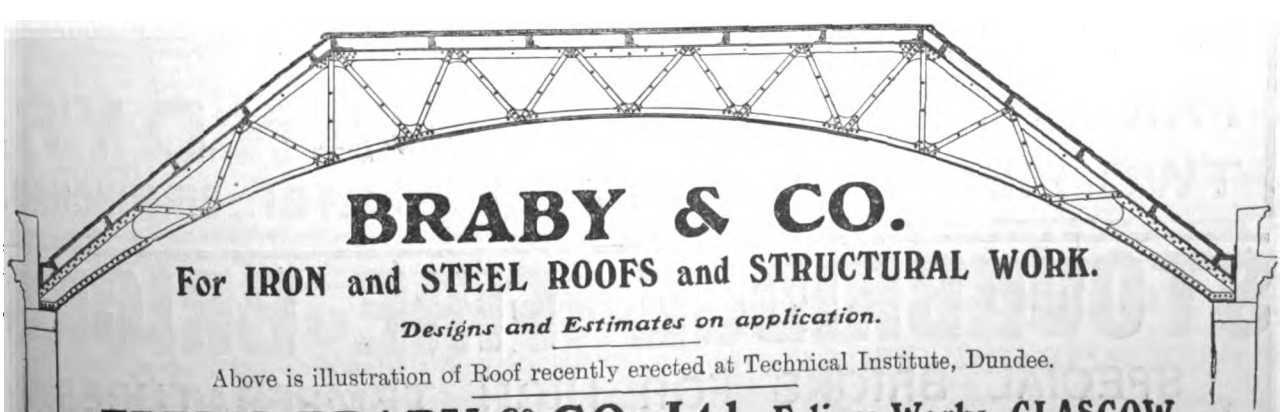
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IRELAND.—Feb. 15.—For erection of two houses in Gray's Hill, Bangor, co. Down. Mr. Ernest L. Woods, A.M.I.C.E.I., 97 Main Street, Bangor, co. Down.

IRELAND.—Feb. 16.—For erection of Crown Post Office at Attey. Deposit 1*l*. Mr. H. Williams, secretary, Office of Public Works, Dublin.

LEEDS.—Feb. 17.—The Leeds education committee invite tenders for repairs to schools for three years ending February 29, 1912, in separate trades as follows:—Bricklayer and mason, carpenter and joiner, plumber, slater, plasterer, smith and founder, heating engineer, concreter, painter. The Architect's Section, Education Offices, Leeds.

LEYTON.—Feb. 23.—For the erection of the Canterbury Road Council schools. Deposit 5*l*. Apply by February 13 to Mr. William Jacques, A.R.I.B.A., 2 Fen Court, Fenchurch Street, E.C.

LIVERPOOL.—Feb. 24.—For construction of additional buildings to the Mansfield Street open-air bath. Mr. W. R. Court, chief superintendent, Municipal Offices, Liverpool.

LUTON.—Feb. 26.—For erection of school buildings on Beech Hill, Dunstable Road. Messrs. J. R. Brown & Sons, architects, Castle Street, Luton.

MANCHESTER.—Feb. 17.—For erection of additional goods offices, &c., at Ancoats Goods Depot, for the Midland Railway Company. The Engineer's Office, Derby Station.

MILE END (COLCHESTER).—Feb. 27.—For the erection and completion of the superstructure of the main building of asylum at Mile End, Colchester, about one and a half miles north of Colchester main line railway station. Deposit 100*l*. Apply by February 13 to Mr. W. P. Gepp, clerk to the visiting committee, New Street, Chelmsford.

MORLEY.—Feb. 25.—For the various works required in alterations to engine house and new engine bed at Gillroyd Mills. Mr. T. A. Buttery, F.I.A.S., architect, Queen Street, Morley, Yorks, and 1 Basinghall Square, Leeds.

NETTESWELL.—Feb. 26.—For widening a small bridge (known as Burnt Mill Bridge) over the mill stream in Netteswell, Essex. Mr. Percy J. Sheldon, M.I.C.E., chief surveyor, Chelmsford.

NEWBIGGIN.—Feb. 26.—For alterations and additions to Newbiggin Police Station, Northumberland. Deposit 1*l*. 1*s*. Mr. J. A. Bean, county architect, The Moothall, Newcastle-on-Tyne.

NORTH BRANCEPETH, &c. (DURHAM).—Feb. 16.—(1) For erection of schools at North Brancepeth (Langley Moor) and New Brancepeth (Sleetburn), and for alterations at Ouston, Wingate, Hawthorn, Rowlands Gill and West Stanley. Mr. F. E. Coates, Shire Hall, Durham. (2) For erection of schools at Medomsley Edge. Mr. J. J. Eltringham, architect, Blackhill. (3) For enlargement of Langley Park infants' Council school. Mr. W. Rushworth, Shire Hall, Durham. Sole tenders are invited.

NORTHENDEN.—Feb. 22.—For the whole of the works required in the erection of a Council school. Send names by February 10 to Mr. W. Taylor, clerk, Technical School, Sale.

NORTH SHIELDS.—Feb. 23.—For erection of a cement concrete retaining wall of about 150 feet in length and 20 feet in height, in Bell Street, or for a reinforced concrete wall. Deposit 2*l*. 2*s*. Mr. John F. Smillie, borough surveyor, Tynemouth.

ST. AUSTELL.—Feb. 15.—For alterations to Menagwins Farm. Mr. B. C. Andrew, M.S.A., architect, Biddick's Court, St. Austell, Cornwall.

SALISBURY.—Feb. 17.—For carrying out alterations at the city police station. Mr. W. J. Goodwin, A.M.I.C.E., city engineer and surveyor, Municipal Offices, Salisbury.

SCOTLAND.—Feb. 13.—For the mason, carpenter, slater, plaster, plumber, and painter and glazier works of new public hall, Kennethmont. Mr. Thos. G. Archibald, architect, 27 Duke Street, Huntly.

SCOTLAND.—Feb. 17.—For the mason and brick, carpenter and joiner, plumber, slater, and cement and plaster works proposed to be executed in erecting shop and dwelling-house at Townhill Road, Dunfermline. Messrs. Muirhead & Rutherford, architects, 3 Abbey Park Place, Dunfermline.

SCOTLAND.—March 2.—For erection of spire for church, for Deacons' Court of United Free English Church, Stornoway. Mr. Neil Maccallum, clerk to Deacons' Court, Stornoway.

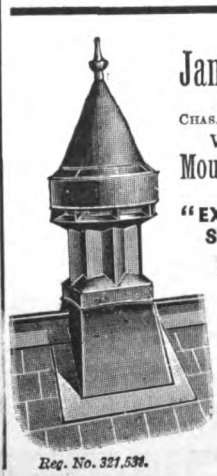
SHEFFIELD.—Feb. 20.—For the erection of ward blocks and kitchens at the Royal Infirmary. Send names to Messrs. Gibbs & Flockton, architects, 15 St. James's Row, Sheffield.

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TODMORDEN.—Feb. 22.—For the various trades in the erection of a secondary school on the Stile Estate. Apply after February 15 to Mr. Jesse Horsfall, F.R.I.B.A., 4 Chapel Walks, Manchester.

WAKEFIELD.—Feb. 15.—For the rebuilding, in steel girders, concrete and masonry of the following bridges for the West Riding highways committee:—(1) Aldham bridge, on the Wombwell Lane main road, within the urban districts of Wombwell and Worsborough, over the River Dove, having a span of 16 feet 6 inches; (2) Rawfolds bridge, on the Leeds and Whitehall (branch) main road, within the urban districts of Liversedge and Gomersal, over Spen Beck, having a span of 22 feet. Deposit 1*l.* each. Mr. F. G. Carpenter, West Riding surveyor, County Hall, Wakefield.

WALES.—Feb. 15.—For carrying out of alterations and renovations to Crane Street Baptist church, Pontypool. Mr. D. J. Lougher, architect, Bank Chambers, Pontypool.

WALES.—Feb. 16.—For erection and completion of three villas at Pencelli Estate, Treorchy. Mr. W. D. Morgan, M.S.A., architect, 194 Ystrad Road, Pentre.

WALES.—Feb. 19.—For the extension of Alltwen Congregational chapel, Pontardawe, and the adding of an organ chamber thereto. Deposit 3*l.* 3*s.* Mr. W. Beddoe Rees, architect, 3 Dumfries Place, Cardiff.

WALES.—Feb. 20.—For erection of a chapel in Arthur Street, Tredegar. Mr. W. S. Williams, architect, Elmwood House, Tredegar, Mon.

WALES.—Feb. 24.—For erection of additions to the Pontypool and District Hospital. Deposit 1*l.* 1*s.* Mr. Sidney Williams, M.S.A., architect, Borough Chambers, Wharton Street, Cardiff.

WALES.—Feb. 26.—For erection of a small generating station at Abertillery, Mon. Deposit 1*l.* 1*s.* Send names by February 15 to Mr. Maurice E. Webb, architect, 19 Queen Anne's Gate, Westminster, S.W.

WALES.—Feb. 27.—For building additions to and altering the Ynysbwl mixed school, Mountain Ash. Mr. W. H. Williams, architect, Town Hall, Mountain Ash.

WALTON-ON-THE-NAZE.—Feb. 18.—For the construction of a public convenience. Deposit 2*l.* 2*s.* Mr. H. W. Gladwell, F.I.S.E., surveyor, High Street, Walton-on-the-Naze.

WINCHCOMB (GLOS.).—Feb. 15.—For alterations and additions to the Drill Hall, Winchcomb (Glos.). Mr. Thomas Malvern, architect, 21 Winchcomb Street, Cheltenham.

WINSFORD.—Feb. 20.—For erection of additional classrooms, lecture room, &c., at the United Methodist Free church school, High Street, Winsford, Cheshire. Messrs. Alfred Price & Son, architects and surveyors, Sandbach.

WIDNES.—Feb. 15.—For erection of garage, repair shop, offices, stores and car shed in the Town Hall Yard. Deposit 1*l.* 1*s.* Mr. John S. Sinclair, A.M.I.C.E., borough surveyor, Town Hall, Widnes.

THE Bexhill Town Council on Monday decided to advertise for tenders for the construction of a colonnade, and the erection of a bandstand and shelters on the new central parade, in order that there shall be no delay in getting to work after the Local Government Board inquiry.

THE work of raising Portland new breakwater has commenced. The proposal is to cut away a length of the inner portion of the breakwater, making it flat at the back, and placing the stone removed on to the top, thus raising it 11 feet. By this means the outer face will be sloped off, thus giving less resistance to the waves. Storehouses and other buildings are to be erected on the breakwater. The extension of the camber is being actively pushed on, and when finished it will be 300 feet in length, providing accommodation for landing at about half a dozen stages.

THE *Colonial Office Journal* gives a description of a scheme for a water supply to Accra, Gold Coast, which has been prepared by Messrs. Middleton, Hunter & Duff, MM.Inst.C.E., Westminster and Edinburgh. The dam will be formed of concrete, the trench for which will be sunk with the aid of steel piling on both sides, which, it is believed, from experience elsewhere, will have the effect of greatly reducing pumping during the sinking and filling up of so deep a trench as is required. The capacity of the reservoir is such that there will be sufficient water to provide power to drive turbines to pump the supply of water to filters and tanks at a high elevation, whence it will gravitate to Accra. The estimated cost of the works is 190,450*l.* The dam is so constructed that it can be raised at a small cost by 4 feet, which would give water for additional power to drive dynamos for electric lighting in Accra.

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TENDERS.

BARKING (ESSEX).

For kerbing, channelling, flagging, &c., at Ripple Road. Mr. C. F. DAWSON, surveyor.

Free & Sons	£482 0 6
Thames Stone Co.	448 9 8
Peters	437 7 7
Wilson, Border & Co.	435 13 7
Glenny	430 2 1
Parsons & Parsons	419 0 0
W. J. Jackson	417 11 7
D. T. JACKSON, Barking (*accepted*)	411 1 7

BARNSLEY.

For erection of additional class-rooms at the Keir Street school.

Recommended tenders.

Taylor & Son, excavator, mason and bricklayer	£498 13 10
Owram, joiner	285 0 0
Dransfield, plumber	194 2 6
Dawber, Townsley & Co., slater	44 10 0
Fleming, plasterer	35 0 0
Beaumont, painter	23 10 0

BELFAST.

For building additions to the Municipal Institute, Belfast. Mr. SAMUEL STEVENSON, architect, Royal Avenue, Belfast. Quantities by Mr. S. C. HUNTER, Scottish Provident Buildings, Belfast.

Keith	£10,147 0 0
Lees	10,141 0 0
Hogg	9,998 0 0
Courtney & Co.	9,717 0 0
Campbell & Son	9,319 0 0
Armstrong	9,300 0 0
Thornbury Bros.	9,242 0 0
J. & W. Stewart	9,199 0 0
Dowling	8,985 0 0
H. & J. Martin	8,804 0 0
CORRY, Belfast (*accepted*)	7,000 0 0

CAMBORNE.

For waterworks at Camborne, Cornwall. Messrs. S. C. CHAPMAN, A.M.I.C.E., Torquay, and F. W. S. STANTON, A.M.I.C.E., Chatham and Bristol, joint engineers.

Shellabear & Son	£6,702 19 9
Berryman	6,108 10 8
Pethick Bros.	5,753 0 0
Mitchell & Bond	5,399 14 0
Neal	5,350 17 3
Bennett	5,088 7 3
Woodman & Co.	4,871 13 0
Brebner & Co.	4,815 19 6
Lester	4,800 0 0
Relf & Son	4,763 15 0
Dixon	4,660 8 7
CARKEEK (*accepted*)	4,637 12 11
Stevenson	4,584 13 10
Steer & Pearce	3,978 6 11

CAMBRIDGE.

For the extension of Cambridge post office, for H.M. Office of Works.

Bell & Sons	£3,997 0 0
Carter & Wright	3,742 0 0
Negus & Sons	3,399 0 0
Smith	3,080 0 0
FRYER & Co. (*accepted*)	2,788 0 0

CHEPSTOW.

For works at Oakwood, Chepstow. Messrs. PROTHERO, PHILLOTT & BARNARD, architects, Cheltenham.

Additions to Oakwood.

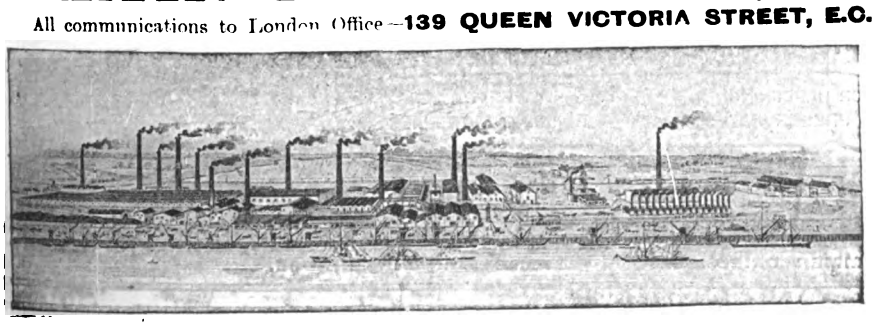
Bowley & Sons	£1,073 0 0
Collins & Godfrey	1,065 0 0
Bendall & Sons	937 10 0
Williams (*recommended*)	897 0 0

Cottages at Oakwood.

Bowley & Sons	690 0 0
Collins & Godfrey	675 0 0
Williams	630 0 0
Bendall & Sons (*recommended*)	550 0 0

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Marshall	£8,303	0	0
Dalton & Sons	8,135	0	0
Kendrick & Sons	7,908	0	0
Blake	7,850	0	0
Herbert	7,860	0	0
Smith	7,732	0	0
Deeley	7,645	0	0
Round & Sons	7,650	0	0
Jones	7,625	0	0
Dorse	7,409	18	10
Oakley & Coulson	7,447	0	0
BARNSLEY & SONS (*accepted*)	7,146	0	0

DUNDEE.

For supply of about 750 tons of cast-iron pipes, the diameters being 6 inches, 8 inches, 10 inches and 12 inches. Mr. GEORGE BAXTER, engineer.

Laidlaw & Son	£4,317	11	3
Maclaren & Co.	4,302	0	6
Stewart & Co.	4,179	10	6
The Clay Cross Co.	4,161	1	10
Macfarlane, Strang & Co.	4,062	3	8
Cochrane & Co.	4,004	1	11
Stanton Ironworks Co.	3,856	12	8
Oakes & Co. (for 12-inch only)	970	4	0

EPSOM.

For making-up of Frederick Road, Cheam. Mr. T. E. WARE, surveyor, Epsom.

Blaker	£367	0	0
E. & E. Iles	349	0	0
Wheeler & Co.	332	0	0
May	325	0	0
Kavanagh	317	0	0
Potter	315	0	0
Aedy	293	16	10
STREETER & Co., Shalford (*accepted*)	277	3	2

EXMOUTH.

For erecting new Y.M.C.A. building in Imperial Road. Mr. G. BEAVIS, architect and surveyor, Exmouth.

Lang	£944	6	0
Perry	910	0	0
Dart	900	0	0
Harding	865	0	0
HAYMAN, Exmouth (*accepted*)	839	10	0

Plumbing.

Weeks	60	0	0

HOUNSLOW.

For the execution of the following works:—(1) Making-up Campo Road, Hounslow; (2) making-up Ailsa Avenue, St. Margaret's. Mr. J. G. CAREY, engineer and surveyor.

Ailsa Avenue.

Blomfield	£1,445	16	4
Dykes	1,295	9	5
Mears	1,262	0	0
Mowlem & Co.	1,213	0	0
Free & Sons	1,184	1	8
Jarman & Co.	1,171	0	0
Brummell	1,147	9	8
Chapman	1,105	1	7
Watson	1,100	0	0
Swaker	1,087	14	7
BALL, Chiswick (*accepted*)	1,057	0	0

Campo Road.

Blomfield	1,219	18	11
Mears	1,118	0	0
Dykes	1,094	2	3
Free & Sons	1,035	17	9
Jarman & Co.	1,022	0	0
Ball	1,015	0	0
Mowlem & Co.	1,010	0	0
Brummell	1,008	10	1
Chapman	955	10	0
Watson	940	0	0
SWAKER, Whitton (*accepted*)	907	14	0

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For the erection of four shops, High Street. Mr. HARRY SPENCER, architect, Hucknall, Notts.

Dove	£1,630 0 0
Cuthbert	1,540 0 0
Birkin & Rowland	1,425 0 0
Webster	1,419 0 0
Munks & Son	1,412 0 0
LEWIN, Carlton (*accepted*)	1,378 10 0

HUNSLET.

For erecting Council offices in Leek Street. Mr. B. W. HIGGINS, architect, Oulton, Leeds.

Wood	£1,349 0 0
SIMPKISS, Hunslet (*accepted*)	1,109 0 0
Gott	1,104 0 0
Irwin & Co.	1,099 0 0
Rhodes	1,076 0 0
Tomlinson & Son	1,064 0 0
Lambert & Son	1,060 0 0
Dewes & Co.	1,038 0 0
Thompson & Sons	1,022 0 0
Pullan	983 0 0

LONDON.

For supply of two 24-inch steel tubes in connection with the Cambridge Heath Bridge over the Regent's Canal, for the Metropolitan Water Board.

Thames Ironworks Co.	£149 10 0
Fraser & Son	146 0 0
FRASER & FRASER (*accepted*)	139 0 0

LUTON.

For carrying out works of private improvements in Frederic Street and Clipston Road.

Frederic Street.

POWDRILL & SON, Luton (*accepted*)	£232 6 2

Clipston Road.

POWDRILL & SON, Luton (*accepted*)	351 17 4

MARKET DRAYTON.

For the entire work of erection of a secondary school, for the Salop County Council.

DALLOW & SONS, Birmingham (*accepted*)	£5,340 0 0

NEW BARNET.

For making-up and sewering Latimer Road (part of), Bosworth Road and back roads between Fergusson Road and Middle Road, for the East Barnet Valley Urban District Council. Mr. HENRY YORK, A.M.I.C.E., surveyor.

Bosworth Road.

Bell & Sons	£561 0 0
Tree & Sons	510 0 0
Hanson	499 9 4
Swaker	469 0 0
Mann	460 0 0
SANGWIN, New Barnet (*accepted*)	441 18 6

Latimer Road.

Sangwin	508 14 6
Bell & Sons	443 0 0
Tree & Sons	440 0 0
Mann	405 0 0
Hanson	385 1 8
SWAKER, Hounslow (*accepted*)	383 0 0

NORWICH.

For the erection of the additions to the infirmary at the House. Mr. B. B. MORGAN, surveyor.

Daws	£13,050 0 0
Hawes	12,498 0 0
Scarles	12,487 0 0
Smith	12,770 0 0
Youngs	12,541 0 0
Hurn	12,095 0 0
Yelf	11,994 0 0
Greengrass	11,858 0 0
Gill	11,754 0 0
HANNENT (*accepted*)	11,739 0 0
Estimate of the surveyor	11,656 0 0

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NEWCASTLE-ON-TYNE.

For erection of the Dunston Excelsior Club. Messrs. WHITE & STEPHENSON, architects, Newcastle-on-Tyne.

Carr	£6,291 15 1
Bailey & Gladder	5,020 0 0
Thompson	4,990 16 0
Paramour	4,770 13 0
Fenwick & Co.	4,655 0 0
Haswell & Waugh	4,642 15 0
White	4,601 15 10
Sheriff & Sons	4,570 0 0
Ritchie	4,538 0 0
Middlemiss Bros.	4,535 0 0
Raven & Hitcham	4,492 11 5
Parkinson & Sons	4,475 0 0
Pringle	4,407 0 0
Johnstone & Brown	4,361 0 0
J. & G. Douglass	4,359 0 0
Rutherford	4,352 0 0
Hutchinson	4,350 0 0
Ayton	4,325 0 0
Killah & Carr	4,322 0 0
Nordmann	4,213 13 0
Bewley	4,146 0 0
Patterson	4,100 0 0
Noble & Son	3,999 4 10
Clements (*recommended*)	3,960 0 0

PORTSMOUTH.

For infirmary extension, for the Guardians. Messrs. RAKE & COGSWELL, architects, Portsmouth. Quantities by Mr. C. W. BALL, Southsea.

Jones	£6,590 0 0
Sperring	6,570 0 0
Porter	6,455 0 0
Dowdell	6,154 0 0
Payne	6,125 0 0
Light & Son	5,992 0 0
Cockerell	5,921 0 0
Tanner	5,900 0 0
Coltherup	5,750 0 0
Corke	5,689 0 0
PRIVETT (*accepted*)	5,267 0 0

OLD FLETTON.

For building technical and commercial school. The Hunts County Surveyor, Huntingdon.

Main buildings.

Saint & Sons	£3,540 0 0
Alcock	3,449 0 0
Guttridge & Sons	3,444 0 0
Parren & Son	3,388 0 0
Thackray & Co.	3,385 0 0
Lucas	3,379 17 0
Hicks	3,366 0 0
Gray	3,281 14 0
Allen & Sons	3,240 14 0
Shanks	3,200 0 0
Hickman	3,156 17 0
Ireson	3,090 8 0
Wrycroft & Sons	3,029 0 0
Hawkins & Sons	3,019 14 0
Bridgfoot & Sons	3,012 12 0
CRACKNELL, Peterborough (*accepted*)	2,896 0 0

Outbuildings.

Parren & Son	240 0 0
Shanks	235 0 0
Saint & Sons	234 0 0
Hicks	229 12 0
Guttridge & Sons	225 0 0
Thackray & Co.	222 0 0
Gray	219 2 0
Lucas	208 13 0
Alcock	203 10 0
Hickman	201 14 0
Ireson	190 6 0
Allen & Sons	186 19 0
CRACKNELL (*accepted*)	186 0 0
Wrycroft & Sons	183 0 0
Hawkins & Son	179 15 0
Bridgfoot & Sons	173 8 0

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REDCAR.

For erection of a small building for the covering in of spring head at Worts Well, Upleatham. Mr. JAMES HOWCROFT, surveyor, 2 West Terrace, Redcar.

France	£240 7 6
Crisp & Son	218 0 6
HUTTON, Saltburn (*accepted*)	163 7 6

SEVENOAKS.

For the making-up of the St. George's and St. James's Roads. Mr. S. TOWLSON, surveyor.

	St. George's.	St. James's.
Iles & Son	£765 0 0	£175 0 0
Woodhams	748 0 0	181 0 0
Chittenden & Simmons	699 0 0	162 0 0
WOOD & SONS, Crokenhill (*accepted*)	636 0 0	166 0 0

SOUTH SHIELDS.

For new boiler-feed pump and steam mains at the baths and washhouses in Derby Street, South Shields. Contract 1, excavator and bricklayer's work; Contract 2, engineering work; for the Town Council. Mr. J. H. MORTON, F.R.I.B.A., architect, 50 King Street, South Shields, and 57 Westgate Road, Newcastle-on-Tyne.

Contract No. 1.

Simpson	£198 13 0
Christie	185 0 0
Middlemiss Bros.	183 7 2
Allison	180 0 0
Ridley	173 0 0
Craven	170 0 0
Thornton	153 0 0
Nichol	153 0 0
JENNINGS (*accepted*)	144 19 0

Contract No. 2.

Sudron	672 0 0
Moorwood & Co.	583 0 0
Hebburn Boiler Co.	565 0 0
Dinning & Cooke	528 15 0
Bradford & Co.	519 10 0
Richardson & Brock	514 0 0
Arrol & Co.	508 0 0
DAVY BROS., Sheffield (*accepted*)	495 10 0

SUTTON (NEAR SOUTHEND-ON-SEA).

For erection of elementary schools for 160 children. Mr. F. WHITMORE, architect, Chelmsford.

Main building.

Parren & Son	£2,000 0 0
Moss	1,819 6 3
Brown Bros.	1,805 0 0
Davidson	1,797 16 7
Jarvis	1,697 0 0
Beaumont	1,682 0 0
Ramsbottom & Co.	1,670 0 0
Dowsing & Davis	1,650 0 0
Bennett	1,650 0 0
F. & E. Davey	1,637 0 0
Johnson & Hawkes	1,633 0 0
Willmott	1,632 0 0
E. & B. H. Davey	1,621 0 0
Pavitt & Son	1,587 16 0
Woodhams	1,570 0 0
Hyde & Co.	1,562 0 0
Norden (*recommended*)	1,482 10 0
Architect's estimate	1,570 0 0

Latrines, drainage, fencing, &c.

Davidson	746 17 9
Dowsing & Davis	660 0 0
Moss	652 10 4
Hyde & Co.	610 0 0
Brown Bros.	600 12 4
Jarvis	599 0 0
Beaumont	558 0 0
Willmott	558 0 0
Ramsbottom & Co.	551 0 0
Bennett	550 0 0
E. & B. H. Davey	546 0 0
Pavitt & Son	539 11 6
Parren & Son	500 0 0
F. & E. Davey	500 0 0
Johnson & Hawkes	497 0 0
Woodhams	480 0 0
Norden (*recommended*)	435 10 0
Architect's estimate	430 0 0



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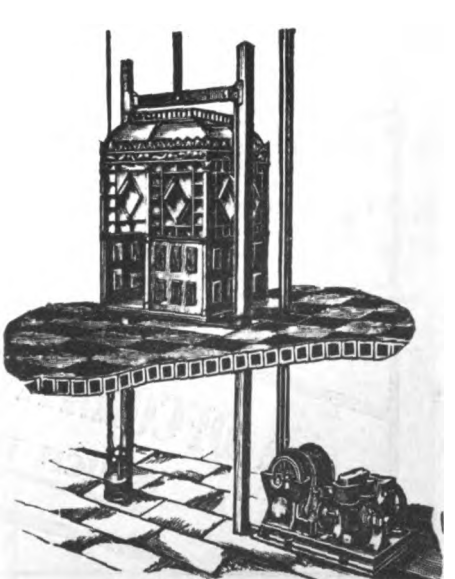
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TAUNTON.

For erecting a covered playground, changing-room, bath-room, boxroom, &c., at Taunton school. Mr. F. W. Roberts, F.R.I.B.A., Taunton.

		Revised tenders.
Small	£1,885 0 0	£1,564 12 3
Spiller & Son	1,854 0 0	1,616 0 0
Smith	1,850 0 0	1,632 7 9
Spiller, Taunton (*accepted*)	1,849 0 0	1,547 8 9
Moggridge & Son	1,821 7 3	1,576 18 10

WALES.

For building eighteen dwelling-houses, for the Aberystwyth Corporation. Mr. Rees Jones, borough surveyor, Aberystwyth.

Jones	£2,928 0 0
Evans & Jenkins	2,800 0 0
Jones & Lewis	2,520 0 0
Owens Bros.	2,502 0 0
Evans & Sons	2,481 0 0
Owen	2,475 0 0
Bearne, Aberystwyth (*accepted*)	2,300 0 0

For sewerage and sewage-disposal works, Efail Isaf, for Llantrisant and Llantwit Fardre Rural District Council. Mr. Gomer S. Morgan, surveyor, Pontyclun.

Evans Bros.	£1,487 0 0
Watkins	1,253 11 2
Barnes, Chaplin & Co.	1,246 8 9
Collins & Co.	1,120. 4 0
Sutherland	1,101 15 10
Murray	1,084 19 10
Pomeroy & Co.	1,068 12 8
Rakin	1,064 5 11
Morgan, Pontypridd (*accepted*)	977 4 10

For construction of streets and sewers at Tonmawr, near Port Talbot. Mr. T. B. Smith, architect, Port Talbot.

Evans	£791 12 10
Sayers	778 0 10
Clarke	695 19 0
Collett	675 0 0
Prothero	645 0 0
T. Scott, Port Talbot (*accepted*)	542 10 6

TIPTON (STAFFS).

For sewage disposal works, for the Tipton Urban District Council, Staffs.

Brebner & Co.	£24,871 3 10
Swann	21,051 9 1
Byrom	20,939 12 0
Mason	20,908 16 7
Price & Co.	20,156 18 4
Holloway	19,924 17 5
Underwood & Bros.	19,859 7 5
Wilson & Sons	19,771 0 0
Mackay	19,525 14 5
Guest & Sons	19,263 0 0
Harrison & Co.	18,952 16 9
Currall, Lewis & Martin	18,873 5 0
G. Trentham	18,587 10 0
Vale & Sons	18,495 16 11
Johnson Bros.	18,224 0 0
G. P. Trentham	18,220 0 0
Trentham	18,220 0 0
Firth & Co.	17,605 18 6
Cunliffe	17,557 5 0
Law	17,062 10 0
Owens	16,995 8 6
Firth, Harrogate (*accepted*)	16,929 18 2

WORKINGTON.

For road improvement and bridge extension at Castle Gardens. Mr. G. J. Bell, M.Inst.C.E., The Courts, Carlisle.

Wilson & Co.	£1,867 0 0
Johnston & Co.	1,389 13 9
Laing & Sons	983 17 2
Dawson	845 0 0
Lant, Newcastle (*accepted*)	640 0 0
County surveyor's estimate	872 5 0

The Widnes Town Council have agreed to make Mr. Parr, the gas and waterworks engineer, a gratuity of 250 guineas for special work done in connection with the laying down of a new water plant.

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TAUNTON.

For construction of 12-inch stoneware pipe sewer from Staplegrove Road to Station Road. Mr. D. EDWARDS, borough engineer and surveyor.

Shear	£680 0 0
Pollard & Co.	530 0 0
Manning & Son	485 0 6
Hart	455 11 7
J. Y. Coles	440 16 9
Small	417 18 0
E. G. COLES, Taunton (*accepted*)	397 10 0
Engineer's estimate	500 0 0

WALTHAMSTOW.

For supplying heating apparatus to the Selwyn Avenue new schools. Mr. H. PROSSER, M.S.A., architect to the education committee.

Boyd & Sons	£558 0 0
Dargue, Griffith & Co.	532 0 0
Grundy	493 0 0
Palowkar & Sons	484 0 0
Werner, Pfleiderer & Perkins	480 0 0
Logsdon	476 0 0
Wontner-Smith, Gray & Co.	459 10 0
Haden & Sons	410 0 0
CASSIDY (*accepted*)	407 0 0
Cash & Co.	386 0 0
Kite & Co.	350 0 0
G. & E. Bradley	330 0 0

For erecting a higher elementary school for the Walthamstow education committee. Mr. H. PROSSER, M.S.A., architect to the committee. Quantities by Mr. G. T. G. WRIGHT, F.S.I., 3 Great Winchester Street, E.C.

Spencer, Santo & Co.	£13,325 0 0
F. & G. Foster	13,224 0 0
Coxhead	13,178 0 0
F. & A. Willmott	13,143 0 0
Cracknell	13,018 0 0
J. & J. Dean	12,966 0 0
Appleby & Sons	12,720 0 0
Lowe & Co.	12,681 0 0
Carter	12,598 0 0
F. & E. Davey	12,555 0 0
Kilby & Gayford	12,531 0 0
Rowley Bros.	12,468 0 0
R. & E. Evans	12,439 0 0
Maddison	12,429 0 0
Nightingale	12,265 0 0
Hammond & Son	12,264 0 0
Brand, Pettit & Co.	11,835 0 0
Knight & Son	11,744 0 0
FISHER, Northampton	11,557 0 0

THE subscribers to the Perth Infirmary at their annual meeting on Monday, instructed the directors to submit a scheme to erect a new infirmary on a new site. It is calculated a new building to accommodate 100 beds can be erected at a cost of 40,000*l*.

MESSRS. EASTON GIBB & SON, London, who have secured the contract for the new naval base at Rosyth, have stated that the work will be put in hand almost immediately. When a start has been made at least 1,000 men will be engaged, and later, five times that number. The principal proposals of the scheme include a large dock, a large entrance lock, a long river wharf, a floating dock, a basin for submarines, a boat slip, ammunition magazines, and workshops and storehouses. Seven years is the time allowed in the contract for the completion of the scheme. The estimated cost of the proposals is three and a quarter millions sterling.

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BUILDING AND BUILDERS.

PLANS have been passed for an addition to the Biggart Memorial Home, Prestwick, at an estimated cost of 4,500*l*.

THE Manchester City Council give official notice of their intention to provide a new public elementary school for about 500 children at Monmouth Street, Rusholme.

MESSRS. BRYDEN & WALTON, architects, Buxton, have been instructed by the Bakewell Urban Council to proceed with specifications and quantities of the proposed baths and pump-room, which will cost about 3,000*l*.

THE designs submitted by Messrs. George Baines & Son, 5 Clement's Inn, Strand, London, W.C., in a recent competition for Palmer's Green Congregational Church have been adopted, and the erection of the buildings is to be at once proceeded with.

THE Local Government Board have signified their willingness to accept the original scheme of the Bradford Corporation for the sewage of Esholt. It includes an all-masonry viaduct across the Aire Valley, which is estimated to cost 75,000*l*.

THE directors of Aberdeen Royal Infirmary state that with the generous gift of 26,758*l*. received in May last from Lord Mount Stephen they propose to increase and improve the accommodation to enable the hospital to cope with the ever-increasing demands upon it.

MR. A. E. PRIDMORE, architect, who is engaged by the St. Pancras Board of Guardians to prepare the plans for the new operating theatre for the North Infirmary, has given the approximate cost of heating the theatre as follows:—Electricity, 75*l*. 2*s*.; gas, 175*l*. 15*s*.; steam, 147*l*. 5*s*.

AT a meeting of Coventry education committee last week recommendations to erect two new elementary schools were received, one in Mile Lane, the price not to exceed 16,000*l*., and the other in Broad Street, price 11,500*l*. The proposals were adopted, after an amendment to build shower-baths at the schools had been defeated.

MESSRS. H. LOVATT, LTD., builders, of Wolverhampton, have secured a contract from the Great Western Railway Company for the reconstruction of Snow Hill passenger station, Birmingham. The total will amount to nearly 100,000*l*. The work includes the demolition of the present station and the erection of a new building.

HAMILTON Burgh School Board, N.B., have decided to build a new academy, and have adopted the recommendation of a special committee of their members to erect the new building in Auchincampbell Road on four acres of ground. A small committee has been appointed to visit other recently erected schools for the purpose of aiding the Board in selecting a design.

AT the L.C.C. Central School of Arts and Crafts, Southampton Row, W.C. (Department of Architecture and Building Crafts), a course of five lectures on the materials of construction and decoration will be delivered by Mr. Noel Heaton, B.Sc., F.C.S., on consecutive Thursday evenings at 8.30 P.M., commencing February 18. This course is intended primarily for students of architecture, and will supplement the instruction given in building construction. The subject will be dealt with from the scientific standpoint, but no previous knowledge of science on the part of the students will be assumed. The main principles of chemistry, geology and physics will be reviewed and their bearings on architecture discussed as revealing the nature and properties of materials, providing a basis for judging their quality, and determining the extent and limitations of their use in building.

A NEW bath house, embracing both Turkish and Russian baths, with hydropathic treatments, has just been opened at 92 Jermyn Street, Piccadilly, W. The architect, Mr. E. H. Adams, of Chichester House, Chancery Lane, has succeeded in combining all that is best in both the baths, the air being sterilised by the high temperature to which it is brought by the heating and steam apparatus, while the constant change taking place ensures its freshness, and the new metallic filament electric lighting pervades throughout. The walls are lined with enamelled copper, and along the side of the Russian bath are tiers of marble slabs. The Turkish bath comprises three hot rooms, viz. the tepidarium, the calidarium, and the radiatus. The heating apparatus has been supplied by Messrs. Crumblehulme & Sons, Ltd., of Bolton, and the lift by Messrs. Waygoods, Ltd., while the douching apparatus, sanitary and other fittings have been supplied by Messrs. Doulton & Co.

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TRADE NOTES.

NEW elementary schools for the Lancashire County Council are now being erected at Failsworth and also at Great Crosby, under Mr. Henry Littler, county architect. The constructional steelwork, concrete floors, and asphalte flat roofs are being carried out by Messrs. Homan & Rodgers, Manchester.

A NEW porch is now being added to Reigate parish church, under the supervision of Messrs. J. O. Scott & Sons, architects. Chilmark stone is being used and supplied by Messrs. T. T. Gething & Co., proprietors of the Chilmark Quarries, Wilts.

THE Catholic schools, Maesteg, are being warmed and ventilated by means of Shorland's patent Manchester grates and inlet ventilating panels, the same being supplied by Messrs. E. H. Shorland & Brother, of Manchester.

MESSRS. JAMES DUTHIE & Co., the sole agents for Duresco in Scotland, have issued a calendar with a view of a castle, thus suggesting the uses which Duresco can be put to, whether used in castle or cottage. Duresco has proved its value by the improved demand made for it year by year.

MESSRS. PATMAN & FOTHERINGHAM, LTD., builders and contractors, have nearly completed two important West End buildings, viz., 4-6 Glasshouse Street, W., facing Piccadilly Circus, under Mr. E. Keynes Purchase, and also the Albemarle Club, Dover Street, W., under Messrs. Smith & Brewer, architects.

THE Linolite Company inform us that, owing to the expansion of business, it has been found necessary to provide larger works for the manufacture of "Tubolite." The company has therefore purchased the freehold of three-quarters of an acre of land at South Acton, and the existing buildings have been rearranged and adapted to the firm's requirements so as to insure the comfort of the workmen and afford adequate provision for dealing with the output.

MESSRS. E. & F. N. SPON, LTD., are well advised in issuing their "Architects' and Builders' Price Book" of a size that will fit into an ordinary pocket, the actual dimensions being 6½ inches by 3¾ inches by ½ inch thick. Although the size has been thus considerably reduced, all the most useful features of the previous thirty-five editions have been retained and much new matter added. Sufficiently thin paper is used to enable nearly 600 pages to be inserted between the leather covers. The contents are thus arranged:—(1) Memoranda section, 355 pages; (2) price book section, 161 pages; (3) index to price book; (4) buyers' directory. The memoranda contain a great amount of valuable concentrated information arranged alphabetically, which the architect and builder would have to make a wide search for if he was without a Spons' Pocket Price Book. The editor is Mr. Clyde Young, A.R.I.B.A., and the book has been revised by Mr. Stanford M. Brooks, architect.

MESSRS. WM. POTTS & SONS, LTD., clockmakers, Leeds, have received instructions to put in hand a large turret clock, to strike the hours and half-hours and show the time upon four large illuminated dials, for abroad. They are at present also engaged in thoroughly overhauling Thirsk Memorial Tower clock at the Market Square, and have other important work in hand.

MR. LEON GASTER, A.M.I.E.E. (editor of *Illuminating Engineer*), will deliver a course of four Cantor lectures before the Society of Arts on "Modern Methods of Illuminating Engineering," beginning February 15. Lecture I. will deal with "Electric Lighting"; Lecture II., February 22, with "Gas Lighting"; Lecture III., March 1, "Lighting by Candles, Oil, Acetylene, Petrol, Air-gas, Alcohol and other Illuminants"; Lecture IV., March 8, "General Problems in Illumination and Illumination Measurements."

THE Aston education committee report that in recent years the Board of Education have pressed upon them the necessity of erecting outside staircases at certain girls' schools which were not upon the ground floor, and which had only one means of entrance and egress. As an experiment, an emergency staircase of the type suggested was erected at Burlington Street schools in 1904. The committee now recommend that the four other schools should be similarly provided, and have submitted plans to the Board of Education, at a cost of 850*l*.

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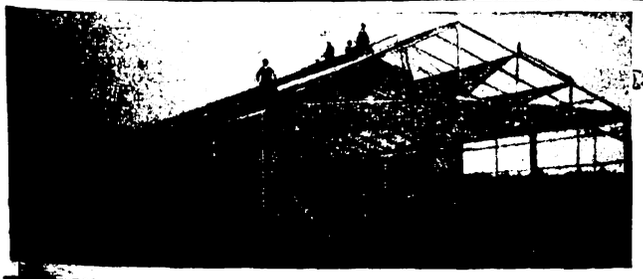
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VARIETIES.

THE public health committee of Edinburgh Town Council recommend that the salary for the office of sanitary inspector be fixed at 200*l.* and that the office be advertised.

SWANSEA housing committee has agreed that preference of Corporation houses be given to those dispossessed; further, that a site be procured to erect 200 additional houses.

THE Llandrindod Wells Urban Council have decided to apply to the Local Government Board for sanction to borrow 10,000*l.* for the erection of a pavilion in the recreation ground.

INVERARY Town Council have under consideration a scheme for thoroughly repairing the stone pier and extending and constructing breast walls on either side of the pier. The work will cost over 6,000*l.*

THE opening ceremony of the new buildings for Wellington Street Baptist Schools and Institute, Luton, took place on Wednesday last. The contract has been carried out by Messrs. T. & E. Neville, of 30 Castle Street, Luton, and amounted to 5,000*l.* The architects are Messrs. George Baines & Son, 5 Clement's Inn, W.C.

ABOUT 50 acres of what is known as Cammell Laird's "option" at Swansea Burrows has been secured by Baldwin's, Ltd., of Birmingham and South Wales. Plans have been prepared for the erection upon the site of blast-furnace plant and tinplate and steel works.

THE Urban District Council of Ventnor, Isle of Wight, have decided to give instructions for the preparation of plans, estimate and specifications for the construction of a funicular railway from the esplanade to the downs overlooking the town.

IT is proposed to erect 300 houses just outside Newport borough boundary on Malpas Road. The Newport sanitary committee recommend that the drains of the new houses be connected to the town main sewer at 5*d.* in the £ upon the rateable value of the properties connected.

THE Salford Town Council will shortly apply to the Local Government Board for sanction to borrow 30,788*l.* to cover the cost of carrying out the Pendleton relief sewer scheme and the construction of sewers in the district of Irlams-o'-th'-Height.

GREAT BRITAIN has been awarded a grand prix d'honneur for their exhibit at the International Congress on the Care of the Insane, held at Milan in 1906, for the plans of the asylums at Ayr, Hellingly (East Sussex) and the London County Council asylums.

THE Bath docks committee recommend the widening of Bath Bridge by cantilevers, thus increasing the width of the footpaths from 6 feet to 8 feet 4 inches and the road from 30 feet 6 inches to 33 feet 4 inches, the estimated cost of which has been agreed between the committees at 1,267*l.*

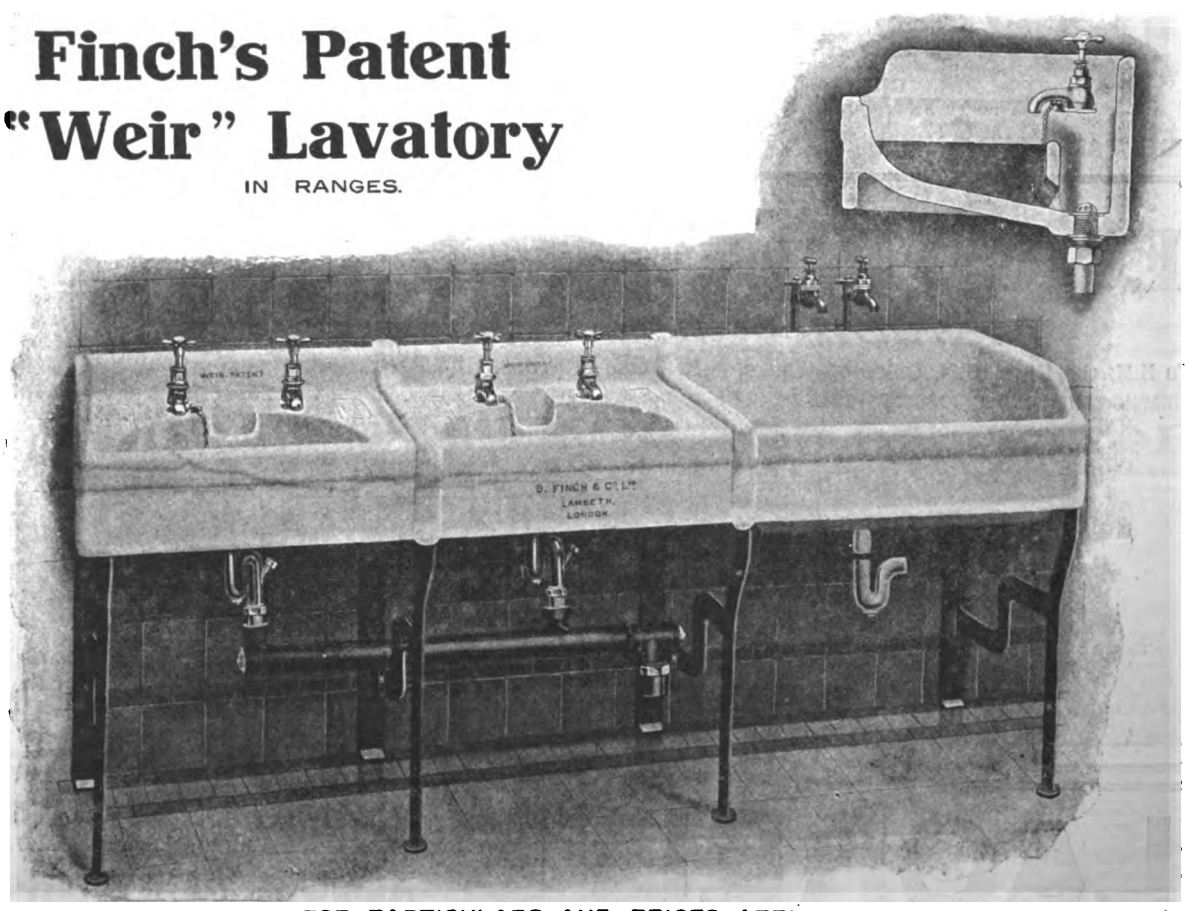
THE Gloucestershire education committee have adopted plans for the erection of a proposed Craft School at Stroud. They provide a school building with accommodation for 120 boys (three class-rooms for forty each), together with two teachers' rooms, and in addition a separate building to be used as workshops for woodwork, ironwork, blacksmithing, textile work and stonework.

THE Thames Conservancy have informed the London County Council as to the decision of the assessor as to the compensation payable by the Council to the Conservators for the lands taken and the proposed permanent works in the river in respect of the erection of the embankment wall for the new County Hall. The amount of the assessment is 15,330*l.*, and the assessor's fee, which is also payable by the Council, amounts to 157*l.* 10*s.*

THE Gamewell fire-alarm system is shortly to be set up in Manchester, at a cost of 13,870*l.* The main principle of the system in contradistinction to others is that the signalling circuit is always "closed," and an electric current is kept continuously circulating round it. The great advantage of this system over an "open" circuit system lies in the fact that the latter has to be closed and an electric current caused to flow before a signal can be transmitted.

THE Staveley Coal and Iron Company, *Ltd.*, have arranged to acquire a new coalfield in the Doncaster district. The works will shortly be erected on a site between Warmsworth and Edlington Wood. A plant is to be put down with all the latest appliances, and the estimated output is to be between 4,000 and 5,000 tons daily, and employment will be found for upwards of 2,000 workmen. In order to meet the requirements caused by the incursion of a new population in the district, a new village will be built.

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THE question of tramway rails was discussed at a special meeting recently of the Hull tramways committee, when it was decided to give the order, proposed to go to the Angleure Company at Liège, to Messrs. W. Scott & Co., at Leeds. The engineer reported that he had written to five English firms, asking whether they supplied similar rails to those required at Hull and Doncaster. One company had not replied, two had stated that they were unable to quote; Messrs. W. Scott & Co. quoted for 350 tons of rails. The committee decided to accept the tender of the Leeds firm for Sandberg rails, at 7*l.* 5*s.* per ton. The price represents an increase of 5*s.* per ton on the price of the Belgian firm, and as the Hull Corporation require only 125 tons, the difference amounts to 30*l.* The Doncaster Corporation will join the Hull Corporation, and will take the balance of the 350 tons of rails the Leeds company require to carry out the order.

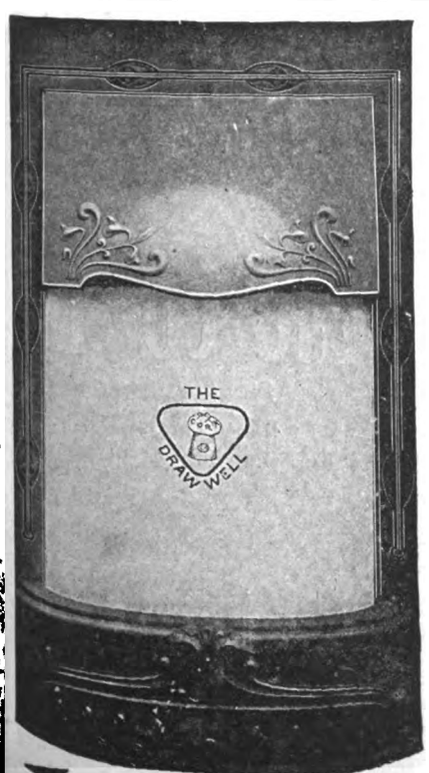
THE Birmingham education committee have adopted the following recommendation of their sites and buildings committee:—"That that portion of minute No. 946 giving to the architect as part of his duties the preparation of quantities for work of alterations to school buildings, &c., not exceeding 5,000*l.* in value be rescinded, and that in future this work be entrusted to Mr. Rowse, quantity surveyor; also that certain arrangements be entered into with the quantity surveyor in reference to commission charges." The portion of the minute referred to reads as follows:—"That the preparation of quantities for work of alterations, &c., to school buildings, not exceeding 5,000*l.* in value, be prepared by the architect as part of his duties, at a commission of 1½ per cent."

THE United States Navy Department are about to carry out a comprehensive series of tests on concrete immersed in sea water at the Navy Yard, Charlestown, Mass. The object of these tests is to determine what the action of sea water is upon concrete, both as regards climatic conditions and chemical action. The tests are to be made as nearly as possible in conformity with usual commercial work, in order to be comparable in all respects with actual work. The specimens are to be built in accordance with the requirements of the Navy Department and under their direct supervision. They are to be built in moulds in the sea in such position as may be directed and exposed for easy inspection and for photographing. They will be so marked as to be easily identified, and a careful record of the materials used and methods will be kept for each specimen.

THE City Architect's Department in Toronto have issued a regulation prohibiting the admittance into places of amusement of more people than can be provided with seats. Some of the town halls and many of the places of popular amusement throughout the province, where large crowds assemble, seem specially constructed to invite a catastrophe. Inadequate exits, flimsy wood construction and dangerous methods of lighting and heating are common.

THE London County Council in 1907 agreed to lease to the Government of Victoria for ninety-nine years, at a rent of 874*l.* a year, a site at the junction of the Strand and the eastern spur street, now known as Melbourne Place, between the Strand and Aldwych. A design was received in July 1907 of the elevation of the buildings to be erected on the site, and, as this was unsatisfactory, further designs were submitted. Eventually Mr. R. Norman Shaw, R.A., offered to assist the Council, and prepared a sketch design which the improvements committee and the architect acting for the Government both approved. Having regard to the importance of the site and to the effect which the elevation of the buildings erected thereon would probably have on the design of the buildings to be erected with a frontage to the Strand on the remainder of the crescent site, it was considered very desirable that every effort should be made to secure an architectural treatment, satisfactory in all respects, of the proposed buildings. In the case of a building on an ordinary site, the original design might perhaps have been accepted. Plans based on Mr. Norman Shaw's sketch design were eventually approved in January 1908. The Government of Victoria have asked for a rebate from the rent payable in consequence of the delay which arose in the approval of their plans and their inability to occupy the new buildings by the date anticipated. The period occupied in these negotiations from the receipt of the first design until the Council's approval was issued was nearly six months, and, in the special circumstances, it has been agreed that a rebate of 218*l.* 10*s.* be made from the rent payable by the Government of Victoria.

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A MODERN INSURANCE BUILDING.

Among the many notable new buildings in and around Piccadilly must be included the new offices for the Norwich Union Life Insurance Society at the eastern corner of Piccadilly and St. James's Street, and of which Messrs.



Ernest Rüntz & Ford are the architects. We have already shown the elevation of these premises. From a constructional point of view they are of sufficient interest to repay a more detailed notice. The steel frame is so disposed that all loads from floors, walls and roofs are transmitted by steel girders to steel stanchions, which take their foundation below the basement. The floors are designed and constructed on the Somerville system, which has been employed in many important buildings and which the architects had previously used on other works with satisfactory results. The general arrangement is shown clearly by the illustration, and consists of hollow reinforced concrete blocks, 3 feet 4 inches span, placed between rolled-steel joists of section suitable for the span and load; good clinker concrete is then filled in on top of the tiers, and brought to a level surface ready to receive the wood-block flooring. The concrete tiles are moulded at Messrs. D. G. Somerville & Co.'s works, being thoroughly matured and seasoned. Each tile is reinforced with a frame of $\frac{3}{16}$ steel rods so designed as to take up the bending and shearing moments. Every tile is guaranteed to carry a load of 3 cwt. per square foot, and we are informed, has been tested up to 19 cwt. per square foot without destruction. The bottom of the concrete tiles projects below the soffite of the steel joists, so giving absolute protection to the steel and forming a level ceiling. The soffites are all scored ready to receive the finishing coats of plaster, which saves the trouble and expense of hacking. In the design of the steel frame of the building considerable economy was effected by the extreme lightness of the floor, which, including the steel joists and concrete filling, only weighs 35 lb. per foot super, against 65 lb. for a solid concrete floor. An interesting feature in the construction of the building was the speed with which it was erected, and this was mainly because no interior scaffolding was used; the floors not requiring any centring were constructed immediately the steel framing was fixed; the builders used them in place of scaffolding, openings being left here and there for hoisting up materials.

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Where a reinforced concrete floor pure and simple is used one of the great difficulties is the amount of centring and strutting required, which cannot be removed under three weeks to a month, and during this time no load must be placed on the green concrete.

Again, once a reinforced concrete floor is set it is a matter of the greatest difficulty and of very considerable risk to make openings or any considerable structural alteration. In Messrs. Somerville's system it is simply a question of trimming the steel joists or for a small opening for removing one of the concrete tiles. In addition to the great strength of this flooring and general economy owing to the reduction in dead weight, a very important advantage is obtained by its soundproofness. The continuous air-spaces which extend inside the floor from wall to wall break up and lose any sounds, unless, of course, of a very exceptional character.

NEW CATALOGUES.

ALTHOUGH the Carron Company this year celebrate their 150th birthday, their two latest catalogues fully substantiate the company's motto, "Esto Perpetua." One catalogue is given up to selected designs for mantel-pieces and mantel register grates with and without overmantels. In it a page is devoted to a clear illustration and a detailed specification of each grate or mantelpiece showing a wide variety in price and design. The second catalogue is a general list, which might be headed "A few of the things made at the Carron Works." It gives prices for their iron air bricks, lavatory fittings, earth rammers, ranges, street tobys, ornamental tables, baths, grates, &c.

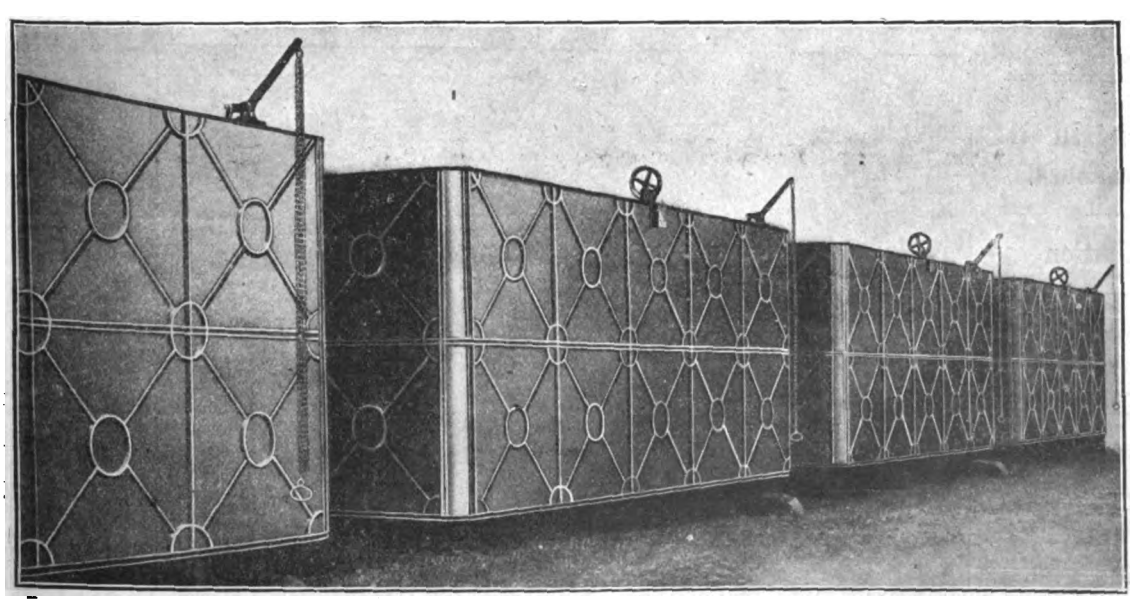
"DOULTON'S" and public health are closely linked in a hundred different ways. They have recently issued a twenty-four page pamphlet to explain their patent mixing valve, which is so designed as to supply a constant stream of water to the required temperature by the movement of one handle, and so constructed that the cold water must pass through first. The mixing valve is already in use in public baths, hospitals, asylums and infirmaries in England, Ireland, Scotland and Wales. No less than nine varieties have been made for the different requirements of operating-rooms. In every case the temperature can be nicely regulated by the user by checking or increasing the flow to the mixer from the hot and cold supply pipes. It is also applied to a rain or shower bath, douche-room fittings, massage under water and other ingenious uses. The price given in the list for a "Doulton's patent non-concussive mixing valve with lever handle, dial plate and wall plate with unions for lead in polished brass" is 3*l.* 7*s.*

PARNALL & SONS were recently faced with the pleasant necessity of enlarging their works and introducing electric machinery if they desired to cope with their orders for shop fronts and interior fittings. No one will disagree with their assertion that "shop fronts and fittings should be designed to harmonise with the location. They should be both striking to the eye and yet pleasing. The space at disposal should be employed to the best advantage, giving facilities for prompt service whilst lending themselves to effective display." Messrs. Parnall achieve this in some of their designs for shop fronts by setting back the main line of glass and shaping it to a quarter circle at the angles with the wall. In fronts and fittings there is frequently a rounding off of the hard right angles (of which we all have had too long experience) by using bent glass. The firm produce also highly creditable wrought iron and other accessories for the equipment of jewellers' shops.

ALTHOUGH the Pooley weighbridge has been in demand by railway companies ever since railways began in this country, Messrs. Henry Pooley & Son, Ltd., Birmingham, have not been unmindful of the requirements of smaller customers. They manufacture weighing apparatus of all types for all purposes. Their latest "No Loose Weight Steelyard" has been designed to overcome objections raised against various forms of "No Loose Weight Steelyards" hitherto in use, as well as to meet the requirements of the Board of Trade Regulations, 1907.

DENNISON, KETT & CO., LTD., in making revolving shutters to be one of their specialities, have done it with thoroughness. Their list gives particulars of ten patterns including lath shutters of convex wood, bevel wood, and flat iron and curvilinear iron, corrugated steel, and other varieties with different fittings. Illustrations are also given

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of the various plans of arranging the coils. It is advised that provision be made so that ready access may be obtained for oiling the shutters or removing them for repairs. The best way to do this is to have the casings or facias screwed or hinged. The firm have special machinery for the manufacture of their improved collapsible steel gates. In these gates the diagonals are fixed in a solid cross head instead of in loose slippers, so as to give rigidity and noiselessness. The other specialities given in this list are pavement lights and electric motors.

"THE Construction of Modern Factories" is the title of a 16-page illustrated pamphlet issued by Mr. W. H. Brown, M.S.A., consulting structural engineer, Standard Buildings, Leeds, for the purpose of showing his patent reinforced concrete skeleton system. Mr. Brown brings to his work an experience extending over fifteen years in factory construction, and he now employs a staff of fully qualified engineers. His ideal factory is one where the columns, floors, foundations and roof are of reinforced concrete to his own system with cavity storm walls reinforced by wire mesh netting and reinforced brick partitions. The floors and roofs are of reinforced concrete with hollow tubes inserted. These floors have been constructed to carry a load of 17 cwt. per foot super, with 10 feet clear spans. A further safeguard against fire which is warmly advocated is the installation of an efficient electrical fire alarm throughout. The pamphlet gives plans and sections of a large factory erected on the principles advocated by Mr. W. H. Brown, who will personally advise on the construction and protection of all factories and mills.

IT may be well to briefly explain the character of "Monolithic Brickwork" as it is a fairly recent arrival in the building trades, although the majority of our readers probably have already seen it, if not already used it. A more precise name would be "Wire-Reinforced Brickwork," for it consists of the embedding in the mortar joints of a steel wire mesh 2 inches and 2½ inches in width, with four straight tensional wires running its extreme length. This mesh forms a continuous bond, makes the mortar become the strength of the brickwork, and renders the brickwork "monolithic." Tests have proved that a cavity wall made up of an outer wall of 4½ inches, brick reinforced, and of 3 inches (brick on edge) reinforced inner wall, has a greater strength than a 9-inch concrete wall. Messrs. Richard Johnson, Clapham & Morris, Ltd., of Manchester, the sole licensees, give in the first portion photographs and descriptions of tests. Photographs show monolithic brickwork in actual use as 3 inch and 4½ inch partitions, and 9-inch cavity storm walls in a large factory; designs for a 130*l.* cottage with cavity walls are included. It is said "a hollow 9-inch reinforced storm wall is cheaper than a 9-inch solid wall, and has all the advantages of a 14-inch cavity wall at one-third less cost." But the present catalogue is lacking in the matter of estimated prices. In one test a piece of wall forming a 5-feet cantilever resisted a load of 3,360 lbs. The last portion of the catalogue is headed "The Clothing of Reinforced Concrete Buildings," and shows the combination of monolithic brickwork walls and partitions with the concrete skeleton. This is done by partly inserting the H.B. Bonding Wire in the concrete during its construction, and building the loose ends into the brickwork.

A COMPANY has been formed and a prospectus issued under the title the "Girls' College Association, Ltd." Subscriptions are invited for 5,000 shares, out of the nominal capital of 10,000 shares of 5*l.* each (50,000*l.*). The chairman of the governing body is Sir George Hayter Chubb. The governing body are in negotiation with the Hon. R. Marsham-Townshend for a portion of the Scadbury Park Estate, Chislehurst, which will be the site of the projected college, and which is situated 1¼ mile from Chislehurst Station, and within fifteen minutes' walk of the Chislehurst Wesleyan Church. Messrs. Gordon & Gunton are the architects, and as soon as the purchase money (9,000*l.*) has been paid plans will be prepared for the erection of the school buildings, laying out the ground, playing fields, &c.

THE Ayr Town Council have agreed that the three shops situated on the Auld Brig belonging to the Corporation should be pulled down and added to the approach of the bridge. These shops did not form any part of the original structure of the bridge, and the premises were not in good condition. The Auld Brig Preservation Committee, it is understood, will be at the expense of taking down the buildings and erecting a suitable parapet wall.

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Heating, Ventilating, and Domestic Engineers.

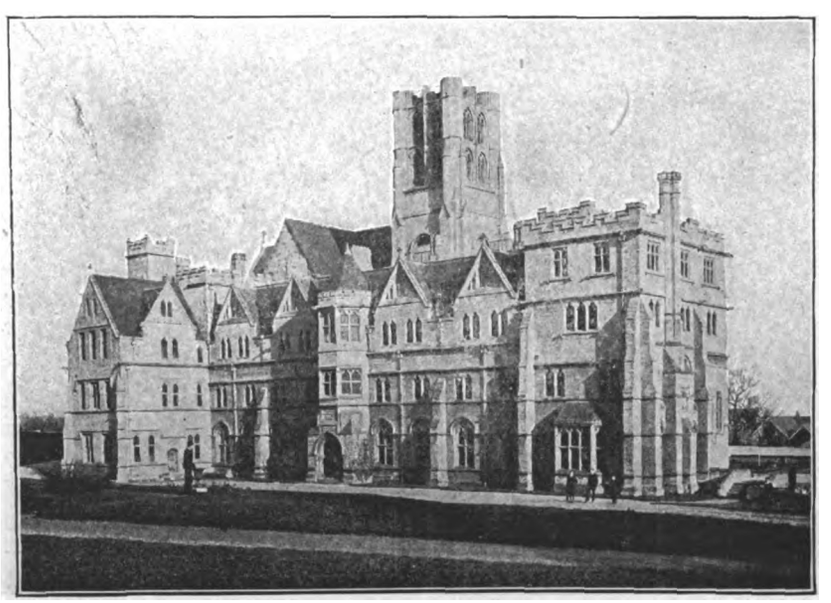
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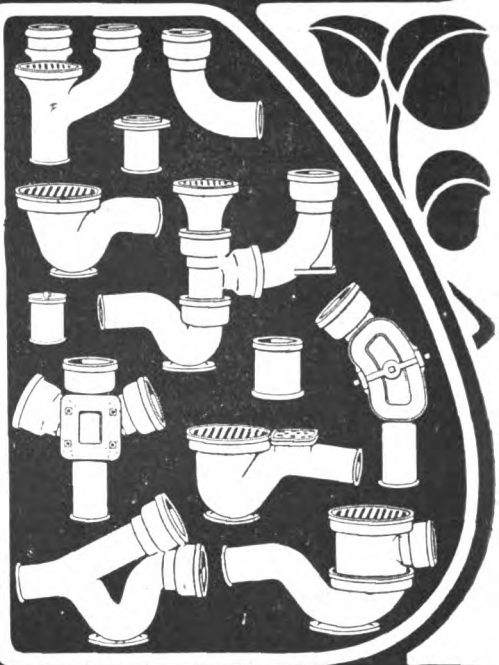
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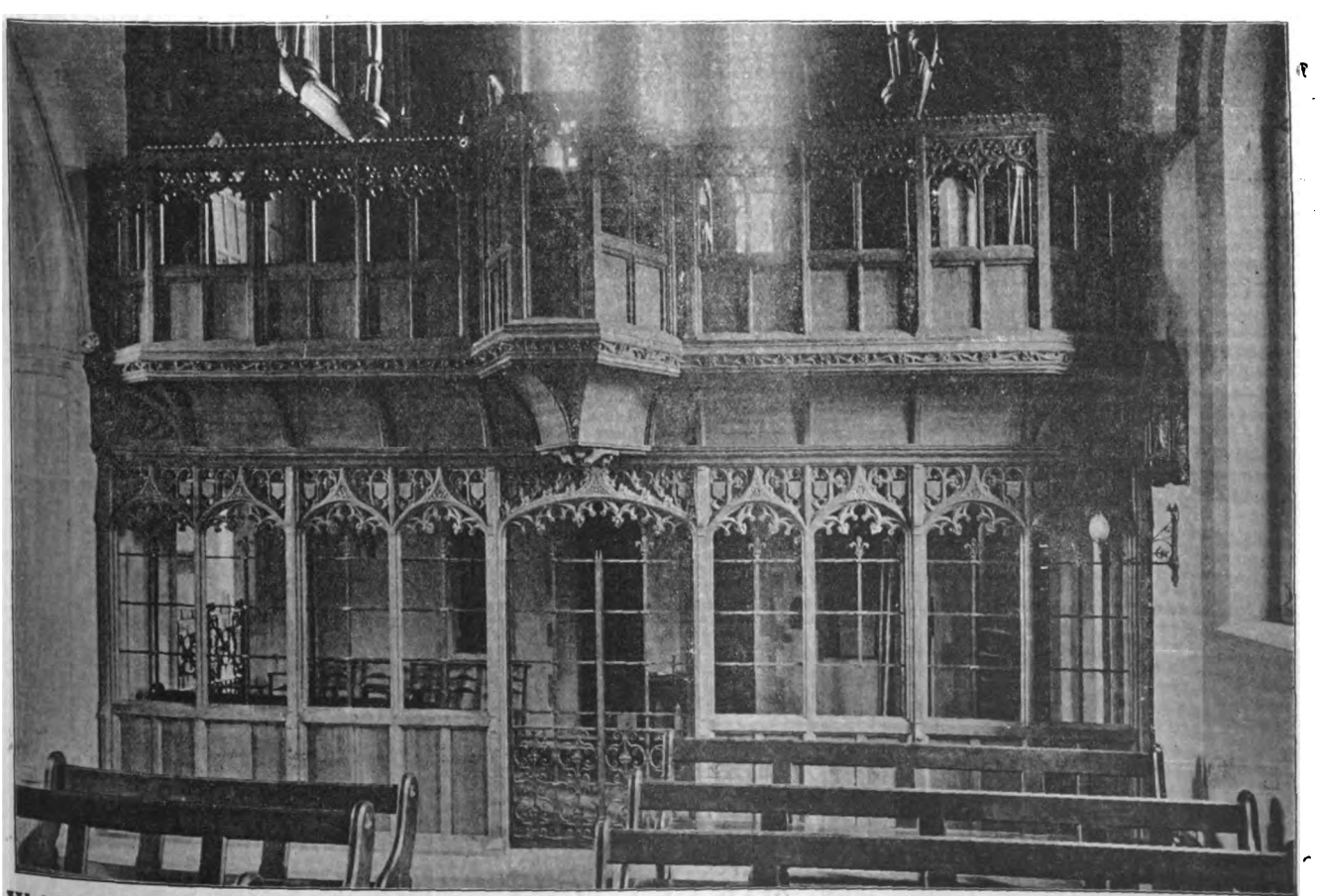
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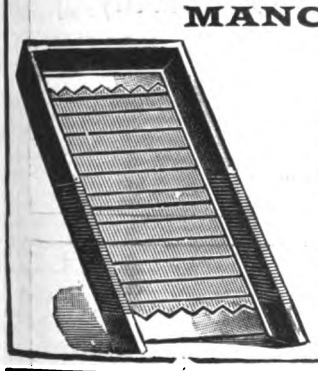
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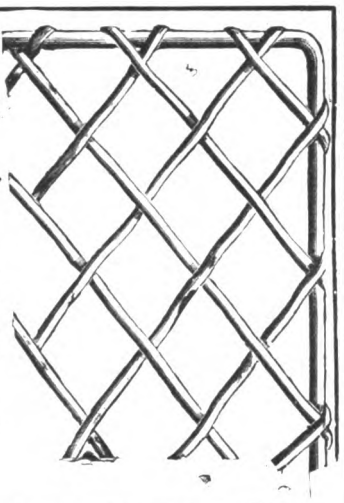
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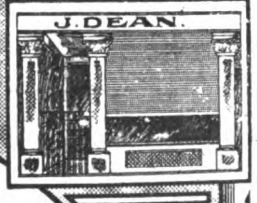
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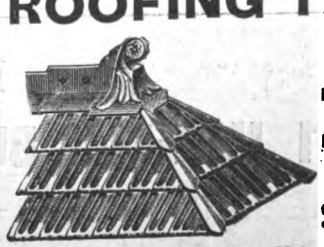
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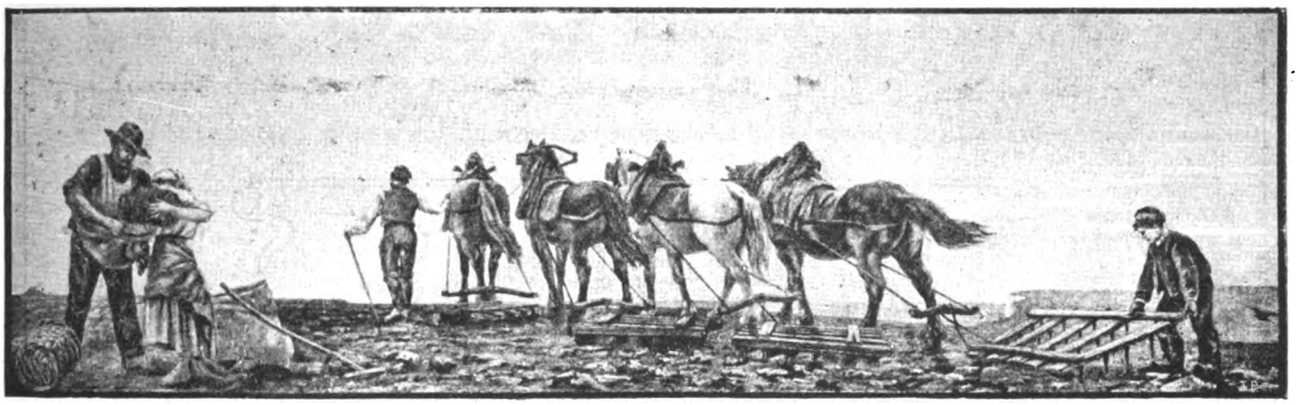
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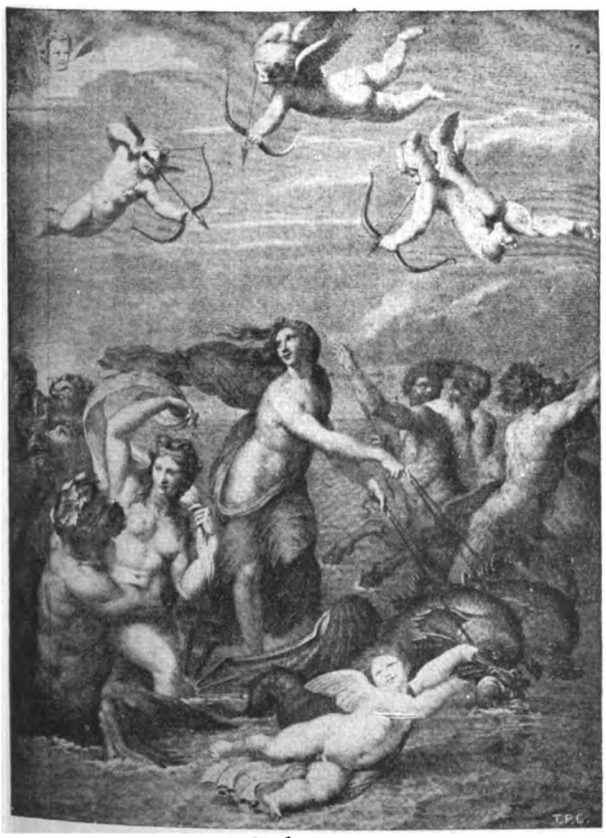


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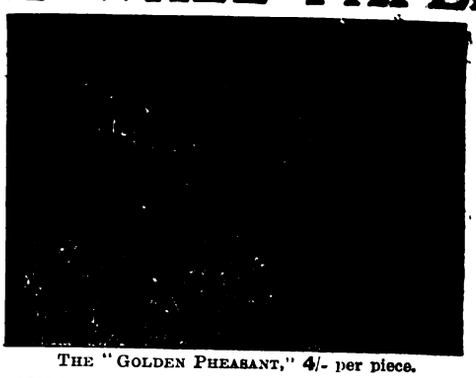
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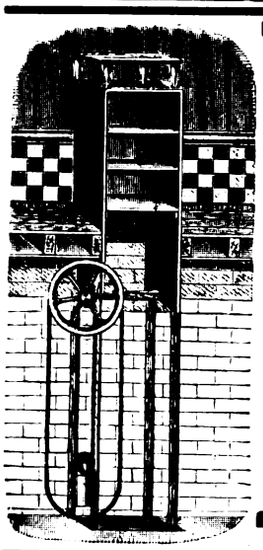
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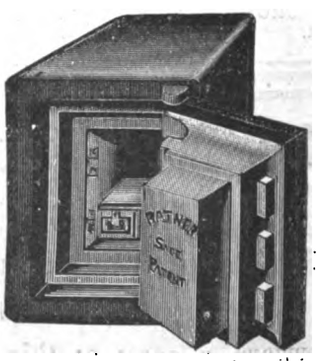
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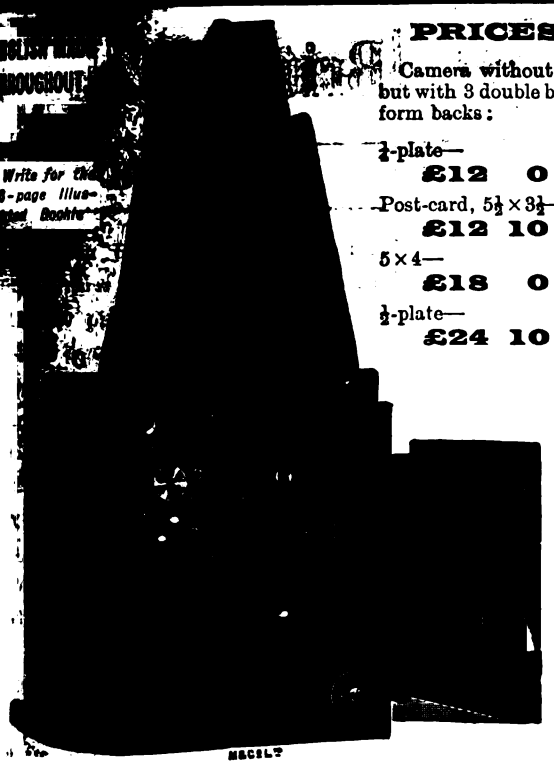
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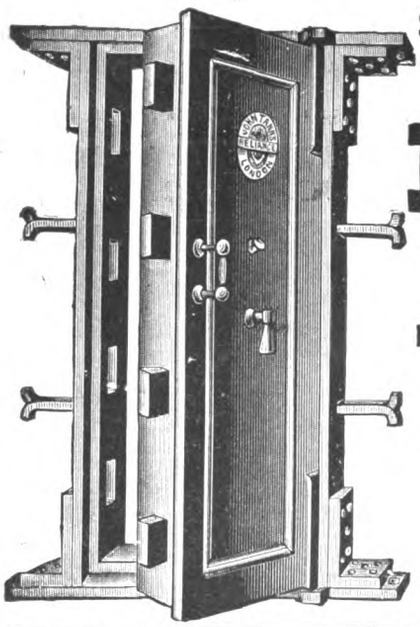
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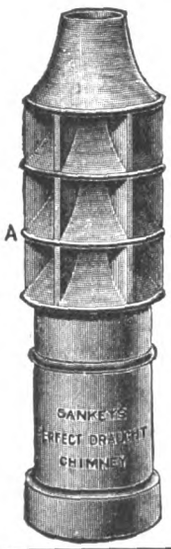
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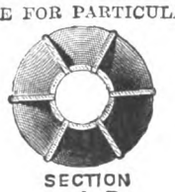
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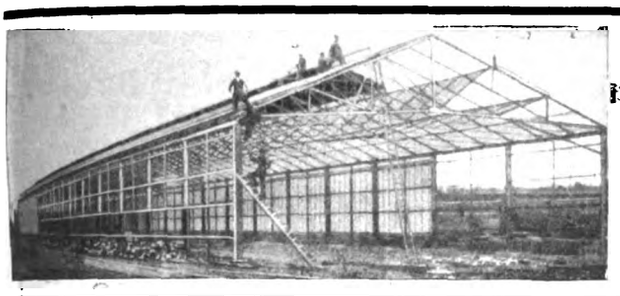
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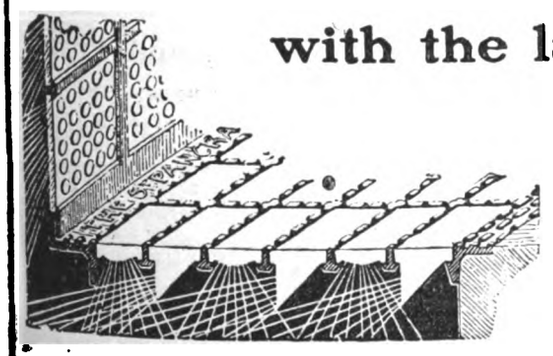
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EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

*** *As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than* 2 P.M. *on Thursdays.*

COMPETITIONS OPEN.

GLASGOW. July 31. The patrons of the Royal Incorporation of Hutchesons' Hospital invite designs for laying out for feuing and building about 195 acres of their lands of Thornliebank, Eastwood. Premiums of 100*l.*, 75*l.*, 50*l.* and 25*l.* will be awarded. Deposit 3*l.* 3*s.* Messrs Hill & Hoggan, 194 Ingram Street, Glasgow.

WALES.—Feb. 20.—Plans are invited for a new chapel at Penclawdd to contain 800 sittings. The approximate cost of chapel, including heating and acetylene lighting apparatuses to be 3,000*l.* A premium of 5*l.* 5*s.* will be awarded the architect whose plan the committee may select. Mr. John Rees, secretary, Penlan, Penclawdd, S.O.

CONTRACTS OPEN.

ASHTON-UNDER-LYNE.—Feb. 20.—For erection of a stone house for the housing of the mechanical filters at Ashway Gap, Greenfield. Forward names to Mr. Fred J. Dixon, A.M.I.C.E., waterworks engineer, Town Hall Chambers, Ashton-under-Lyne.

ATTLEBOROUGH.—Feb. 20.—For erection of church parish room in Park Avenue, Attleborough, Warwickshire. Send names to Mr. Ernest E. Shepherd, architect and surveyor, Nuneaton.

AYCLIFFE.—For proposed alterations and additions to house at Aycliffe, near Darlington. Mr. Frank Martin, architect, 2 Prebend Row, Darlington.

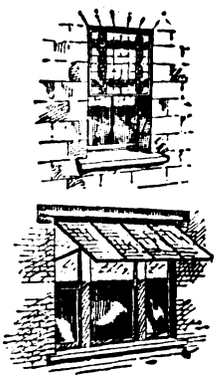
BELFAST.—Feb. 20.—For erection of two semi-detached villas at Fruit Hill Park, Falls Road. Messrs. Young & Mackenzie, architects, Scottish Provident Buildings, Belfast.

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Bolton-upon-Dearne.—March 1.—For erection of wall, &c., Recreation Ground, Goldthorpe. The works include about 154 yards cube digging, 207 yards hedge stubbing, 187 yards rubble, 6 inches clink in mortar, 12 roods 30 feet 15 inches rubble, 45 roods Brighouse stone wall, 518 feet double chamfered stone coping, 50 flag copings, 16⅓ yards cement dado, gates, railings, &c. Deposit 10*s.* 6*d.* The Surveyor, Bolton-upon-Dearne, Rotherham, Yorks.

Bury St. Edmunds.—Feb. 22.—For converting the large room at the Town Hall into public offices, and certain other alterations. Deposit 2*l.* 2*s.* Mr. Walter D. Harding, A.M.I.C.E., borough surveyor, Town Hall, Bury St. Edmunds.

Butlock's Heath.—March 1.—For erection of an additional classroom for sixty children and two cloak-rooms at Butlock's Heath, Hants. Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

Canterbury.—Feb. 24.—For erection of a cottage for the head attendant at the Canterbury Borough Lunatic Asylum. Deposit 3*l.* Messrs. Jennings & Gray, architects, 4 St. Margaret's Street, Canterbury.

Chopwell.—For the whole or part of the works required in the erection of three houses and shops at Chopwell. Deposit 10*s.* 6*d.* Forward names to Mr. D. M. Spence, architect and surveyor, Shotley Bridge.

Coventry.—Feb. 22.—For erection of buildings at the Foleshill Gasworks, comprising offices, &c., of capacity about 48,000 cubic feet. Deposit 1*l.* 1*s.* Mr. Fletcher W. Stevenson, engineer and general manager, Gasworks, Coventry.

Doncaster.—Feb. 20.—For the reconstruction of Golden Lion Hotel, Cleveland Street, Doncaster. Mr. James Heseltine, architect and surveyor, Old Castle Drawing Office, Pontefract.

Doncaster.—Feb. 23.—For erection of a school. Deposit 1*l.* 1*s.* Apply to Messrs. Empsall & Clarkson, architects and surveyors, 7 Exchange, Bradford.

Dorchester.—Feb. 24.—For the following works for the Cricket Club:—(1) Erection of pavilion; (2) for laying water supply. Mr. P. B. J. Harding, hon. secretary, Cambridge Road, Victoria Park, Dorchester.

Edinburgh.—Feb. 24.—For the various building works in the erection of slaughter-houses, as follows, for the Magistrates and Council:—(1) Excavator, mason and brick works; (2) iron and steel work, Schedule No. 1; (3) iron and steel work, Schedule No. 2 (steel roofs, pennages and railings); (4) carpenter and joiner work; (5) plumber work; (6) slater work; (7) cement and plaster works; (8) glazier work; (9) tile layer's work; (10) ferro-concrete work and asphalte. Deposit 3*l.* 3*s.* Mr. James A. Williamson, A.R.I.B.A., city superintendent of works, Public Works Office, City Chambers.

Enfield.—March 16.—For erection of a block of schools at Lavender Road. Deposit 3*l.* 3*s.* Apply by February 27 to Mr. G. E. T. Laurence, architect, 22 Buckingham Street, Adelphi, W.C.

Evesham.—Feb. 20.—For erection of a Council secondary school. Deposit 2*l.* 2*s.* Apply to the County Education Office, Worcester.

Grange-over-Sands.—Feb. 22.—For (*a*) erection and fittings of public conveniences near the Crown Hotel, in Main Street; (*b*) making-up of Charney Road. Mr. Thos. Huddleston, engineer and surveyor, Council Offices, Grange-over-Sands.

Heckmondwike.—Feb. 22.—For extensions to club premises in Back Lane. Mr. H. Stead, architect, Heckmondwike.

Hereford.—Feb. 22.—For erection of cottages for the Hereford Co-operative Housing, Ltd. Deposit 2*l.* 2*s.* Messrs. Groome & Bettington, architects and surveyors, Palace Chambers, Hereford.

Hoddesdon.—Feb. 25.—For erection of a County Council school at Rye Park, Hoddesdon, Herts. Deposit 2*l.* 2*s.* The County Surveyor's Office, Hatfield.

Ireland.—Feb. 24.—For the erection of sanitary annexes at the Rathdown Workhouse. Mr. P. Cunniam, clerk, Loughlinstown, Ireland.

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LEYTON.—Feb. 23.—For the erection of the Canterbury Road Council schools. Deposit 5*l*. Apply by February 13 to Mr. William Jacques, A.R.I.B.A., 2 Fen Court, Fenchurch Street, E.C.

LIVERPOOL.—Feb. 24.—For construction of additional buildings to the Mansfield Street open-air bath. Mr. W. R. Court, chief superintendent, Municipal Offices, Liverpool.

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LONDON.—Feb. 24.—For the alteration and enlargement of conveniences at Golder's Hill Park, Hampstead, N.W. The Parks Department, 11 Regent Street, S.W.

LOSTWITHIEL.—Feb. 24.—For erection of three or five houses for the Lostwithiel Building Company, Ltd. Mr. J. Venning, auctioneer, &c., secretary, Lostwithiel.

LUTON.—Feb. 26.—For erection of school buildings on Beech Hill, Dunstable Road. Messrs. J. R. Brown & Sons, architects, Castle Street, Luton.

MARGATE.—March 2.—For the supply and erection of:—(1) A glass and iron addition to an existing bandstand on the sea front, the structure to measure 110 feet by 30 feet, the roof to be wholly of glass and to be of patent glazing, supported by means of fifteen cast-iron columns and wrought-iron ornamental principals; (2) a timber and glazed folding wind screen of about 2,000 superficial feet area; (3) a covered way 110 feet by 30 feet consisting of cast-iron columns, steel joists, concrete roof, asphalte topping, and ornamental iron railing, &c. Mr. E. A. Borg, borough engineer, 13 Grosvenor Place, Margate.

MILE END (COLCHESTER).—Feb. 27.—For the erection and completion of the superstructure of the main building of asylum at Mile End, Colchester, about one and a half miles north of Colchester main line railway station. Deposit 100*l*. Apply by February 13 to Mr. W. P. Gepp, clerk to the visiting committee, New Street, Chelmsford.

MORLEY.—Feb. 25.—For the various works required in alterations to engine house and new engine bed at Gillroyd Mills. Mr. T. A. Buttery, F.I.A.S., architect, Queen Street, Morley, Yorks, and 1 Basinghall Square, Leeds.

NETTESWELL.—Feb. 26.—For widening a small bridge (known as Burnt Mill Bridge) over the mill stream in Netteswell, Essex. Mr. Percy J. Sheldon, M.I.C.E., chief surveyor, Chelmsford.

NEWBIGGIN.—Feb. 26.—For alterations and additions to Newbiggin Police Station, Northumberland. Deposit 1*l*. 1*s*. Mr. J. A. Bean, county architect, The Moothall, Newcastle-on-Tyne.

NORTHENDEN.—Feb. 22.—For the whole of the works required in the erection of a Council school. Send names by February 10 to Mr. W. Taylor, clerk, Technical School, Sale.

NORTH SHIELDS.—Feb. 23.—For erection of a cement concrete retaining wall of about 150 feet in length and 20 feet in height, in Bell Street, or for a reinforced concrete wall. Deposit 2*l*. 2*s*. Mr. John F. Smillie, borough surveyor, Tynemouth.

PETERBOROUGH.—Feb. 23.—For alterations and additions to two cottages at Orton Waterville. Messrs. H. M. Townsend & R. A. Fordham, architects, Cross Street, Peterborough.

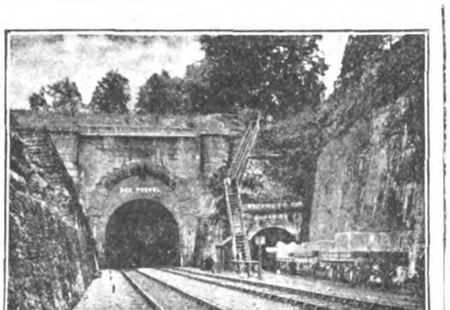
SANQUHAR (SCOTLAND).—March 1.—For new retort-house, new bench, and other proposed improvements at the Sanquhar Gasworks. Apply by Feb. 23 to Mr. Wm. Forsyth, town clerk.

SCOTLAND.—March 2.—For erection of spire for church, for Deacons' Court of United Free English Church, Stornoway. Mr. Neil Maccallum, clerk to Deacons' Court, Stornoway.

SCOTLAND.—March 13.—For the construction of greenhouses, &c., at Wellshill Cemeteries, Perth. Mr. James W. Bayne, superintendent of cemeteries, Wellshill, Perth.

SHEFFIELD.—Feb. 20.—For the erection of ward blocks and kitchens at the Royal Infirmary. Send names to Messrs. Gibbs & Flockton, architects, 15 St. James's Row, Sheffield.

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Silloth.—Feb. 22.—For the different artificers' work required (joiners' excepted) for erection and completion of eight cottages at Silloth. All information obtained at 13 Esk Street, Silloth, Cumberland. Mr. J. R. Thomson, joiner, Silloth.

Skipton.—Feb. 22.—For erection of gate piers and hanging only of ornamental gates at the Sackville Street entrance to Firth Recreation Ground. Mr. A. E. W. Aldridge, engineer and surveyor, Town Hall, Skipton.

Todmorden.—Feb. 22.—For the various trades in the erection of a secondary school on the Stile Estate. Apply after February 15 to Mr. Jesse Horsfall, F.R.I.B.A., 4 Chapel Walks, Manchester.

Upper Gornal.—Feb. 23.—For erection and completion of combined cookery, laundry work and handicraft centres at Upper Gornal, Sedgley, Staffordshire. Deposit 1*l.* 1*s.* Apply to Mr. Graham Balfour, director of education, County Education Offices, Stafford.

Wales.—For new block of offices in York Street, Swansea. Deposit 5*l.* 5*s.* Send in names to Messrs. Margrave & Peacock, architects, Metal Exchange, Swansea.

Wales.—Feb. 20.—For erection of a chapel in Arthur Street, Tredegar. Mr. W. S. Williams, architect, Elmwood House, Tredegar, Mon.

Wales.—Feb. 23.—For the construction and erection of farm buildings in connection with the mental hospital at Whitchurch, near Cardiff. Deposit 2*l.* 2*s.* Mr. J. L. Wheatley, town clerk, City Hall, Cardiff.

Wales.—Feb. 23.—For the extension of retort-house, four settings of six retorts, condenser and rotary scrubber-washer, for the Briton Ferry U.D.C. Mr. J. Mogford, manager, Gasworks, Briton Ferry.

Wales.—Feb. 23.—For erection of about 730 lineal yards of dwarf wall and wrought-iron railing in Cathays Park, Cardiff. Separate tenders are required for:—(1) Construction of the Portland stone dwarf wall; (2) supply and erection of wrought-iron railing. The City Engineer's Office, City Hall, Cardiff.

Wales.—Feb. 24.—For erection of additions to the Pontypool and District Hospital. Deposit 1*l.* 1*s.* Mr. Sidney Williams, M.S.A., architect, Borough Chambers, Wharton Street, Cardiff.

Wales.—Feb. 24.—For completing an extension to the Council school, Blaina, Mon. Mr. R. L. Roberts, architect, Abercarn.

Wales.—Feb. 26.—For erection of a small generating station at Abertillery, Mon. Deposit 1*l.* 1*s.* Send names by February 15 to Mr. Maurice E. Webb, architect, 19 Queen Anne's Gate, Westminster, S.W.

Wales.—Feb. 27.—For building additions to and altering the Ynysbwl mixed school, Mountain Ash. Mr. W. H. Williams, architect, Town Hall, Mountain Ash.

Wales.—March 6.—For erection of a church at Ogmore Vale. Mr. J. Cook Rees, architect, Parade Chambers, Neath.

Yorks.—March 12.—The West Riding education committee invite whole or separate tenders for the following works:—Wombwell, new school; Aston-with-Aughton, Aughton new school. Mr. Francis Alvey Darwin, clerk of the County Council, County Hall, Wakefield. Deposit 1*l.* with West Riding Treasurer, County Hall, Wakefield.

A deputation from Partick Town Council have visited Greenock and inspected the refuse destructor erected by the Corporation in Dellingburn Street.

The President and the Council of the Institution of Electrical Engineers have appointed Mr. P. F. Rowell to be secretary of the Institution, in succession to Mr. G. C. Lloyd.

The Glasgow Corporation last week considered two designs for new gates to be erected at the Victoria Road entrance to the Queen's Park, towards the cost of which the Parks Department are to receive from the Tramways Department a contribution of 300*l.* Design No. 1, by Messrs. Walter Macfarlane & Co., was estimated to cost 600*l.*; and design No. 2, by the city engineer, was estimated to cost 250*l.* The parks committee, after some discussion, were instructed to advertise for designs and estimates.

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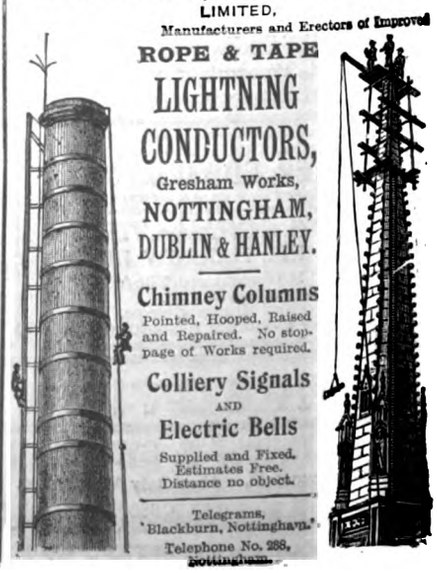
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BEVERLEY.

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DEMPSTER & SONS, Elland (*accepted*)	£2,750 0 0

BIRMINGHAM.

For reconstructing the drainage system at the workhouse.

SAPCOTES & SONS (*accepted*)	£2,557 0 0

CHATTERIS (CAMBS.).

For alterations to police-station.

Spragg	£973 0 0
Papworth	943 5 0
Barrett	869 15 6
Shanks	855 0 0
HEATH, March (*accepted*)	783 0 0

CHILCOMBE.

For erecting a coachman's cottage at Chilcombe, Bicknoller. Mr. F. W. ROBERTS, F.R.I.B.A., Taunton.

Jennings	£438 10 6
Chibbett & Sons	354 0 0
Manning & Son	348 0 0
Hunt & Son	324 10 0
SPEAR, Taunton (*accepted*)	300 0 0

DARTFORD.

For shaping out roads and kerbing, &c., drainage, &c. Messrs. TAIT & HOBBS, architects, Dartford.

Knight	£1,020 0 0
Pedrette & Co.	922 6 9
Rayner	911 0 2
Wood & Sons	894 16 3
Parsons & Parsons	853 17 5
Bell & Sons	819 0 0
Lonsdale	769 0 0
Ellingham	768 0 0
Jackson	764 8 6
Wheeler	753 9 0
Bate & Co.	722 17 6
Trueman	719 0 0
Price, Rochester (*recommended*)	700 0 0

DONCASTER.

For the erection of a race-stand.

MULLINS & RICHARDSON (*accepted*)	£5,960 0 0

EAST HAM.

For erection of the residence for the medical officer of health on the hospital site.

Hosking	£647 0 0
Webb	629 0 0
Jaggers Bros.	585 0 0
Moss	580 0 0
Myall & Upson	540 0 0
Hammond & Miles	542 0 0
Pickrill & Orchard	528 0 0
Newell & Lusty	520 0 0
Bradley	516 0 0
Jerram	495 0 0
Luton	457 0 0
Clemens Bros.	442 10 0
Chadwell Heath Joinery Co. (*recommended*)	360 0 0
Borough engineer	523 0 0

HEXHAM.

For the construction of covered service reservoirs and works connected therewith. Mr. J. E. PARKER, A.M.I.C.E., engineer, Newcastle-on-Tyne.

Thorpe	£1,383 8 6
Darlington	1,264 7 4
W. J. & G. Douglas	1,225 9 3
Blackett & Sons	1,198 0 0
Davison	1,157 17 1
Kennedy	1,140 0 0
Bailey	1,035 13 4
Craven	1,020 0 0
Henderson & Wilson	964 0 0
Pickshall	931 3 1
Beattie & Son	926 3 5
Robson	859 3 0
LANT, Newcastle-on-Tyne (*accepted*)	857 8 10
Engineer's estimate	1,000 0 0

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For erection of a masonic hall at Liscard, Cheshire. Mr. J. W. B. HARDING, architect, Liverpool.

Mayor & Co.	£3,625 0 0
Hills & Sons	3,395 0 0
Rothwell	3,345 0 0
Haigh & Co.	3,287 0 0
Popple	3,274 0 0
Dolan & Sons	3,273 0 0
Paterson	3,270 0 0
Parker & Son	3,260 0 0
Dryland & Preston	3,229 15 0
Duthie & Dobson	3,224 0 0
Lloyd	3,200 0 0
Hall & Jamieson	3,197 0 0
Bellis	3,160 0 0
Tyson	3,142 0 0
Milestone	3,107 10 0
Spencer	3,060 0 0

LONDON.

For the supply of agricultural drain-pipes required for the drainage of the Wylde Farm section of Hampstead Heath.

Sutton & Co.	£216 13 5
Northwich Brick and Terra-cotta Co. *	169 1 9
Turner & Lisney	162 6 2
Hawkins & Co.	157 19 0
Ellistown Collieries *	157 18 6
Robinson & Dowler *	156 4 0
Hall & Co. (Croydon)	146 11 4
Ballard	146 3 8
Knowles & Co. (Wooden Box)	145 8 4
Young & Son	141 12 8
Albion Clay Co.	140 3 0
Lawford & Sons	138 17 6
Leeds Fireclay Co.	136 7 4
West Bros.	135 12 8
Broad & Co.	129 10 10
Bagworth Brick Co. *	127 10 10
Arlesey Brick Co. (*recommended*)	126 2 0
Lamb & Sons	Incomplete

* Price for delivery at nearest railway station.

LONDON—*continued.*

For the erection of a police section house at Yeoman's Row, Walton Street, S.W. Mr. J. DIXON BUTLER, F.R.I.B.A., New Scotland Yard, S.W.

Ansell	£7,000 0 0
McCormick & Son	6,750 0 0
Harris & Wardrop	6,743 0 0
Shurmur & Son	6,660 0 0
Holloway Bros.	6,570 0 0
Willmott & Sons	6,559 0 0
Lovatt	6,444 0 0
Leslie & Co	6,376 0 0
Mowlem & Co.	6,349 0 0
F. & H. F. Higgs	6,340 0 0
Ashby & Horner	6,263 0 0
Prestige & Co.	6,175 0 0

For the supply and erection of an arris-pale oak fence, with gravel board, along the Seven Sisters Road boundary of Finsbury Park.

Winter & Sons	£1,165 5 0
Broker	554 10 0
Peyton	535 7 6
Batcheller	517 10 0
Longley & Sons	502 0 0
Pulford	499 12 0
Millars' Karri and Jarrah Co.* (1902)	495 0 0
Bowen	490 0 0
Horton & Son	486 10 0
W. Stenning & Son	468 0 0
J. Stenning & Son	465 0 0
Rowland Bros.	460 0 0
Elliott & Son	457 0 0
Turner & Son	455 0 0
Marshall	438 0 0
J. & S. Agate	419 16 3
White	413 0 0
Mulford	409 10 0
Fann, Davis & Co.	408 0 0
Blay (*recommended*)	399 0 0

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LONDON—*continued.*

For the erection on the Buxton Street site, Whitechapel, of a public elementary school to accommodate 612 children.

F. & T. Thorne	£13,803 0 0
Shurmur & Sons	13,082 0 0
Appleby & Sons	12,816 0 0
L. H. & R. Roberts	12,641 0 0
Patman & Fotheringham	12,623 0 0
McCormick & Sons	12,512 0 0
Leng	12,508 0 0
Killby & Gayford	12,472 0 0
Chessum & Sons	12,404 0 0
Perry & Co. (Bow)	12,048 0 0
Lawrance & Sons	11,987 0 0
Kirk & Randall	11,944 0 0
Roberts & Co. (*recommended*)	11,723 0 0
Estimate of the architect (education)	12,491 0 0

For providing and fixing two boilers and a low-pressure hot-water heating apparatus at the Teesdale Street school, Bethnal Green, N.E.

Wontner-Smith, Gray & Co.	£788 0 0
R. H. & J. Pearson	714 0 0
Beeson & Sons	700 0 0
Davis	698 0 0
Harlow & Son	689 0 0
Tilley Bros.	676 0 0
Cannon & Hefford	659 0 0
Defries & Sons	604 0 0
G. & E. Bradley (*recommended*)	573 0 0
Estimate of the architect (education)	675 0 0

For heating Laxon Street school, Bermondsey, for the London County Council.

Korting Bros. (*recommended*)	£472 0 0

For new iron gun and drill sheds and converting drill-hall into riding-school, &c., at Artillery House, Stratford Green, for the Territorial Force Association.

Castle & Son	£2,200 0 0
Lawrence & Sons	1,792 0 0
Harris & Wardrop	1,788 0 0
Price	1,757 0 0
ALLEN BROS., Chingford (*accepted*)	1,479 14 5

LONDON—*continued.*

For heating Bolingbroke Road school, Battersea, for the London County Council.

Cash & Co. (*recommended*)	£418 0 0

For alterations and cleansing and painting of the news room, &c., at the St. Martin's Lane Library, for the Westminster City Council.

Haylock & Co.	£255 15 0
Coulthard	232 0 0
Jenner	197 0 0
Hoskins & Co.	153 10 0
Sims	148 0 0
Burton Bros. (*recommended*)	140 0 0

ORMESBY (YORKS).

For levelling and covering part of the Market Place, North Ormesby, with tar macadam and for kerbing and channelling round the same. Mr. W. G. HARRISON, surveyor.

Coates	£661 18 3
Ingletts	631 18 9
Hobbs	614 2 0
Goodhall Bros.	605 6 8
Burrows	583 5 6
ELLISON, Redcar (*accepted*)	549 19 6

REDNAL.

For erecting a public reading-room for King's Norton and Northfield Urban District Council. Mr. BENJAMIN BOWER, architect, Birmingham.

Gibbs	£852 4 7
Atkinson	678 0 0
Cragg & Son	620 0 0
Sapcote & Sons	620 0 0
Willetts & Sons	612 0 0
Johnson	587 0 0
Matthews	576 5 5
Ingram & Sons	558 0 0
Harper	552 17 8
WALDRON, King's Heath (*accepted*)	545 10 0

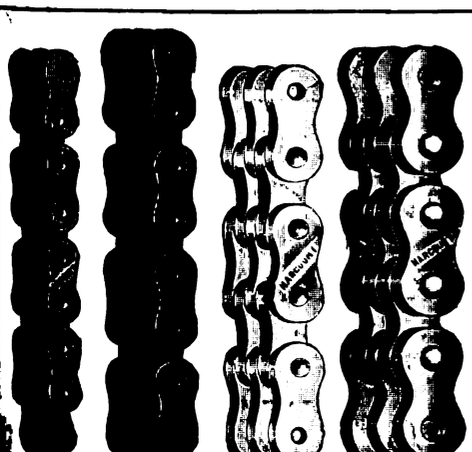
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The New Lunatic Asylum, Bristol.
The Houses of Parliament, Brisbane.
The Holborn Viaduct Buildings, London.
The New Library, Pollokshields.
The Asylum, Letterkenny.
The Dykebar Asylum, Paisley.
The Metropolitan Carriage Works, Saltley.
The Royal Artillery Barracks, Manchester.
The Cottage Hospital, Walsall.
The Fever Hospital, Bristol.
The Stores of A.T. Stewart, Esq., New York.
The Mansion of T. Wilson, Esq., Hull.
The City Asylum, Birmingham.
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THURNSCOE (YORKS).

For alterations and improvements at the Thurnscoe sewage-disposal works.

Dickinson, Bolton-upon-Dearne (*accepted*)	£633 0 0

WALES.

For erecting two shops and a dwelling house, Evans Street, Kenfig Hill. Mr. Aneuryn T. James, architect and surveyor, Port Talbot.

Davies	£789 0 0
Price Bros.	667 7 4
Thomas Bros., Maesteg (*accepted*)	598 0 0

For earthenware pipe sewers, for Llandaff and Dinas Powis Rural District Council. Mr. J. Holden, engineer, Cardiff.

Sayers	£3,304 0 7
Rankin	2,778 14 3
Pollard & Co.	2,603 0 0
Taylor	2,552 3 4
Rutter	2,468 9 1
Barnes, Chaplin & Co.	2,412 7 4
Osmond & Sons	2,271 1 1
Smith	2,247 11 5
Davies, Cardiff (*accepted*)	2,082 0 0

For providing and laying about 1,300 yards of 12-inch cast-iron and 140 yards of earthenware pipe sewers, with manholes, &c., at Pencisley, Llandaff. Mr. J. Holden, A.M.I.C.E., engineer, Cardiff.

Sayers	£3,304 0 7
Rankin	2,778 14 3
Pollard & Co.	2,603 0 0
Taylor	2,552 3 4
Rutter	2,468 9 1
Barnes, Chaplin & Co.	2,412 7 4
Osmond & Sons	2,271 1 1
Smith	2,247 11 5
Davies, Cardiff (*accepted*)	2,082 0 0

For erection of two shops and a dwelling-house (attached) at Evans Street, Kenfig Hill. Mr. A. T. James, architect, Port Talbot.

Davies	£789 0 0
Thomas Bros., Maesteg (*accepted*)	598 0 0

WORKSOP.

For erection of offices in Carlton Road. Mr. A. H. Richardson, architect, Worksop.

Gill & Son	£2,077 0 0
Ilett & Sons	2,025 0 0
W. & A. Forsdike	1,985 0 0
Doncaster	1,950 0 0
Bowles & Sons	1,942 0 0
Middleton	1,936 0 0
Leverton	1,919 18 0
Rowsell	1,804 15 0
Perks & Son, Long Eaton (*accepted*)	1,699 0 0

Mr. C. Harrison Townsend, F.R.I.B.A., has prepared the plans for reconstructing the Church school at Penn, Buckinghamshire, at a probable outlay of 1,300*l*.

The number of houses erected during the first ten months of 1908 at Coventry was 1,047. The number for the twelve months of the preceding year was 1,010. In 1898 the total was 501.

Mr. Spurr, city engineer, York, has been instructed to prepare a detailed report of what would be required to put the present Exhibition Buildings into a satisfactory state, and also to estimate the cost of a new building capable of seating 3,000 people. The buildings were recently shut as unsafe.

In his new book, "All about Investment," published by the *Financial Review of Reviews* at 2 Waterloo Place, Mr. Henry Loewenfeld points out that there are two classes of investors, the nervous and the over-confident. It would be interesting to know which of these two suffers the greater losses of capital. One of the chapters is devoted to the "Indispensable requisite towards successful Investment." "All about Investment," by its pointing out of the happy *via media* between nervousness and over-confidence, should act as a stimulant to the one and a warning to the other. Written simply and lucidly, so that its 280 pages are packed with information, advice and counsel, the new manual may well become guide, counsellor and friend in paths which without such aid are apt to prove slippery to the uninitiated.

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BUILDING AND BUILDERS.

THE sanitary committee have been authorised to proceed with a scheme for the provision of public slaughter-houses on a site in Roushill, Shrewsbury.

THE National Federation of Building Trade Employers of Great Britain and Ireland intend holding their half-yearly general meeting at Portsmouth this summer.

THE Glasgow Trades Council have agreed that a deputation should wait upon the Corporation tramways committee and urge upon them the advisability of having all buildings under their control erected by their own workmen, instead of placing these in the hands of private contractors.

"THE Tenements of Berlin" forms the subject of an illustrated article in *Harper's Magazine* for February, from which it appears that those who cannot build of stone use a cheap brick which meets the requirements of the fire department and can be covered with plaster to take the inevitable sculpturesque motive.

THE Girls' High School at Lincoln is to be enlarged, at a cost of 6,000*l*. The work includes the provision of four new class-rooms, three new music-rooms, two Kindergarten rooms, one science room, one art room, together with the necessary cloak-rooms, &c., and the conversion of several existing rooms for special purposes, such as stores, library, lavatory, &c.

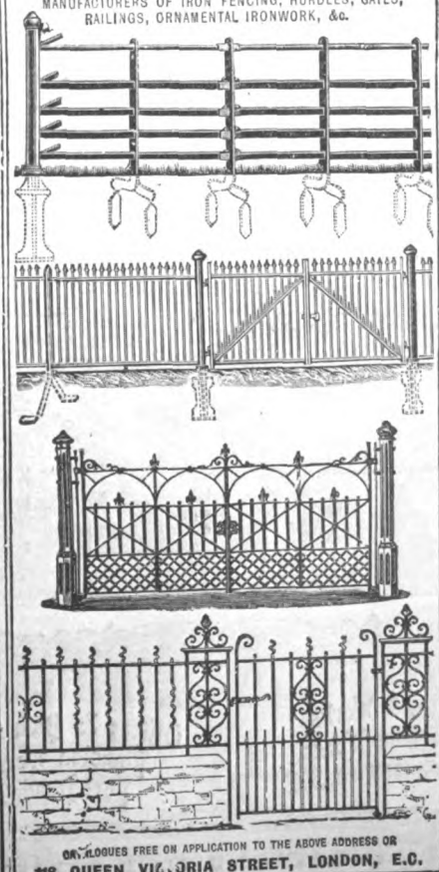
THE ratepayers of Girvan, N.B., have formally approved of the plans prepared by Mr. Jennings, architect, Canterbury, for a new town hall which is to be presented to the town. The building will consist of three floors. On the first will be the Council chamber and the principal hall, which, with the stage and gallery, will seat 752 persons, and on a special occasion 1,000. On the ground floor will be the police-court and committee-rooms, waiting-rooms, and lesser hall suitable for small meetings and social gatherings, and will accommodate about 240 persons; while in the basement will be waiting-rooms, kitchen, heating apparatus, &c.

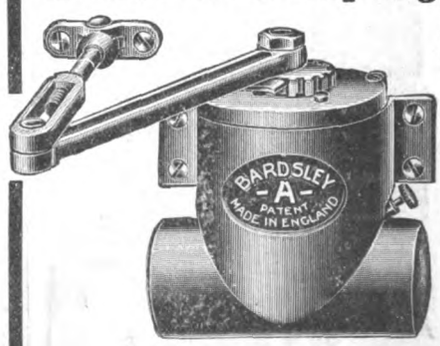
AT the last meeting of the Council of University College, Dundee, it was reported that draft plans for the new mechanical engineering laboratory had been prepared by Sir Rowand Anderson and submitted to the works committee, and were at present being amended in accordance with suggestions by the committee. This laboratory is to cost 15,000*l*. or 16,000*l*. Of this sum 10,000*l*. is to be provided by the Carnegie Trust and 5,000*l*. by the college. The tenders for wiring for the electric lighting in the new physics laboratory were submitted. The lowest was by Messrs. Steinthal & Boydell, Ltd., amounting to 353*l*., and it was accepted.

AT West London Police Court, Mr. Lane, K.C., gave his decision on a summons taken out against the Hammersmith Distillery Company by Mr. A. P. Stokes, district surveyor for North Fulham, who claimed 16*l*. as fees incurred in surveying certain alterations at the distillery. The alterations only took place in one corner of the company's works, but the surveyor claimed that that part of the distillery was inseparable from the whole works, and that he was entitled to take the whole area as the basis of his calculations as allowed by the Building Act. The defendants contended that the process of distilling was carried on in separate buildings, and that those separate and distinct buildings could not be described as one building under one roof within the meaning of the Act. Mr. Lane, K.C., decided against the surveyor and dismissed the summons. He did not grant costs.

AT last week's meeting of the Glasgow Corporation the gas committee recommended the leasing for ten years of premises in Sauchiehall Street for the exhibition of gas appliances, the lease of the premises in Union Street, which had been used for that purpose, expiring at Whit-Sunday. A letter was read from the Glasgow and West of Scotland Plumbers' Association, stating that they considered that proposal a further encroachment on the interests of the members of the plumbing and ironmongery trades; and, further, that it was against the spirit of the agreement which was come to between the gas department and the Master Plumbers' and Ironmongers' Associations in December, 1907. They therefore asked that the passing of the minute be delayed until the committee of the association had an opportunity of laying their views before the gas department. A letter in similar terms was sent by the Glasgow and West of Scotland Ironmongers and Allied Trades Association. Consideration of the minute was postponed for a fortnight.

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THE general purposes committee of the London County Council report on the subject of the future execution of jobbing works and of the shoring and hoarding works connected with dangerous structures, that they have approved the following proposals as a basis on which the several contracts shall be framed. Three separate forms of contract are necessary, viz., for architectural works, for engineering works (excluding works of a mechanical character, which will in any case have to be dealt with quickly by the firms most experienced in this class of work) and for hoarding and shoring works (dangerous structures). For jobbing works they have arranged that tenders shall be invited by public advertisement for the execution, for a period of three years, subject to six months' notice on either side after the expiration of the first year, of architectural and of engineering works respectively, either within the whole county, or within either of the districts north and south of the Thames, the Council reserving to itself the right to accept a tender for either description of work within either the whole county, or one or other of the districts. As regards hoarding and shoring works, they have arranged that tenders shall be invited from thirteen firms of repute selected by them; that the contract shall cover the execution of all works within the county, and shall be triennial, subject to the same conditions as to termination as the jobbing works contracts.

THE work under the contract dated February 24, 1904, between the London County Council and Messrs. Price & Reeves for the construction of Rotherhithe tunnel has been completed, and the measurements and accounts have now been settled. The total amount of the contract was 1,088,484*l*. 16*s*. 1*d*. This included provision money for certain definite objects and 100,000*l*. as general provision. This latter sum was intended to cover such matters as electric lighting, drainage pumps, &c., in addition to the ordinary extras which arise in a contract of this kind. Certain claims by the contractors for additional extra works were settled by the Council's chief engineer at 8,145*l*. The electric lighting of the tunnel cost 10,350*l*. 2*s*. The principal other extra items and their cost were as follows—granite entrance arches to "cut and cover," 4,196*l*. 17*s*.; additional paving works in Horseferry Branch Road, 2,115*l*. 18*s*. 5*d*.; gauge arches at entrances to tunnel, 1,948*l*. 15*s*. 4*d*.; motor generator house, stores, office, &c., 1,636*l*. 18*s*. 6*d*.; Portland stone cornice, &c., at shafts Nos. 1 and 4 and granite mouldings in shafts, 1,473*l*. 4*s*. 8*d*; drainage pumps, 1,225*l*. 6*s*. 7*d*.; foundations for Messrs. Hubbuck's new buildings in Broad Street, 1,025*l*. 12*s*. 11*d*.; house for superintendent, 870*l*. 18*s*. 3*d*.; rendering walls of open approaches, 649*l*. 4*s*.; and repairs to the river wall at New Star Wharves, 387*l*. 7*s*. 9*d*. The chief engineer has certified that all the works under the contract have been completed. The final settlement of the accounts shows that the total amount to be paid to Messrs. Price & Reeves under the contract is 995,809*l*. 6*s*. 8*d*., a saving of 92,675*l*. 9*s*. 5*d*. on the contract sum. This result is regarded as very satisfactory, and as reflecting the greatest possible credit on all concerned.

TRADE NOTES.

IN our description of the Norwich Union Assurance's new premises at the corner of St. James's Street and Piccadilly, last week (now nearing completion from the designs of Messrs. Rüntz & Ford), we omitted to mention that the general contractors are Messrs. Patman & Fotheringham, Ltd., Theobald's Road, W.C.

THE Isolation Hospital, Worthing, is being supplied with Shorland's patent Manchester stoves with descending smoke flues, Manchester grates, exhaust roof and special inlet ventilators by Messrs. E. H. Shorland & Brother, of Manchester.

ST. BEGA'S SCHOOLS, West Hartlepool, erected from the designs of Mr. Edward J. Kay, architect, Norton-on-Tees, have been ventilated by means of Mackay's patent direct-acting ventilators, supplied by Messrs. Cousland & Mackay, ventilating engineers, Glasgow, the sole makers.

THE Burnley Corporation having erected new tramway offices in the centre of the town, have given instructions to Messrs. Wm. Potts & Sons, Ltd., clock manufacturers, of Leeds and Newcastle, to erect an illuminated turret clock, showing the time upon two large external dials, which will be lighted by electricity and turned on and off automatically by an electric switch. The dials will be fixed on a metal drum resting on iron brackets. The clock should be a great boon to the public at this busy centre, and is to be fixed at an early date.



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ILLUSTRATIONS.

1.—FIRST PREMIATED DESIGN FOR GLAMORGAN COUNTY HALL, CARDIFF.—ELEVATIONS—PLANS.

2.—DESIGN FOR GLAMORGAN COUNTY HALL, CARDIFF.—ELEVATIONS AND SECTIONS—PLANS.

THE inventor of the Hawksley Tread, now manufactured by the Andrews-Hawksley Patent Tread and Engineering Company, should be considered as a public benefactor, for who can estimate the number of accidents which have been prevented by his rigid oak blocks, which offer so safe a foothold? Old folk are extremely liable to serious injuries, especially in the rushing which is usual in railway stations. But the Hawksley blocks take a long time to become smooth, and then they can be easily removed, and under the new system can be reversed. They can not only be used in iron frames, but they can supplement stone and concrete steps. In several buildings such as the Corn Exchange, London, power stations, and where there is much traffic, they are applicable. One of the most useful of their adaptations is to coal plates. In too many streets iron plates are allowed to remain until their smoothness becomes a risk to those who step on them. Last year their improved treads were introduced, and as they had been laid down at Windsor Castle and Sandringham, and in many public buildings, the security they offer is confirmed by unquestionable evidence.

ON Tuesday afternoon there arrived at the headquarters of the London Fire Brigade a new petrol motor fire engine, which is the first of its kind to be put into service in the Metropolis. However, a second engine of exactly the same design is practically completed. The new machine, which is of Merryweathers' patent "Hatfield" pattern, pumps 500 gallons of water per minute, and can attain a speed of 30 miles an hour on the level, whilst any hill in the London district can be negotiated. The pump is driven by the same motor as propels the vehicle, the power being transferred from the road wheels by the movement of a single lever. It is specially adapted for working from deep lifts, and will draw water in a few seconds from a depth of 27 feet without priming devices. With its capacity for instant turn-out, its high rate of speed, and its powerful pumping capabilities, this latest acquisition should certainly prove a valuable addition to Captain Hamilton's rapidly increasing motor equipment.

VARIETIES.

THE Isle of Wight education committee have approved a scheme for the erection of a Council school to accommodate 210 pupils at Brading. The cost is estimated at 3,000*l*.

THE Liverpool justices will on Monday next consider a scheme for rebuilding the Dale Street police court at an estimated cost of 35,000*l*.

AN informal dinner was held at the Criterion Restaurant, Piccadilly, London, W., on the 9th inst., at which the formation of an Illuminating Engineering Society in this country was the subject of discussion.

THE Manchester gas committee propose to take over the supply and maintenance of incandescent gas-fittings and mantles. A deputation of plumbers and other tradesmen waited on the committee on Friday.

THE Ormesby Urban District Council have instructed Messrs. D. Balfour & Sons to prepare the necessary plans, specifications, &c., in order that the Council might be able to apply to the Local Government Board for sanction to raise a loan of 6,000*l*. for a new main drainage scheme.

AT a meeting of the Employers' Parliamentary Council held at Westminster, a resolution was adopted in support of the following motion which the Earl of Wemyss will bring forward in the House of Lords in the forthcoming session:—(1) That in the opinion of this House it would be for the public good that important national trading and other organisations and societies should each name three peers in the current and each succeeding Parliament to speak and act on behalf of such societies in all questions in which they are interested, and that the names of the peers so nominated be entered in the Journals of the House. (2) That the Lord Chancellor, the Marquess of Lansdowne, the Earl of Crewe, and the Earl of Halsbury be empowered to determine what societies are of sufficient importance to be admitted to the said privilege of nomination. (3) That no peer shall be entitled to vote on any public question who has not attended twenty sittings in the current or previous session of the House.

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THE Newport works committee recommend the appointment of Mr. Butler, M.I.C.E., of Swindon, as assistant engineer for the supervision of private improvement works. The salary is 130*l.* a year. At the same meeting Mr. J. Dix's tenders for the improvement of Castle Street and Corelli Street were accepted, and that of Mr. Vincent for Somerset Road.

A MEETING of the shareholders of W. T. Tyler & Co., Victoria Mill, Horwich, was held recently to consider schemes submitted by the directors for the extension of the shed and increasing the number of looms. If one scheme is adopted, doubling the capital to 30,000*l.*, a warehouse would be built and the shed extended to hold 500 looms, but at first only 150 will be added to the present 200. The scheme was favourably received, and a special meeting of the shareholders is to be called, when the scheme will be submitted for their approval.

MESSRS. MOUNTAIN & GREGORY, railway and tramway engineers, are to establish their works at Burton-on-Trent. The proposal includes the absorption of the business of Thornewill & Warham, ironfounders, which the new company propose to carry on in conjunction with their own. The men already employed at Messrs. Thornewill & Warham's will be kept on, and it is understood that the new firm will bring their skilled labour with them. In all, it is expected that work will be found for some 500 to 700 people. When the project was first mooted some six years ago it was stated that the outlay would be 53,000*l.* for the reconstruction of the works.

MR. BANISTER FLETCHER will give seven public lectures on "English Renaissance Architecture" (illustrated by lantern slides, photographs and diagrams), at the University of London, Imperial Institute Road, South Kensington, S.W. The first lecture was on Monday, the 15th inst. These lectures will include the most famous Elizabethan and Jacobean mansions, the works of Inigo Jones and Sir Christopher Wren, and the most prominent examples in the Queen Anne and Georgian styles, including those by eighteenth-century architects such as the Brothers Adam, Hawksmoor, Sir John Vanbrugh and others.

AN interesting feat was carried out at the south yard of Messrs. Workman, Clark & Co., Ltd., shipbuilders, Belfast, on February 13. To provide more headroom in the lower part of the joiners' shop, the building, which is 230 feet long, was raised to the extent of 3 feet. The operation was performed by means of powerful hydraulic jacks distributed around the shop. These having been placed in position, a signal was given, when the lifting process began, and the wooden building began to rise inch by inch. The simultaneous leverage elevated the structure at the rate of an inch each five minutes, and at noon the work was completed to the satisfaction of those in charge. Not a single item of machinery inside the four walls was disarranged or disturbed, and everything on the ground and upper floors remained as usual.

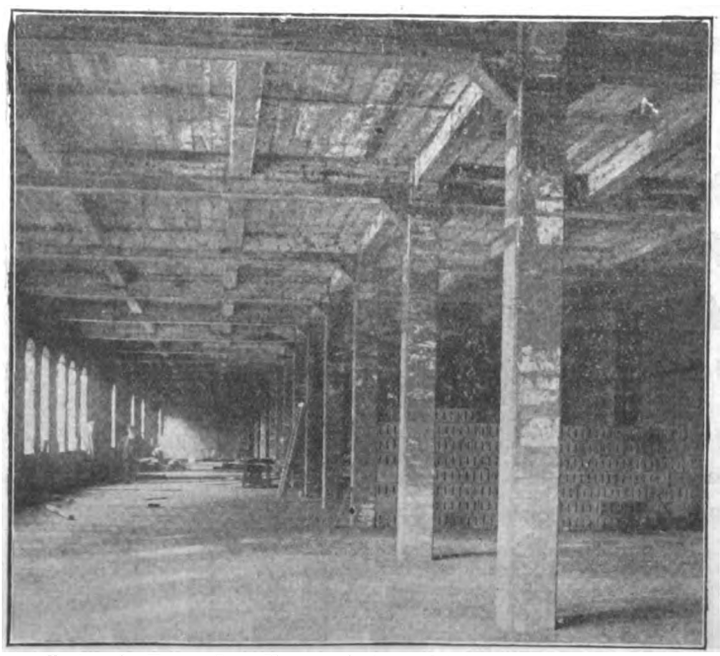
AT the Kingston County Bench on Thursday a house-owner was summoned at the instance of the Walton Urban District Council to abate a nuisance. It appeared the tenant drew the Council's attention to the house, and their inspector found that there was extensive decay in the floors; that they were wet, crumbling in the joists, which were so rotten that they could be broken away with the finger. He contended that rotten floors, which might be penetrated by a foot or the leg of a chair, must necessarily be a nuisance. The trouble was caused through there being an insufficient number of air bricks. The sanitary inspector to the Council, under cross-examination, agreed that linoleum did help to rot boards; but he did not agree that, no matter how many air bricks were there, the linoleum would cause the boards to rot. The medical officer of health said he was of opinion a nuisance existed injurious to health. For the house-owner it was submitted that, supposing there was an absence of air bricks, that did not constitute in any sense a "defective or want of structural convenience." The rotting, counsel argued, was not set up by lack of ventilation at all, but by the placing on the floors of linoleum. His client was contesting the case not to escape any obligation, but in the interests of an enormous number of property owners in the district. The magistrates found that air bricks were "structural conveniences," and that the nuisance had arisen in that case from insufficient ventilation. They made an order accordingly. The defendant asked the magistrates to state a case, and this was agreed to.

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Works: Archangel Wharf, New Cross.
Glasgow: 68 Bath Street.

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THE Surbiton District Council have again failed to obtain the approval of the Local Government Board to their sewage disposal scheme. An application was made last July for sanction to a loan of 60,000*l.* for a scheme which superseded one that the Local Government Board had already refused. The new scheme was drawn up partly on lines suggested by the Local Government Board. In a communication which has just been received the Board allege that there has been want of care and foresight in the preparation of the drawings, specifications and bills of quantities, and say that these are in various respects incomplete and defective. The drainage committee of the District Council, in reply, pointed out that the matters to which exception is now taken were approved of in the previous scheme by the Board's own inspector. The committee ask the Board to receive a deputation on the matter.

THE finance committee of the Hammersmith Board of Guardians reported recently on the settlement of accounts incurred in connection with the new workhouse and infirmary buildings, the expenditure on which, it will be remembered, was the subject of a Local Government Board inquiry eighteen months ago. It appears that the total actual expenditure was 259,036*l.*, and that the amount sanctioned by the Local Government Board was 254,686*l.*, the amount paid in excess being thus 4,350*l.* Several items, amounting in the aggregate to 1,725*l.*, could not properly be charged against a loan, and a balance of 2,625*l.* was thus left which could be so raised. However, the Guardians decided not to make application for a loan for this sum, as all amounts have been paid, but that the Local Government Board be only requested to sanction the excess expenditure of 3,079*l.*, that being the sum of 4,350*l.*, less 1,271*l.* recovered from the architects. The items of expenditure and total amounts actually paid in full discharge were:—Site, 14,528*l.* 3*s.* 6*d.*; structure, 196,965*l.* 18*s.*; laundry machinery, 3,503*l.* 2*s.* 3*d.*; cooking appliances, 1,887*l.*; electric lighting, 7,593*l.* 19*s.* 8*d.*; boundary wall, 3,358*l.* 14*s.* 10*d.*; road-making, 2,328*l.* 14*s.* 6*d.* and 2,866*l.* 5*s.* 6*d.*; furnishing, 6,549*l.* 5*s.* 11*d.*; equipment, 8,213*l.* 13*s.* 6*d.*; architect's fees (original claim, 8,536*l.*), 7,500*l.*; quantity surveyor (original claim, 4,343*l.*), 2,352*l.* 18*s.* 3*d.*; clerk of the works, 772*l.* 16*s.*; rough levelling, 400*l.*; cost of raising loan, &c., 216*l.* 2*s.* 6*d.*; total, 259,036*l.* 14*s.* 6*d.*

A TESTING NEEDLE FOR CEMENT.

MESSRS. W. F. STANLEY & CO., LTD., Great Turnstile, Holborn, W.C., have added to their long list of instruments serviceable for architects, engineers, manufacturers, contractors and others a testing needle for accurately ascertaining and recording the initial and final setting time of Portland cement. The processes of producing cement tend more and more to the elimination of erring human agency. This idea is carried still farther by the new testing needle, for the results are achieved independently of the operator upon whose hand and powers of observation the results have heretofore depended. The aim of the inventor was that the results of his experiments should agree as far as practicable with the British Standard Needle at present in use, and further that the needle should be of such size and carrying such weight that whilst agreeing with the final set of the British standard specifications, it should also indicate and record the initial set of the same sample. The size needle decided upon is 1 mm. diameter, and carrying a total weight of 400 grammes. Another important point is the mould; this has 40 mm. diameter and 20 mm. deep.

It will be seen that at the side of the instrument is a screw surmounted by a small wheel, and that this screw carries a nut with a small projecting arm which bears the weight of the needle bar, but is in no way attached to the needle bar. The needle falls by its own weight; the screw and wheel are only to prevent any sudden dropping or pressure from above. The instrument is so adjusted that the pointer is on the dial at zero, with the needle just touching the surface of the cement mixture in the mould.

When the small wheel is rotated so as to lower the needle, the needle will at first, until setting commences, completely perforate the cement mixture in the mould, and the pointer will record the extent of the perforation as 20 mm. on the dial plate.

So soon as the needle fails to perforate the sample beyond 15 mm. as recorded by the pointer on the dial plate, then the initial set has begun.

The final set is ascertained in exactly the same manner, and when the needle fails to perforate more than 2 mm.

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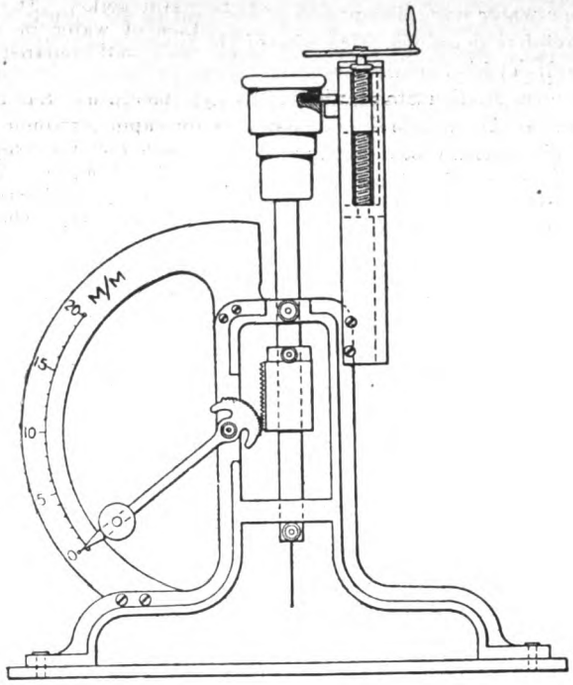
Convertible Open and Close Fire Ranges.

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as recorded by the pointer on the dial plate, then the final set has taken place and the time occupied in both operations can be noted.

The reason that 2 mm. is fixed as the limit of perforation for final set is because in mixing up a sample of cement for testing, what may be termed a "scum" or cream rises to the surface, and this will continue to show a slight impression or perforation for some time after the real and final set of the cement has taken place.

The British Standard Needle gives slightly slower final set tests, but this is due to the difficulty in saying when the



impression ceases to exist, and particularly because the so-called "impression" is unduly prolonged owing to the existence of the "scum" or cream on the surface of the mould.

Perhaps the greatest difficulty that the cement tester has to cope with at the present time is the difference of opinion as to what constitutes "an appreciable impression," as made by the needle. The new instrument should be of great service in this respect. It is the invention of Mr. C. H. Watson, the managing director of Messrs. I. C. Johnson & Co., Ltd., of Greenhithe and Gateshead

PAINTING STRUCTURAL STEEL.*

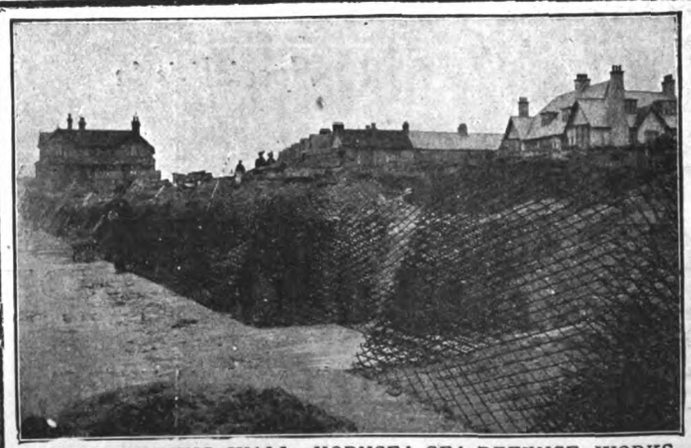
Few engineers in this country, even those that are most stringent in their demands concerning physical and chemical qualities, make any surface inspection; yet flaws, flash, rust and grease are things that may destroy the work of the painter.

No surface of structural steel ought to be coated with paint unless it shows the greyish-white, natural colour of the metal, and is absolutely free from traces of adherent acids and moistures. Yet, when unsatisfactory results are obtained, the paintmaker is generally the first one to be criticised, though most probably he has applied a perfectly good and suitable paint.

Steel is perhaps the most tenacious of all known substances, having great cohesive force between its particles, so that they resist any effort to pull or force them apart; and as we fancy all matters to be in a state of motion at all times, the difficulty in preserving it by the use of paint is at once apparent. The defects in modern structural steel are largely due to mechanical working; that is, it is run out too hot or too quickly, and afterwards not properly housed and cared for.

The enormous increase of late in its use in building and engineering constructions demands increased vigilance and attention to its maintenance and present condition wherever it has been placed; as, either from corrosion, fatigue, vibra-

* Abstract of a paper by Mr. Gaston Despierres, read before the Paint and Varnish Society, London, entitled "Paint and Its Application to Structural Steel."

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tion, or general deterioration, the metal may become so impaired as to be unfit to do that for which it was designed; and unless properly protected by coatings of paint at various periods those entrusted with its care will assume the enormous responsibility for further catastrophes.

Who knows whether the collapse of Charing Cross station a short time ago may not have been due to some such cause?

Rust.

Chemists are not definitely agreed as to the exact meaning to be attached to the term "rusting." To paint-makers and painters rusting must be understood to mean the atmospheric oxidation, and not corrosion by other agencies. Consequently, apart from chemical agents, water and oxygen are the primary causes of rust, with the contributory influence of atmospheric carbon dioxide (carbonic acid). Rust is hydrated oxide of iron; that is, a compound of the metal iron with oxygen and water; 100 parts ordinary iron rust containing 52 parts of iron, 22 parts of oxygen, and 25 parts water.

Water is here in a state of chemical combination, and not a mere mechanical adjunct in the form of moisture. Wherever rust has once formed, its further occurrence is a natural sequence; and its prevention becomes more difficult—in fact, impossible—unless the affected parts are perfectly freed from all traces of oxide. So far from being a solid, coherent mass, rust is loose and porous, absorbing and persistently retaining water, which, with the help of atmospheric air, assists in the conversion of such portions of the iron which have hitherto remained intact.

Again, it has been proved that hydrated oxide of iron is an energetic oxidising agent, and its power is, so to speak, illimitable, because of its recuperative capacity in contact with air; after parting with oxide to oxidisable substances—metallic iron, for instance—it is reconstituted, and in a position to give up a further quantity of oxygen. It is on this account that, in course of time, nails embedded in wood damage the portions in their immediate vicinity, and that fabrics spotted with rust quickly fall into holes. This continuous development of rust also furnishes a reason for the complete corrosion of rivets, screws, &c., in steel structures.

Rust has a tendency to grow and spread out from a centre; hence a small spot of it on the metal expands itself under the paint, so that in time the paint will be flaked off, and the metal will have expanded. It is therefore essential for the proper upkeep of the steel structure that all rust spots, of whatever nature, should be as early as possible prevented from spreading, and to this end they ought to be repaired at once, without waiting for all the old paint to disappear before laying on an entirely fresh coat all over.

It is a remarkable thing that a speck of rust will sometimes strike through a coat of paint like a smoke stain through distemper in a ceiling; and this is, of course, more visible when white paint is used. When this is dry it is seen that the rust has turned the paint yellow. It is most probably due to a certain percentage of water in a good many paints, though, of course, in a well-prepared paint this should not be the case.

Various authors have advanced the theory that electrolytic action is one of the agencies for rapid corrosion. Like all other chemical reactions, rusting is no doubt accompanied by electrical tension, set up in the affected objects. This is practically proved by the fact that in large steel structures the maximum amount of corrosion is to be found where two pieces of steel are attached together; this is especially noticeable round the rivet holes, bolts, and nuts; thus the necessity for greater care to be exercised in their painting.

An important point to be noted in the formation of rust is the increase in volume of the iron concurrently with the progress of the rust formation. Ironwork embedded in fresh mortar or set in brickwork soon becomes attacked at the surface, and gradually the corrosion extends towards the interior—a circumstance that may become a great danger to the structure; and yet almost daily all over this great city thousands of tons of steel girders are embedded without a particle of paint, or with a miserable coat of shop-paint given for appearance sake only, and having no protective value. Yet engineers and architects are supposed to draw proper specifications to protect their clients, and district surveyors are appointed to see on behalf of the public that structures are sound; but in many cases they seem to be unaware of the fact that in not insisting to have the steel structure carefully protected by several coats of paint they assume the responsibility of many accidents and catastrophes which may happen in years to come.

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The Cleaning of Steel.

The cleaning of structural steel is a problem for engineers. Specifications are often very loose with regard to the manner in which the cleaning should be done before re-painting; when, as a matter of fact, no clause can be stringent enough, no inspection by the clerk of works too minute, when the importance of the cleaning of steel before the application of paint is taken into consideration.

Several methods are at present employed:—(1) Scrubbing or scouring with hard substances, such as pumice-stone, emery, &c.; (2) scrubbing with wire brushes, and chipping with chipping hammers or steel scrapers made of old files; (3) pickling with acids; (4) cleaning by the sand-blast process.

The first method of scrubbing and scouring cannot be recommended, as it necessitates the employment of water or petroleum oil, which are often used to facilitate the removal of the iron rust. It is highly probable that this is the cause of many failures, since the labourers generally entrusted with the cleaning of ironwork can hardly be expected to know the meaning of absolute dryness. When this method is employed a hot blast from a blow-lamp should be applied to the surface of the iron, to remove all moisture or burn off all traces of petroleum oil from its surface; but, unfortunately, this is seldom if ever put into practice on account of the expense of it.

The pickling with acids is undoubtedly the process by which a thousand times as much new iron and steel is cleaned than by any other process. All work that is to be electro-plated, for instance, or that is to receive a coat of vitreous enamel, is cleaned in this way. No doubt an efficient cleaning is obtained by pickling in hot sulphuric acid or muriatic acid; but unless one is well prepared to neutralise thoroughly, and remove all traces of acid from the metal immediately after it is taken from the "bath," the result will be disastrous.

Of all methods the cleaning by sand-blast seems to offer the most rapid, effective, and economical means of preparing structural steel to receive a coating of paint. It leaves the metal not only perfectly clean, but dry, an important and essential condition if a receptive surface is to be secured. The painting of the metal should follow immediately after the cleaning, as the cleaning of the steel by this process roughens its surface slightly, and it is well known that under such conditions surface corrosion rapidly sets in.

It is argued that one of the disadvantages of sand-blasting is the deleterious effect upon the eyes and lungs of the operator. This can easily be overcome by means of suitable respirators, various kinds being now obtainable which would insure complete immunity on that score. There is no doubt that sand-blasting offers the best means of cleaning old structures which are very rusty; and now that air-compressors, small oil engines, and electric motors of a portable kind are available, it is fair to presume that steel coatings will have better opportunities in the future to prove the life there is in them than they have had in the past; if the example that has been set before us by America for some years past is followed in England—to wit, the adoption of the method of cleaning by sand-blast.

(*To be continued.*)

CEMENT SALES IN EGYPT.

The recent observations of the Adviser for Public Works in Egypt emphasising the fact that the Portland cement employed in the construction of the Esneh weir, as well as the Assouan dam, has been consistently of British manufacture, give point, says the *Manchester Guardian*, to an investigation undertaken by the British Chamber of Commerce in Alexandria on the share England has obtained in the Egyptian cement trade during the past five years. In 1903 England contributed 15 per cent., France 40 per cent. and Belgium 35 per cent. In 1905 England sent 31 per cent., France 20 per cent. and Belgium 43 per cent., while by the end of 1907 the Belgian aggregate for the period was 126,522 tons to England's 73,798 tons, France's being 71,839 tons. The Chamber considers that Belgium has the chief hold on the Egyptian market to-day. It may be remembered that in his report for 1906 Lord Cromer referred to Belgian cement for use on public works in Egypt and the Soudan as being considerably lower in price, but in quality distinctly inferior to British brands. The Chamber of Commerce considers that this opinion is not fully shared by the Egyptian market in general and the State purchasing de-

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partments in particular, for in a recent contract offered to public tender by the Egyptian State Railways for the supply of 6,000 tons of Portland cement, the specification being the British standard one, the order was divided between the Josson & Co. Belgian brand at 2*l.* 6*s.* 9*d.* per ton and the Russian "Caucasus" brand at 2*l.* 6*s.* 1*d.* per ton, c.i.f. on the railway quays in Alexandria. It is therefore to be assumed that other causes are in operation, and these the Chamber considers to be, first, the cheaper freights from Antwerp (8*s.* 6*d.* per ton, plus 10 per cent.) and Marseilles (8 francs per ton) as compared with that from London to Alexandria (about 12*s.*); and, secondly, the possibility that the leading Belgian factories are better equipped to produce the same article at less cost. The Chamber is of opinion, further, that British manufacturers are handicapped by the fact that both France and Belgium have more frequent sailings than London to Egypt, a disadvantage likely to increase if plans now under consideration mature for a new service of fast cargo boats between Antwerp and Alexandria.

WINDOW CLEANING IN GLASGOW.

A DECISION of interest to builders and householders has been given by the Glasgow Dean of Guild (Mr. M. Pearce Campbell). The Procurator Fiscal presented a petition to the Court as to the effect of certain provisions of the Building Regulations Act. The circumstances are brought out in the following interlocutor:—

Glasgow, February, 1909.—Having considered the closed record, and along with the trades liners and in presence of the parties inspected the windows in question, the Dean of Guild finds as matter of fact that the said windows are so constructed as to admit of the outside of the said windows being cleaned from the inside of the rooms: Finds in law that the windows in question satisfy the requirements of section 102 of the Glasgow Building Regulations Act, 1900, founded on by the petitioner: Therefore dismisses the petition: Finds the petitioner liable in expenses: Allows an account thereof to be given in: and remits the same when lodged to the Clerk of Court qua auditor to tax and report.

(Sgd.) M. PEARCE CAMPBELL, D.G.

Note.—In this case the question as to the effect of the provisions of section 102 of the Act of 1900 in regard to windows in dwelling-houses existing at the time the Act was passed is raised for the first time. The houses of the respondent were in existence at that time. It is not maintained that they do not come within the operation of Section 102. But it is maintained that the windows as constructed satisfy the requirements of the section.

In view of the likelihood of this case going further, the Dean of Guild thought it well that the parties should lodge an agreed-on description of the windows in question. A joint minute giving the dimensions of the windows has been lodged, and forms No. 6 of process. To that the Dean would add that the windows in question are double-hung windows which are opened by the top sash being pulled down and the bottom sash being pushed up.

The requirement of section 102 (5) is that all window sashes in dwelling houses and habitable rooms above the ground floor shall be so constructed as to admit of the outside of the window being cleaned from the inside of the room. The idea which underlies the enactment is, as everyone knows, the prevention of accidents in window cleaning. And it is a matter of common knowledge that, according to the views of some people, the only satisfactory mode of ensuring safety is the conversion of windows from the double-hung system to the hinged system. But however that may be, and however the idea may have been developed since the first general Police Act, the question here depends upon the construction of the enactment of 1900.

The case seemed to the Dean to be one which could be more satisfactorily dealt with by a judicial visitation than by an ordinary proof, and this view was accepted by the parties. The Dean accordingly of consent ordered an inspection, and he made that inspection along with the trades liners and in the presence of the master of works and the parties. The Dean found the windows to be as described in the minute. The respondents had in attendance a person who is a window cleaner by trade. It appeared to the Dean from his examination of the windows that the ordinary occupant of such a tenement might have difficulty in cleaning the outside of the windows from the inside of the rooms. But the window cleaner present at the inspection had no

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difficulty in the matter. In the presence of the Dean and the liners he cleaned the outside of some of the windows while he himself remained in the inside of the rooms, and so far as the Dean and the liners could see he did this without any extra exertion or difficulty.

The petitioner argued that the enactment must be so construed as to be applicable to everyday and ordinary conditions, that every householder could not afford to employ professional window cleaners, and had to do his window-cleaning by members of his own household. But an enactment of the kind in question cannot be construed in this spirit. The section does not say the construction of the windows is to be such as to admit of the outside of the window being cleaned by a member of the household from the inside of the room. Whatever may have been the intention of the framers of the section, all that has been actually enacted turns upon the answer to the question—Is it physically possible in an ordinary way to clean the outside of the windows from the inside of the room? The exhibition of the window cleaner gave a clear affirmative answer to that question. The Dean is therefore of opinion and holds that the windows in question as presently constructed meet the requirements of section 102 (5) of the Act of 1900. The trades liners are all of the same opinion.

NORTHAMPTON POLYTECHNIC INSTITUTE.

For several years the work of the Northampton Polytechnic Institute has outgrown the accommodation provided in the buildings erected in 1896, and various schemes have been under discussion for increasing the accommodation. Eventually the necessary funds, amounting to 9,000*l.*, having been generously provided by the London County Council, it was decided to erect, in such a position as not to interfere with the access of light and air to the present buildings, a five-storey building in one corner of the courtyard and to complete the roofing of the remainder of the yard so as to give a basement floor occupying the whole of the area.

The grant was made by the Council in March 1908; plans, tenders and contracts were handled rapidly, and the work of erection commenced during the last week in May.

The official opening by the Earl of Halsbury of the courtyard extension took place on the evening of Friday, February 5, and the following is a brief description of the additional accommodation provided, in accordance with the designs and under the superintendence of Mr. W. Campbell Jones, the architect to the governing body, who has admirably utilised the somewhat awkward space placed at his disposal.

Commencing with the basement floor there is an extension of the mechanical engineering workshop. Adjoining this is a small room which will be utilised as an erecting shop for mechanical engineering work, and also adjoining it in the direction of the new building is a room which is to be utilised for experimental steam-raising and gas-producing plant. Further on, under the whole of the new building, is a large room, which will be equipped as a power laboratory. On the right of this room as entered from the mechanical engineering workshop there will be found an extension of the existing mechanical engineering laboratory, occupying part of the space of the courtyard.

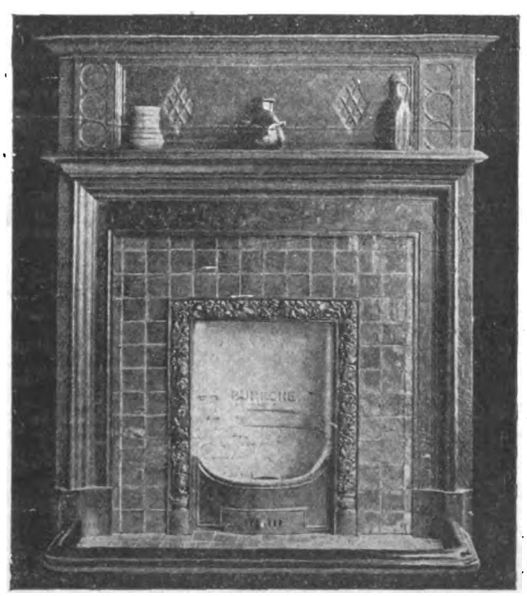
On the ground floor are three large rooms, two of which are to be used for the meetings of scientific societies connected with the Institute and for the meetings of the Institute clubs respectively. The third room will be furnished and used as a common room for the staff, an extension of the Institute accommodation which has long been urgently needed. The two small rooms on this floor are for the accommodation of the Honorary Stewards' Association and the secretaries of Institute clubs.

On the first floor the additional accommodation provided by the new building is utilised almost entirely for a large lecture theatre, which supplies a long-felt need in the accommodation of the Institute. On the second and third floors there are suites of rooms, numbering thirteen in all, which have been fitted up as class-rooms. The rooms have been purposely planned to be of different capacities, so that they may accommodate economically the variously sized classes which are met with in the Institute's work. As class-rooms they will give very much needed relief to the overcrowded class-rooms in the other parts of the building, and it is hoped that next session some developments of the existing work which have been long contemplated will be proceeded with.

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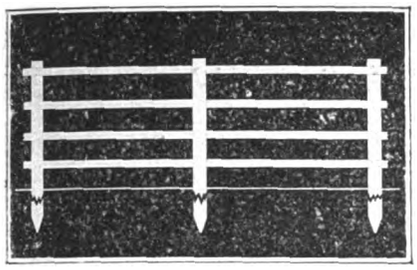
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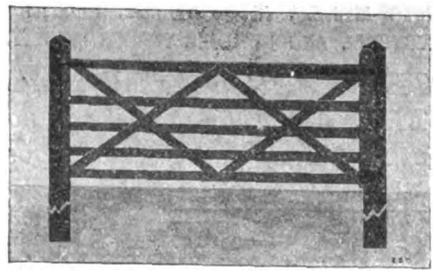
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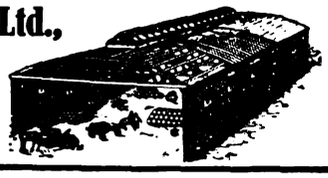
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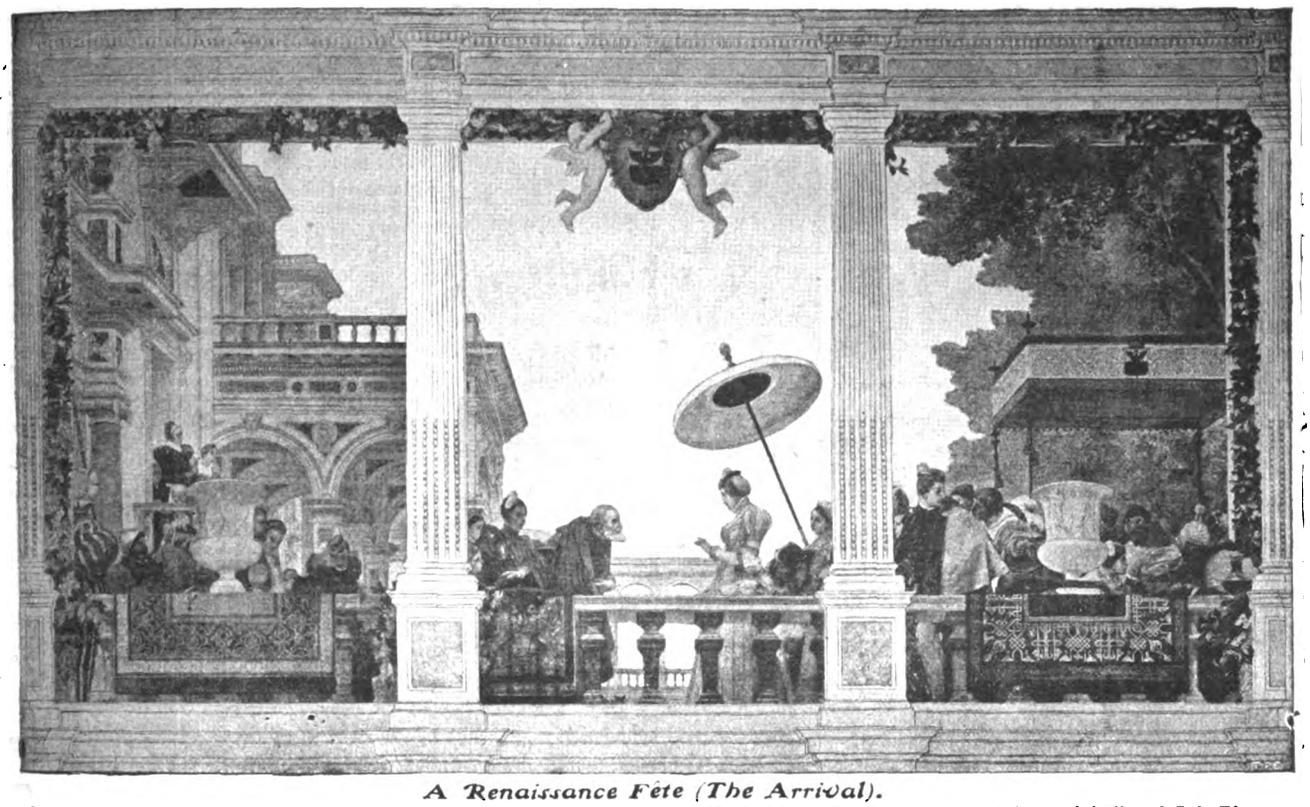
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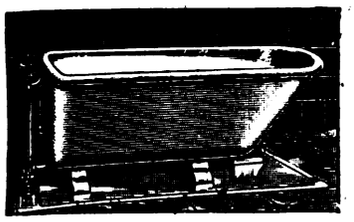
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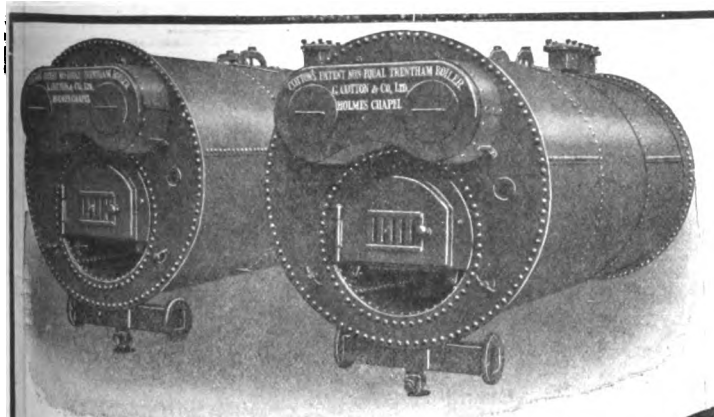
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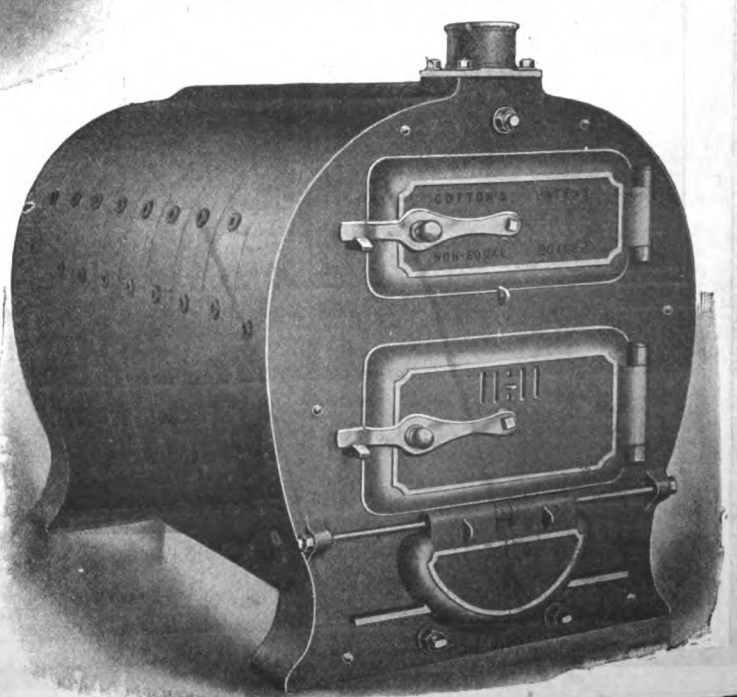
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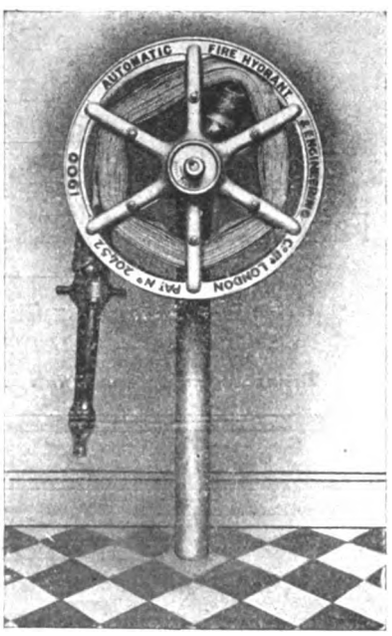
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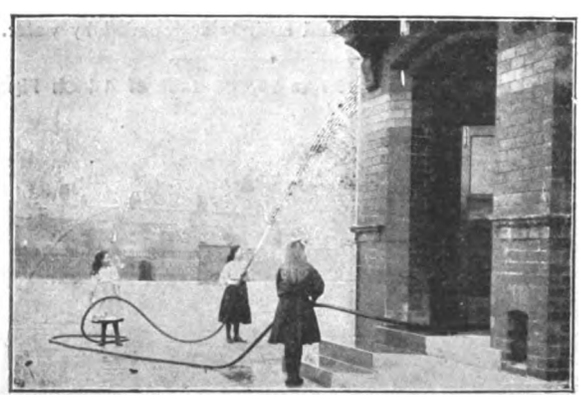


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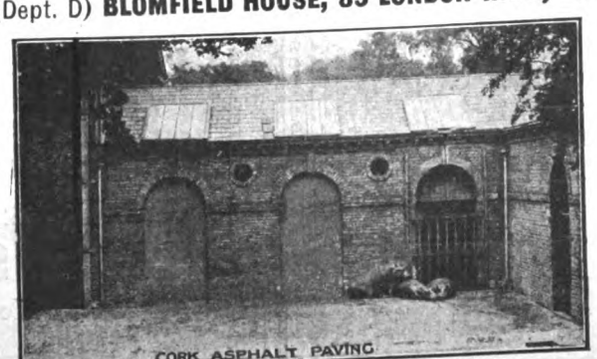
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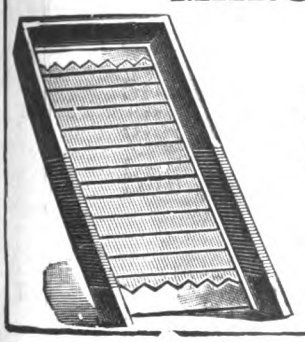
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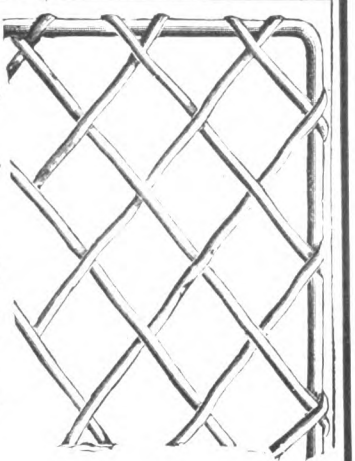
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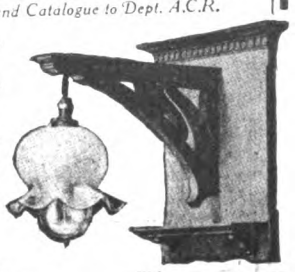
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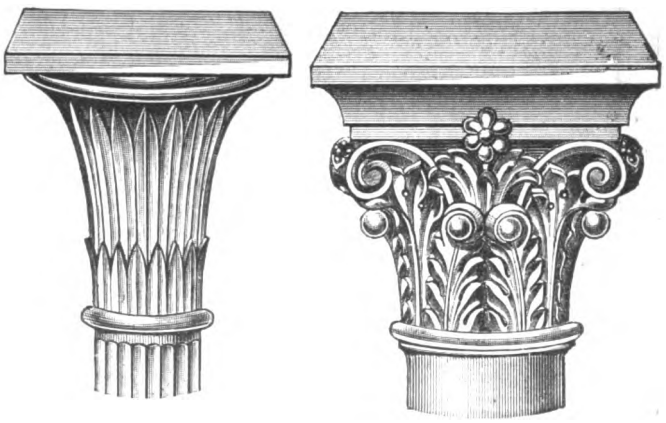
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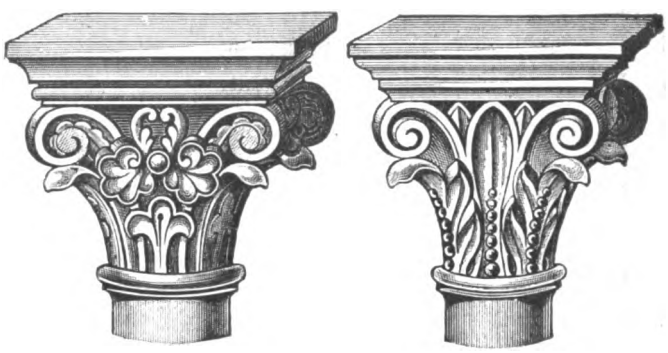
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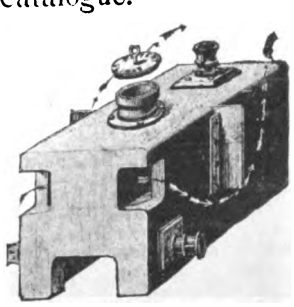
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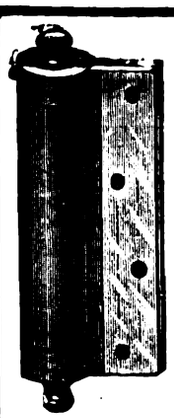
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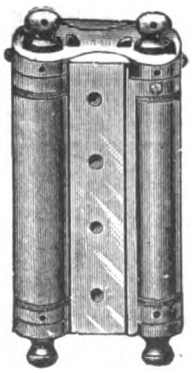
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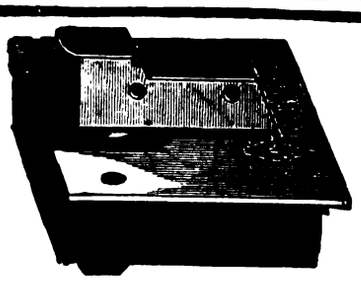
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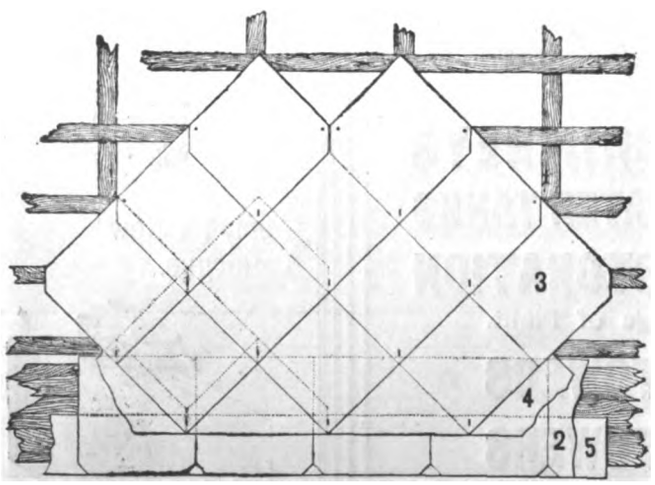
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EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

**** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITION OPEN.

GLASGOW.—July 31.—The patrons of the Royal Incorporation of Hutchesons' Hospital invite designs for laying out for feuing and building about 195 acres of their lands of Thornliebank, Eastwood. Premiums of 100*l.*, 75*l.*, 50*l.* and 25*l.* will be awarded. Deposit 3*l.* 3*s.* Messrs. Hill & Hoggan, 194 Ingram Street, Glasgow.

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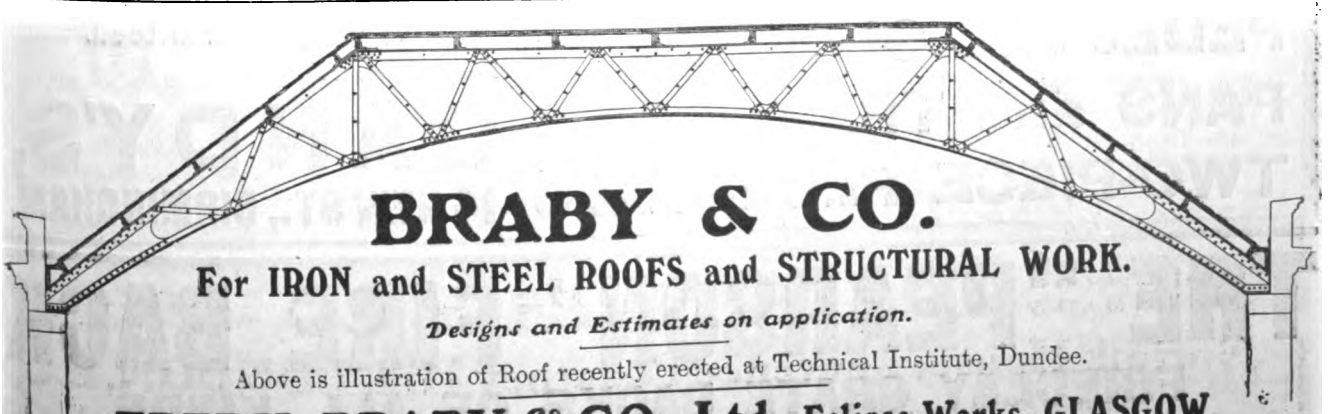
BARROW-IN-FURNESS.—March 1.—For carrying out the work of additions to the pavilion at Biggar Bank. The Borough Engineer's office.

BEXHILL.—For construction of a sea wall and promenade, length about 1,400 feet. Deposit 5*l.* Mr. George Ball, Assoc.M.Inst.C.E., surveyor, Town Hall.

BIRKENHEAD.—March 15.—For erection and completion of twenty-two double tenement Corporation dwellings on land bounded by Egerton Street, Getley Street, and Tunnel Road. Deposit 1*l.* 1*s.* Mr. Chas. Brownridge, M.I.C.E., borough engineer and surveyor, Town Hall, Birkenhead.

BITTON.—March 20.—For erection of an elementary school at Bitton, near Bristol. Deposit 2*l.* 2*s.* Apply by March 5 to Mr. R. S. Phillips, architect, Midland Bank Chambers, The Cross, Gloucester.

BLACKWATER.—March 6.—For proposed addition to Blackwater Council school, Cornwall, according to plans and specifications. Mr. Sampson Hill, architect to the committee, Green Lane, Redruth.



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Bolton-upon-Dearne.—March 1.—For erection of wall, &c., Recreation Ground, Goldthorpe. The works include about 154 yards cube digging, 207 yards hedge stubbing, 187 yards rubble, 6 inches clink in mortar, 12 roods 30 feet 15 inches rubble, 45 roods Brighouse stone wall, 518 feet double chamfered stone coping, 50 flag copings, 16½ yards cement dado, gates, railings, &c. Deposit 10*s*. 6*d*. The Surveyor, Bolton-upon-Dearne, Rotherham, Yorks.

Bridgnorth.—March 2.—For erection of a building at the waterworks to contain a series of the "Candy Patent Filters." Borough Surveyor's office, Bridgnorth, Salop.

Bristol.—March 8.—For erection of a chancel with vestries and other work at the church of St. Anne's, Brislington. Mr. Henry M. Bennett, architect, 36 Corn Street, Bristol.

Burnsall.—For the various works required in erection of a village institute. Mr. J. W. Broughton, architect and surveyor, Skipton.

Butlock's Heath.—March 1.—For erection of an additional classroom for sixty children and two cloak-rooms at Butlock's Heath, Hants. Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

Cambridge.—March 9.—For erection of five cottages in Albion Row. The Surveyor, Guildhall, Cambridge.

Clowne.—March 2.—For all trades in conversion of shop into working men's club, at Clowne, near Chesterfield. Mr. P. A. Hinchliffe, A.R.I.B.A., architect, surveyor and valuer, 14 Regent Street, Barnsley.

Enfield.—March 16.—For erection of a block of schools at Lavender Road. Deposit 3*l*. 3*s*. Apply by February 27 to Mr. G. E. T. Laurence, architect, 22 Buckingham Street, Adelphi, W.C.

Gosforth.—March 4.—For the various works required in alteration and addition to shop and stores at Gosforth, Cumberland. Messrs. W. G. Scott & Co., architects and surveyors, Workington.

Ireland.—March 8.—For building additional offices in connection with the County Courthouse, at a cost not exceeding 750*l*., for the Armagh County Council. Mr. Joseph Atkinson, county secretary, County Courthouse, Armagh.

Ireland.—March 6.—For erection of a manse at Donemanagh. Mr. W. Stuart, B.E., M.R.S.I., Strabane.

Ireland.—March 11.—For erection of school and parochial hall building in Keady. Mr. H. C. Parkinson, architect, Russell Street, Armagh.

Keighley.—March 1.—For erection of twenty-two cottages, in blocks of six, three, and thirteen, on the Strongclose Park estate. Apply on March 1 to Messrs. Moore & Crabtree, architects, York Chambers, Keighley.

Leeds.—March 1.—For the following works for the unhealthy areas and housing committee:—Alterations and repairs to No. 28 Trafalgar Street; alterations to staircase, &c., at No. 30 Lady Lane. Mr. W. T. Lancashire, city engineer, Leeds.

Margate.—March 2.—For the supply and erection of:—(1) A glass and iron addition to an existing bandstand on the sea front, the structure to measure 110 feet by 30 feet, the roof to be wholly of glass and to be of patent glazing, supported by means of fifteen cast-iron columns and wrought-iron ornamental principals; (2) a timber and glazed folding wind screen of about 2,000 superficial feet area; (3) a covered way 110 feet by 30 feet consisting of cast-iron columns, steel joists, concrete roof, asphalte topping, and ornamental iron railing, &c. Mr. E. A. Borg, borough engineer, 13 Grosvenor Place, Margate.

London.—March 1.—For supply and delivery at Lower Edmonton station of 60 tons or more or less of English steel joists (prompt delivery required), for the Edmonton Urban District Council. Mr. G. Eedes Eachus, M.I.C.E., engineer to the Council, Town Hall, Edmonton.

Newark.—March 2.—For the renewal and repairs to the Newark parish church roofs. Messrs. Sheppard & Lockton, architects, Bargate, Newark.

Nottingham.—March 5.—For erection of a telephone exchange. Deposit 1*l*. 1*s*. The Clerk of Works, Head Post Office, Nottingham, or H.M. Office of Works, &c., Storey's Gate, S.W.

Pembury.—March 11.—For alterations to and new buildings at the Infirmary, and men's day room at the workhouse, Pembury, Kent. Mr. S. Philpott, architect, 65 High Street, Tunbridge Wells.

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ROYSTON.—March 3.—For erection of a cart shed, brick wall and close-boarded fence, in Queen's Road. The Surveyor's office, Town Hall, Royston, Herts.

SCOTLAND.—March 2.—For erection of spire for church, for Deacons' Court of United Free English Church, Stornoway. Mr. Neil Maccallum, clerk to Deacons' Court, Stornoway.

SCOTLAND.—March 10.—Designs and estimates for a bandstand to be erected in Saughton Park. Mr. J. A. Williamson, A.R.I.B.A., Public Works Office, Edinburgh.

SCOTLAND.—March 15.—For the construction of a goods shed, on Riverside Quay, York Hill, 1,370 feet by 100 feet. Engineer Clyde Navigation Trustees, Glasgow.

SELBY.—March 4.—For erection of a caretaker's cottage and outbuildings at the School, Gowthorpe House. Mr. J. H. Bantoft, clerk to the governors, 33 Finkle Street, Selby.

STOCKBRIDGE.—March 11.—For erection of a Council school for 220 children, at Stockbridge (Hants). Deposit 2*l.* 2*s.* Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

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TUCKENHAY.—March 3.—For erection of eight cottages. Mr. W. F. Tollit, architect, 10 High Street, Totnes.

WALES.—Feb. 27.—For building additions to and altering the Ynysbwl mixed school, Mountain Ash. Mr. W. H. Williams, architect, Town Hall, Mountain Ash.

WALES.—March 1.—For erection of twenty houses or more at Pwllgwaun, Pontypridd, for the Llwynmadoc Building Club, Pontypridd. Mr. Edward Rees, architect and surveyor, Alexandra Chambers, Pontypridd.

WALES.—March 1.—For erection of a vicarage for the parish of Tregare, near Raglan (Mon.). Deposit 1*l.* 1*s.* Mr. Ernest G. Davies, M.S.A., architect, 132 Widemarsh Street, Hereford.

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WREXHAM.—March 9.—For alterations and additions required at the Electricity Works, Willow Road. The Borough Engineer's office, Willow Road, Wrexham.

YORKS.—March 12.—The West Riding education committee invite whole or separate tenders for the following works:—Wombwell, new school; Aston-with-Aughton, Aughton new school. Mr. Francis Alvey Darwin, clerk of the County Council, County Hall, Wakefield. Deposit 1*l.* with West Riding Treasurer, County Hall, Wakefield.

TENDERS.

ARMATHWAITE.

For erecting a mixed elementary school. Mr. G. DALE OLIVER, F.R.I.B.A., county architect, Carlisle.

Exors of W. Grisenthwaite	£3,452	2	4
Beaty	3,153	8	0
Reed & Sons	2,973	0	0
Laing & Sons	2,791	19	7
MUSGRAVE, Carlisle (*accepted*)	2,729	4	0

BARNSLEY.

For work at the Keir Street school.

MEDLEY, Barnsley (*accepted*)	£535	0	0

BIRMINGHAM.

For reconstructing the drainage system at the Workhouse, Western Road, for the Guardians of the Poor. Messrs. W. H. WARD, architects, Paradise Street, Birmingham.

White	£4,970	5	3
Currall, Lewis & Martin	4,439	0	0
Harper	3,918	3	5
Cooper	3,871	17	3
Smith	3,398	0	0
Wood	3,333	0	0
Fenwick	3,300	0	0
Gibbs	3,150	0	0
Trentham	3,144	0	0
Woodcock & Riley	2,925	0	0
Bates	2,890	0	0
Swift	2,850	0	0
Robinson	2,818	0	0
SAPCOTE & SONS, Birmingham (*accepted*)	2,557	0	0

BEDFORD.

For paving, channelling, roadmaking, &c., in Campbell Road, for the Town Council.

Palmer (*recommended*)	£342	0	0

BINGLEY.

For various works in erection of a detached residence in Glen Road, Eldwick, Bingley, Yorks. Mr. W. R. NUNNS, M.S.A., architect, Bingley.

Mason.

Brown & Son	£322	0	0
J. & W. Potter	286	0	0
Wildman	277	0	0
Foster	272	0	0
WINCOCK, Queensbury (*accepted*)	245	0	0

Joiner.

DRIVER, Keighley (*accepted*)	140	0	0

Slater.

THORNTON (*accepted*)	32	0	0

Plumber.

RUSHFORTH, Shipley (*accepted*)	66	0	0

Plasterer.

HOLMES, Shipley (*accepted*)	34	0	0

Painter.

EARNSHAW, Main Street (*accepted*)	12	14	6

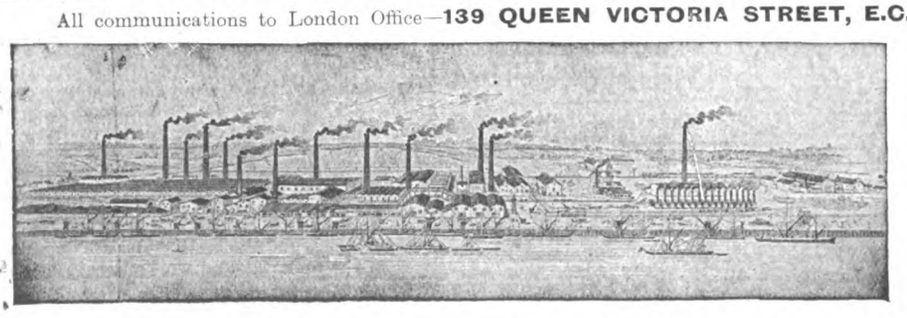
BRIGHTON.

For the erection of boundary walls and entrance gates and the excavations for and the construction of one covered service reservoir at North Lancing, for the Brighton Town Council.

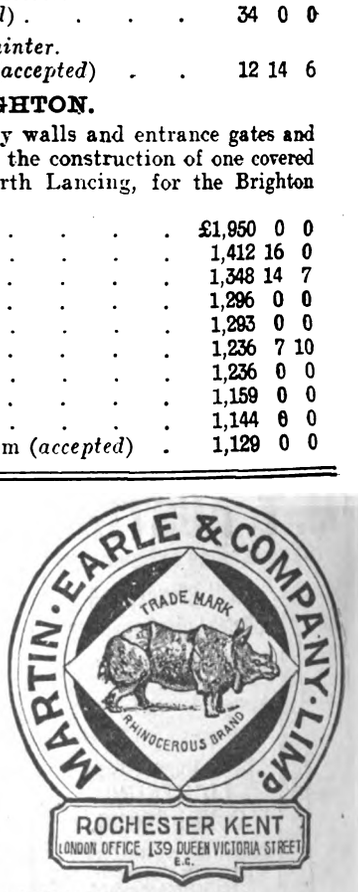
Olliver	£1,950	0	0
Hockley & Co.	1,412	16	0
Nunn & Co.	1,348	14	7
Cook & Sons	1,296	0	0
Bostel Bros.	1,293	0	0
Burstow	1,236	7	10
J. & W. Simmonds	1,236	0	0
Rowland Bros.	1,159	0	0
Swales	1,144	0	0
LINDFIELD & SON, Horsham (*accepted*)	1,129	0	0

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BRIDLINGTON.

For the erection of a dwelling-house in Cardigan Road. Mr. J. SHEPHERDSON, architect, Bridlington.

Booth	£925 0 0
Martindale	910 0 0
POSTILL & SONS, Bridlington (*accepted*)	830 0 0

EAST STONEHOUSE.

For alterations to premises, No. 1 St. Mary Street, No. 1 Clarence Place and the workhouse premises. Messrs. THORNELY & ROOKE, architects, Plymouth.

Pethick Bros.	£1,107 0 0
Pouter	1,075 0 0
Lethbridge & Son	1,037 0 0
Wilkins & Sons	995 0 0
Allen	933 0 0
Crockerell	930 0 0
Triscott	921 3 5
Crews	910 0 0
Turpin	905 0 0
Littleton & Son	902 0 0
Coles	895 0 0
Trevan	860 0 0
Pearn Bros.	860 0 0
Paynter	852 0 0
Andrews	852 0 0
Stevenson	820 0 0
Endicott	805 0 0
Taylor	793 0 0
Roberts	786 14 9
LARWITHEN, Plymouth (*accepted*)	763 0 0

FRIZINGTON.

For the construction of sewerage settling-tanks at Frizington, Cumberland. Mr. G. ASHBRIDGE, A.R.S.I., engineer.

GREEN, Cockermouth (*accepted*)	£302 12 0
Engineer's estimate	300 0 0

GOSPORT.

For street works, for the Gosport and Alverstoke Urban District Council. Mr. H. FROST, surveyor, Gosport.

Bevis Road.

Lear & Son	£346 0 0
Farminer	330 0 0
Croad	323 0 0
Douglas	307 0 0
Hunt	301 0 0
DASH (*accepted*)	279 0 0
Surveyor's estimate	347 0 0

Blake Road.

DASH (*accepted*)	279 0 0
Surveyor's estimate	355 0 0

Burnett Road.

DASH (*accepted*)	195 0 0
Surveyor's estimate	238 0 0

Cobden Street.

DASH (*accepted*)	133 0 0
Surveyor's estimate	155 0 0

Coward Road.

DASH (*accepted*)	168 0 0
Surveyor's estimate	213 0 0

Parham Road.

DASH (*accepted*)	794 0 0
Surveyor's estimate	958 0 0

Stone Lane.

DASH (*accepted*)	147 0 0
Surveyor's estimate	192 0 0

GREENWICH.

For forming and paving Eversley Road as a new street.

Peters	£598 0 0
Fry Bros.	532 0 0
Etheridge	530 0 0
Woodham & Sons	527 0 0
Mowlem & Co. (*recommended*)	499 0 0

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(Signed) WILLIAM F. GEPP.
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31 BARTHOLOMEW CLOSE, LONDON, E.C.

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HAILSHAM (SUSSEX).

For the erection of premises for the London and County Banking Co., Ltd., and offices. Mr. ARTHUR H. BURTENSHAW, P.A.S.I., architect, Eastbourne.

Martin & Sons	£1,775 0 0
Peerless, Dennis & Co.	1,768 0 0
Bodle	1,733 0 0
Chilton	1,648 0 0
Rich	1,583 0 0
Martin	1,549 0 0
PHILLIPS (*accepted*)	1,390 0 0

ILFRACOMBE.

For new post office, for H.M. Office of Works, &c.

Upton	£4,756 0 0
Cowlin	3,983 0 0
Wilkins & Sons	3,968 0 0
Pethick Bros.	3,900 0 0
Bovey & Son	3,730 0 0
Hayward & Wooster	3,650 0 0
Peckett	3,562 0 0
Stevenson	3,500 0 0
Wakeham Bros.	3,498 0 0
Blake	3,435 0 0
Coles	3,365 0 0
Stanbury	3,334 0 0
WOODMAN & SON (*accepted*)	3,067 0 0

KEMPTON PARK.

For construction of sewage works at the Kempton Park station, for the Metropolitan Water Board.

Mowlem & Co.	£640 0 0
Kirk & Randall	577 0 0
Muirhead & Co.	564 18 4
Catley	541 15 0
Renshaw	520 0 0
Leslie & Co. (*recommended*)	495 0 0

LONDON.

For providing and fixing a low-pressure hot-water heating apparatus at the London County Council secondary school, on the West Hill site, Wandsworth.

Grundy	£1,897 0 0
Strode & Co.	1,777 0 0
J. & F. May	1,675 0 0
Cannon & Sons	1,650 10 0
Moorwood, Sons & Co.	1,600 0 0
Yetton & Co.	1,575 0 0
Stevens & Sons	1,550 0 0
Wenham & Waters	1,547 0 0
Ashwell & Nesbit	1,528 0 0
Korting Brothers	1,512 4 2
Comyn Ching & Co.	1,490 0 0
Defries & Sons	1,458 0 0
Cash & Co.	1,444 0 0
G. & E. Bradley, 77 Lever Street (*recommended*)	1,421 0 0
Architect's estimate (education)	1,560 0 0

For making-up of Frankfurt Road, Herne Hill, for the Camberwell Borough Council.

Jerram	£958 18 8
Adams	915 15 6
Manders	913 3 9
E. & E. Iles	894 19 3
Hobman & Co.	889 15 7
Killingback & Co.	867 0 6
Woodham & Sons	830 7 9
Hobman & Co.	811 19 5
Dykes	797 6 7
Mowlem & Co.	791 6 2
Etheridge	787 19 9
Wheeler & Co.	779 12 0
Pearce	765 10 6
Fry Bros.	721 3 0
ANDERSON, Poplar (*accepted*)	717 13 0

For erection of thirty-two additional cottages on the second part of Section B of the Norbury Estate, for the London County Council.

Gathercole Bros. (*recommended*)	£6,579 14 0

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LONDON—*continued.*

For branch post office, South Kensington, and meteorological office, for H.M. Office of Works, &c.

Willett	£21,500	0	0
Pethick Bros.	21,495	0	0
Wilkins & Sons	21,466	0	0
McLaughlin & Harvey	19,715	0	0
Galbraith Bros.	19,650	0	0
Spencer, Santo & Co.	19,559	0	0
Higgs & Hill	19,484	0	0
Mowlem & Co.	19,458	0	0
Minter	19,178	0	0
Lovatt	19,170	0	0
Low & Co.	18,889	0	0
Perry & Co. (Bow)	18,756	0	0
Barker & Co.	18,730	0	0
Holloway Bros. (London)	18,700	0	0
McCormick & Sons	18,690	0	0
King & Son	18,594	0	0
Smith & Sons	18,479	0	0
Wallis	18,472	0	0
F. & E. Davey	18,434	0	0
Coles	17,989	0	0
Leslie & Co.	17,989	0	0
Williams	17,927	0	0
Lawrance & Sons	17,826	0	0
F. & H. F. HIGGS (*accepted*)	17,722	0	0

For alterations at the Laindon branch workhouse, for the Poplar Board of Guardians.

HARRISON & Co., Camberwell (*accepted*)	£1,422	0	0

MANSFIELD.

For alterations to the retort bench.

DRAKES (*accepted*)	£1,175	0	0

PLYMOUTH.

For the construction of a new road between the Little Saltram and Mount Gold estates, from Lanhydrock Road to Beaumont Road.

DONEY (*accepted*)	£829	8	0

NEWCASTLE.

For erection of Newcastle head post office, for H.M. Office of Works, &c.

Fenwick & Co.	£25,580	0	0
Ayton	25,100	0	0
Craven	24,680	17	0
Davidson & Miller	24,269	13	2
J. & W. Lowry	24,200	0	0
Ferguson	23,348	0	0
Neill & Sons	22,084	0	0
Easten	21,977	0	0
Lumsden	21,500	0	0
Manchlen	21,170	10	0
Middlemiss Bros.	20,976	6	0
Milne	20,678	10	0
KIRK & BROWN (*accepted*)	20,275	1	11

OAKHAMPTON (DEVON).

For laying down granite kerbing and channelling and cement concrete footpaths at Hatherleigh. Mr. S. HOOPER, surveyor, Hatherleigh.

Avery	£871	10	8
Pethick	830	19	11
Taylor	820	14	2
Furse & Sons	775	12	8
Ash	764	13	6
Shaddock	757	10	1
Bolt	756	3	7
Hooper	695	5	7

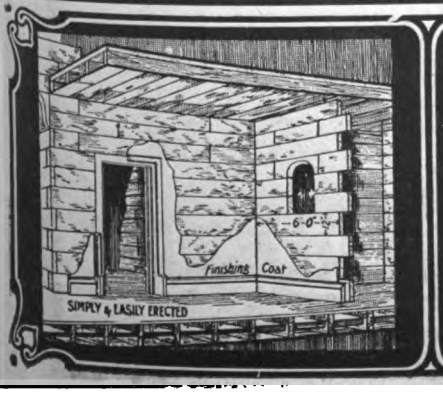
PORTSMOUTH.

For rebuilding premises, Osborne Road, Southsea. Messrs. RAKE & COGSWELL, architects.

Light & Son	£947	0	0
Davis	918	0	0
Salter	880	0	0
Croad	850	0	0
Privett	827	0	0
Corke	824	0	0
Lay & Co.	819	0	0
Bishop Bros.	800	0	0
Crockerell	798	0	0
Jones	778	0	0
COLTHERUP, Portsmouth (*accepted*)	775	0	0

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PORTSMOUTH—*continued.*

For additions to the Jewish synagogue. Messrs. RAKE & COGSWELL, architects, Portsmouth.

Salter	£1,375 0 0
Crockerell	1,322 0 0
Corke	1,308 0 0
Croad	1,280 0 0
Jones	1,267 0 0
PRIVETT, Portsmouth (*accepted*)	1,247 0 0

ROMSEY.

For the erection of a porch at the abbey. Mr. W. D. CAROE, architect.

Haywood & Co.	£1,337 0 0
Wheeler & Son	1,290 0 0
Goulding & Son	1,250 0 0
Thompson & Co.	1,196 0 0
Collins & Godfrey	1,194 0 0
CORNISH & GAYMER (*accepted*)	1,094 0 0

ST. ALBANS.

For erection of school at St. Paul in Hatfield and Blandford Roads. Messrs. J. E. K. & J. P. CUTTS, architects, 14 Southampton Street, W.C.

Dunham	£8,475 0 0
Harris & Wardrop	8,180 0 0
Godson & Sons	7,789 0 0
Staines	7,776 0 0
Bowman & Sons	7,725 0 0
Darvill	7,600 0 0
Dorey & Co.	7,599 0 0
L. H. & R. Roberts	7,587 0 0
Ekins & Co.	7,586 0 0
Miskin & Sons	7,550 0 0
Honour & Son	7,445 0 0
BENTLEY & SONS, Waltham Abbey (*accepted*)	7,324 0 0

SEDGEFIELD.

For carrying out the Ferryhill north side sewage scheme.

HOBBS, Stockton (*accepted*)	£1,210 17 0
Surveyor's estimate	1,800 0 0

SHIREMOOR.

For street works, for Easdon Urban District Council. Mr. J. R. MACMILLAN, surveyor, Shiremoor.

McLaren & Co.	£1,102 6 9
Thornton & Co.	999 0 0
Shannon & Co.	995 2 1
Henderson	916 19 9
Robson	910 13 3
Coxon	891 5 9
YOUNG, Newcastle (*accepted*)	844 16 5
Surveyor's estimate	1,006 0 0

SUTTON (SURREY).

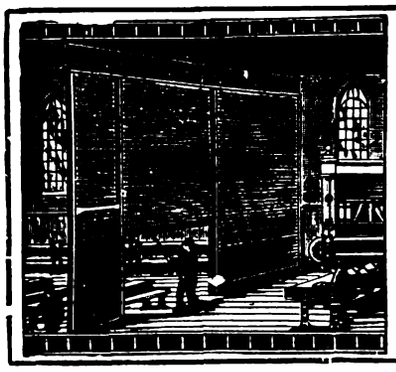
For the erection of a house in the Worcester Road. Messrs. FRANK CHOWN & SHEFFIELD, architects, Hanover Square, W.

Gathercole Bros.	£1,960 0 0
Parker & Son	1,937 0 0
Saunders	1,924 0 0
Smith & Sons	1,897 0 0
Cropley Bros.	1,887 0 0
NIGHTINGALE, London (*accepted*)	1,755 0 0

TERRINGTON ST. CLEMENT (LYNN).

For erecting cottage. Messrs. WALKER & WALKER, architects, Wisbech.

Reeder	£219 5 9
Tash & Langley	216 9 0
Rilett	214 0 0
Wilkinson & Son	200 0 0
Papworth	189 5 0
Johnson & Son	180 10 0
Parker	176 17 6
Green	171 8 6
Lawson	169 15 0
White	168 0 0
Hornigold	161 10 11
Bone	161 0 0
Tann & Johnson	160 0 0
Barnes & Co.	146 0 0
EGGLETON, Lynn (*accepted*)	136 0 0



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For Index of Advertisers, see page X.

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SAUNDERSFOOT.

For the erection of villa residence at Saundersfoot, for Mr. J. Angel. Mr. J. PREECE JAMES, architect, Tenby.

David & Richards	£978 0 0
Parry	860 0 0
Thomas	853 0 0
GRIFFITHS (*accepted*)	850 0 0

For additions to White Park Farm, Saundersfoot, for Mr. H. C. Lewis. Mr. J. PREECE JAMES, architect, Tenby.

David & Richards	£186 0 0
Griffiths (*recommended*)	183 0 0

TENBY.

For alterations and additions to No. 1 Glendower Houses, Tenby, for Miss Waters. Mr. J. PREECE JAMES, architect, Tenby.

DAVIES, PHILLIPS & HUSBAND (*accepted*)	£414 0 0

For alterations and additions to No. 2 Glendower Houses, Tenby, for Miss Harvey. Mr. J. PREECE JAMES, architect, Tenby.

DAVIES, PHILLIPS & HUSBAND (*accepted*)	£479 0 0

For new shop front for Mr. A. Squibbs, Warren Street, Tenby. Mr. J. PREECE JAMES, architect, Tenby.

PHILLIPS (*accepted*)	£100 0 0

THURNSCOE (YORKS).

For various works for the Urban District Council.

Sewer.

Williams, jun.	£274 10 0
Woods	262 4 0
Hall & Co.	240 10 0
Dickinson	229 0 0
Hann	217 13 9
Mason	211 6 6
Slater	210 3 0
Haigh	187 14 0
Kaye Bros.	187 9 0
WILSON, Thurnscoe (*accepted*)	177 11 6
Rothera	175 10 8
Sykes	164 0 0
Hawksworth	155 19 0

Footpath.

WILLIAMS, JUN., Thurnscoe (*accepted*)	121 5 0

Boundary wall.

WILSON (*accepted*)	46 10 0

THRYBERGH (NEAR ROTHERHAM).

For working men's club, Thrybergh, for the trustees. Mr. P. A. HINCHLIFFE, A.R.I.B.A., Barnsley.

Chadwick & Co.	£2,750 0 0
Cooper	2,643 0 0
Thornton & Son	2,631 0 0
Snell	2,492 0 0
Trehern	2,420 0 0
Newton	2,154 0 0
BEEDEN, Rotherham (*accepted*)	2,054 0 0

TYNEMOUTH.

For supply of whinstone and limestone during year ending March 31, 1910, for the Tynemouth Rural District Council. *Whinstone.*

Haydon Bridge Quarry Co.	£1,847 16 0
Walker	1,823 5 0
Northumberland Whinstone Co.	1,725 11 8
Reid & Co.	1,706 5 10
Richardson	1,684 5 0
Appelby	1,664 16 4
EWESLEY QUARRY CO., Newcastle (*accepted*)	1,647 5 0

WALES.

For erecting a parsonage house at Aberavon (Port Talbot). Mr. J. A. JAMES, architect, Port Talbot.

Davies	£2,436 0 0
Cox	2,047 0 0
Maggs	1,990 15 0
Davies & Sons	1,890 0 0
Evans	1,876 0 0
GROOM, Aberavon (*accepted*)	1,865 0 0

For erection of dwelling house, shop, &c., at Pen Cwm, Goodwick, for Mr. Albert Lewis. Mr. J. PREECE JAMES, architect, Tenby.

Williams	£803 8 0
Edwards	630 0 0
EVANS (*accepted*)	628 0 0
Jackson	610 0 0

For alterations to the church of Dewi Sant, Llwynypia. Mr. J. W. RODGER, architect, Cardiff.

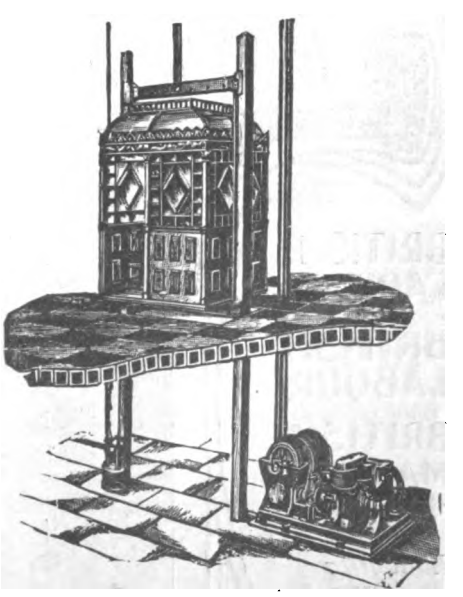
COX & BARDO, Cardiff (*accepted*)	£360 19 2

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WALES—*continued.*

For paving, kerbing, channelling, flagging, sewering, forming, metalling, &c., Moy Road, Taff's Well, for the Caerphilly Urban District Council. Mr. ALFRED O. HARPUR, surveyor.

Protheroe	£1,063 0 0
Mundy	947 17 6
Barnes, Chaplin & Co.	863 14 2
Collins & Co.	803 16 8
J. Rutter	799 8 4
Osmond & Sons	798 16 8
Williams	760 5 0
G. Rutter	708 4 2
EDWARDS, Taff's Well (*accepted*)	685 18 4

For the construction of about 1,000 lineal yards of 12-inch sewer at Parknewydd Farm, Merthyr Tydfil. Mr. OWEN WILLIAMS, C.E., surveyor, Aberdare.

BROWN, Merthyr Tydfil (*accepted*)	£411 10 0

WALLASEY (CHESHIRE).

For erection of Wallasey Masonic Hall, Cheshire. Mr. J. W. B. HARDING, architect, Liverpool.

Mayor & Co.	£3,625 0 0
Mills & Sons	3,395 0 0
Rothwell	3,345 0 0
Haigh & Co.	3,287 0 0
Popple	3,274 0 0
Dolan & Sons	3,273 0 0
Paterson	3,270 0 0
Parker & Son	3,260 0 0
Dryland & Preston	3,229 15 0
Duthie & Dobson	3,224 0 0
Lloyd	3,200 0 0
Hall & Jamieson	3,197 0 0
Bellis	3,160 0 0
Tyson	3,142 0 0
Milestone	3,107 10 0
Spencer	3,060 0 0

WALTON-ON-THE-NAZE.

For construction of a public convenience. Mr. H. W. GLADWELL, town surveyor, architect.

Ellis	£698 0 0
Carhan	667 11 0
Farr	595 0 0
Wash	586 17 0
Jones	579 0 0
Smith, Clacton-on-Sea (*deferred for consideration*)	546 0 0
Surveyor's estimate	629 0 0

WATFORD.

For the erection of the Leavesden Road Baptist church, Watford. Messrs. G. BAINES & SON, architects, 5 Clement's Inn, W.C.

Bracey & Clark	£4,905 0 0
Brown	4,827 0 0
G. & J. Waterman	4,710 0 0
Darvill	4,660 0 0
Clark Bros.	4,527 0 0
Wiggs	4,485 0 0
King	4,455 0 0
BRIGHTMAN & SON, Watford (*accepted*)	4,279 0 0

WELLINGTON.

For kerbing, channelling and flagging with adamant concrete a number of streets and footpaths in the urban district of Wellington (Salop). Mr. GEO. RILEY, surveyor, 14 Walker Street, Wellington, Salop.

Williams	£3,696 0 0
Stiff	3,663 11 11
Thorpe	3,586 12 7
Holloway	3,325 0 0
Trentham	3,191 10 7
Empire Stone Co.	3,185 9 7
Pearce	3,155 18 4
Ceriog Granite Co.	3,047 18 4
Gibbs Bros.	2,941 7 5
Croft Granite Co. (contracts 1 and 2)	2,375 15 0
Lillestall Co. (contracts 3 and 4)	597 0 8
Surveyor's estimate	3,000 0 0

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ILLUSTRATIONS.

DESIGN FOR GLAMORGAN COUNTY HALL, CARDIFF.—ELEVATIONS—DETAIL OF MAIN FRONT—PLANS.

HOUSE AT SUNDRIDGE PARK.

NEW CLUB HOUSE, MARKEATON.

WINSFORD.

For erection of class-rooms, lecture-room, &c., at the United Methodist Free Church school, Winsford, Cheshire. Messrs. A. PRICE & SON, architects, Sandbach.

Sergeant Bros.	£1,056 0 0
Birchall Bros.	1,020 0 0
Finney	1,003 10 0
Pickstock & Royle	999 0 0
FOWLES & SONS, Winsford (*accepted*)	995 0 0
Wilson	970 10 0
Court	960 0 0
Curzon	926 10 0
Dickinson & Noden	799 0 0

YORK.

For erecting a temporary grand stand in the gardens of the Yorkshire Philosophical Society, for the executive committee of the York Historic Pageant, Mr. F. W. SPURR, city engineer, Guildhall, York.

Bellerby	£1,607 0 0

For the substitution of patent glazing in the skylights of the baths. Mr. SPURR, surveyor.

HOLT & SONS, Birmingham (*accepted*)	£123 19 8

A TENDER has been accepted for the erection of a Baptist church and institute, Leavesden Road, Watford. The block is designed in a free treatment of Late Gothic. The facings will be in pressed red bricks and the dressings in Bath stone. The church is to accommodate about 700 persons. The architects, whose design was selected in a competition, are Messrs. George Baines & Son, 5 Clement's Inn, Strand, W.C. The contract, which amounts to 4,150*l.*, is let to Messrs. Brightman & Son, of Watford.

TRADE NOTES.

AN addition is being made to Messrs. Lingard's premises, Bradford. Mr. James Ledingham, F.R.I.B.A., is the architect. The floors are to be on the "Fawcett" system, and are being put in by Messrs. Fawcett & Co., of Westminster and Greenwich.

THE directors of John Oakey & Sons, Ltd., recommend the payment of a final dividend of 5 per cent. to the ordinary shareholders, making a total of 10 per cent. for the year, and in addition a bonus of 5 per cent. free of income tax, leaving a balance of 5,050*l.* 19*s.* 9*d.* to be carried forward to next year.

VARIETIES.

THE Westminster City Council have agreed that a number of streets be repaired during the coming year at an estimated cost of 30,903*l.* 10*s.*

FRASERBURGH Harbour Commissioners have decided to erect a store at the quayside for the convenience of local traders.

AT a meeting of the Society of Engineers next Monday, at the Royal United Service Institution, Whitehall, a paper is to be read entitled "A New Test for Concrete," by J. S. Owens, M.D., A.M.I.C.E.

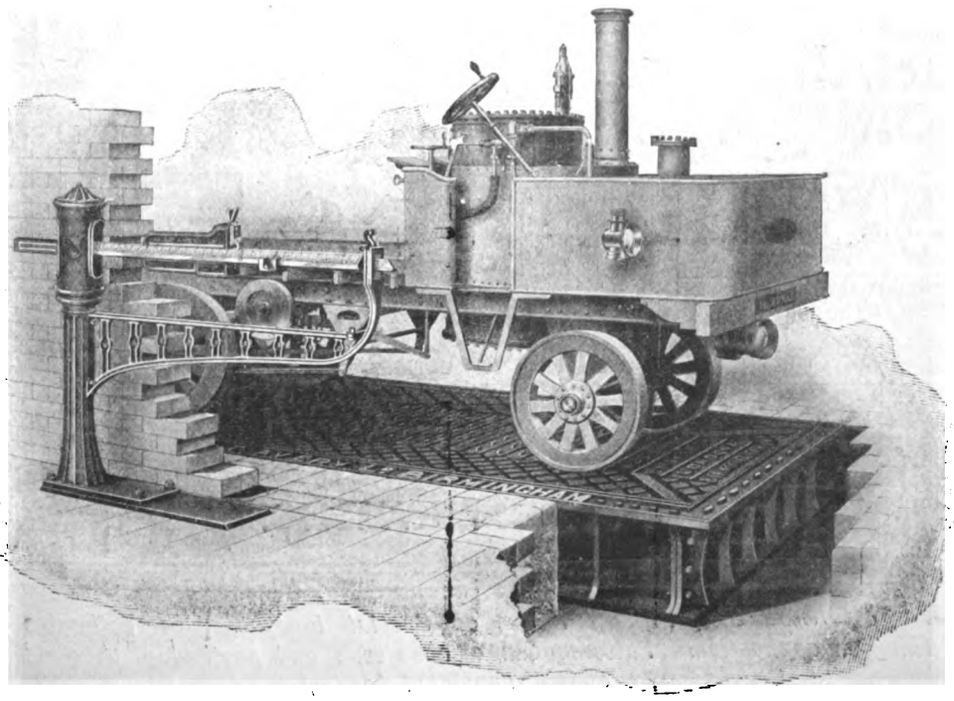
MESSRS. LOVEGROVE & PAPWORTH, of 374-8 Old Street, E.C., architects and surveyors, have succeeded to the practice carried on for many years by the late Mr. J. H. Richardson, of 22 King Street, Hammersmith, W. Both addresses and telephone numbers will be retained.

THE Farnham (Surrey) Urban District Council have received a letter from the Board of Trade refusing an application by the Farnham and District Electric Lighting Company for permission to erect overhead wires in carrying out their Order to light the town by electricity.

THE tower attached to the St. John's parish church, Staveley, has been found to be in need of restoration, owing to the masonry and woodwork showing signs of decay. With the object of ascertaining the estimated cost of the defects, an expert has examined the portion of the edifice affected. It has been decided to proceed with the renovation shortly, which will cost between 300*l.* and 500*l.*

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THE Willington Urban District Council have instructed their works committee to consider the question of a refuse destructor.

MR. COLE ALFRED ADAMS, F.R.I.B.A., of 66 Victoria Street, S.W., died on February 21, at the age of sixty-four, after three and a half months' suffering. Mr. Adams became an Associate of the Institute in 1874.

HEREFORD GARDEN CITY.—The committee of the Hereford Co-operative Housing, Ltd., on February 22 instructed Messrs. Groome & Bettington, architects, to accept the tender of Messrs. W. P. Lewis & Co., Hereford, for the building of twenty cottages on the site near Barrs Court station.

THE Safety Tread Syndicate, Ltd., 15 Barbican, E.C., announce that owing to the low price of metals they have been able to make contracts for long supplies of material at the favourable prices now ruling. There are therefore now substantial reductions on the list prices of Mason's Patent Steel and Lead Treads (V-grooved sections).

MR. P. C. COWAN, M.Inst.C.E., Chief Engineering Inspector of the Local Government Board, Ireland, held an inquiry at Belfast on Monday into an application by the Corporation for sanction to loans of 8,000*l.* and 75,000*l.*, for the purpose of enlarging the lunatic asylum at Purdysburn. It is proposed to proceed with the first instalment of the work directly official sanction for the loan is received.

A LOCAL Government Board inquiry was held on Tuesday at Fleetwood, Lancs., into the Council's application for authority to borrow 21,500*l.* for the purchase of the undertaking of the Fleetwood and District Electric Light and Power Syndicate. It was stated that the Council had obtained a provisional order to purchase the electric light works, and the amount agreed upon was 15,000*l.* Various other sums for stock, new refuse destructor, and the freehold of the works brought up the amount to 21,500*l.*

AT the last meeting of the executive committee of the Swansea Harbour Trust plans were submitted for two new warehouses at the King's Dock, one of 400 feet by 150 feet, to be furnished with transporters and electrically equipped, to be devoted to the Eastern trade, and the second, 400 feet long by 50 feet, to be devoted to cargo trade. Plans were also submitted for a substantial extension of the fish market in the South Dock; also for the widening of the existing market and provision for accommodation on the roof of empty boxes.

A SERIES of fire-resisting doors were under test at the British fire-prevention committee's testing-station on Wednesday, there being four doors under review—i.e. an "armoured" tin-clad door, an iron door and two composite doors. The tests were high-temperature tests, up to 1,800° Fahr., followed by the application of water from a steam fire-engine. A large number of public officials were present, including Sir Schomberg McDonnell, K.C.B. (H.M. Office of Works), and representatives of nearly all the Government Departments concerned. The testing operations were under the direction of two sub-committees, presided over by Mr. Ellis Marsland (district surveyor) and Mr. J. Herbert Dyer (vice-president National Fire Brigades Union). Official reports on the tests will be issued at an early date.

THE A. A. play, 1909, will be entitled "The Rise and Fall of Architecture," interspersed with music by Claude Kelly and bits of rather ancient chaff by the editors of the Purple Patch. This entirely new production will be presented by the Architectural Association Musical and Dramatic Society at the King's Theatre, Covent Garden, on the following evenings:—Ladies' night, March 24, 8.15 o'clock; members' night (smoker), March 26, 8.15 o'clock. Tickets are limited, and can be obtained by members on application to Mr. T. W. Watkins, 11 Old Queen Street, Westminster, S.W., or at the offices of the Architectural Association, 18 Tufton Street, Westminster, S.W.

THE National Provident Institution for Mutual Life Assurance hold their seventy-third annual meeting to-day, the 26th inst. In the financial year ending November 20 last, 1,879 proposals for assurance were received and considered, amounting to 783,483*l.*; of these 345 were not completed, or were declined by the Board, amounting to 157,015*l.*, leaving 1,534 proposals, for which policies were issued amounting to 626,468*l.*, new premiums annually payable on which amount to 30,270*l.* 19*s.* 5*d.*; single premiums



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were also received amounting to 12,272*l.* 5*s.* 10*d.* Of the above new assurances, 45,000*l.* was re-assured with other offices at annual premiums of 3,827*l.* 18*s.* 4*d.* Twenty-seven immediate annuity policies were issued, securing 1,311*l.* 19*s.* 6*d.* per annum, the purchase money received for which amounted to 17,546*l.* 17*s.* 8*d.*

AN extremely compact portable electric hoist for the use of builders and constructional engineers has been put upon the market under the name of "Oerlikon," as it is produced by the Maschinenfabrik Oerlikon, whose London offices are at Oswaldestre House, Norfolk Street, W.C. These standard hoists are supplied for charges up to 1,120 lb., and a lift speed of approximately 1 foot 8 inches per second. Hoist 82 feet. The motors are built to suit supply systems, either for direct current or single-phase, two-phase, or three-phase alternating current. The hoists are sold complete with starter and speed reversing switch, fuses and fuse wires, also a flexible insulated cable on a drum, fixed to the carriage, permitting the connecting up of the motor on to the supply system, in any position. The motor is connected to the hoist by means of a worm gear of the well-known Oerlikon high efficiency type. The hoisting and lowering is done by means of levers. When hoisting the brake opens before the motor starts, and when lowering, the brake closes first. The weight of a complete apparatus on an iron framing with wheels, to work with three-phase 6 b.h.p. motor, is 2,600 lb.

BUILDING AND BUILDERS.

DINORWIC quarries resumed working full time on Saturday. Owing to the depression in the slate trade only five days a week had been worked for many months.

PLANS have been adopted for the erection of a Wesleyan church in Longsight, Lancs., on land near the Longsight cricket ground. The total sum required for the undertaking is 1,700*l.*

THE Great Western Railway at their meeting last week sanctioned several expenditures, including 25,000*l.* on the improvements at St. David's Station, Exeter, which had been rendered absolutely necessary by the increased traffic at the station.

THE Deptford Borough Council are going to take steps for the purchase of a central library site at a cost of 5,000*l.*, the negotiations in regard to certain houses at the corner of Lewisham High Road and Amersham Park Road having fallen through.

THE North-Eastern Railway Company are beginning a comprehensive scheme for alterations and additions to the offices, waiting-rooms, and refreshment department at Ripon station. The contract for the carrying out of the work has recently been placed with Messrs. R. Blackett & Son, Darlington.

THE Liverpool city magistrates on Monday approved the report of the sub-committee appointed to consider the proposed alterations and re-building of the police courts at a cost of 35,000*l.* The most important alterations and additions refer to the first floor. The idea is that the existing licensing court should not be interfered with, but otherwise practically the whole structure is to be remodelled and largely added to by building on land to the west of the present boundary.

THE Town Planning Bill to be re-introduced in Parliament this Session will, if passed, confer certain powers on the municipality of Sheffield. The City Council at its January meeting agreed to the appointment of a committee composed of elected and co-opted members, to consider the question in relation to Sheffield, and, by authorising surveys, or in other ways, as they may deem expedient, to place the Corporation in a position to take advantage of the powers which will be conferred upon them, should the Housing and Town Planning Bill be passed into law. Bodies outside the City Council will be represented as follows:—Sheffield Society of Architects and Surveyors, Mr. Fred Fowler and Mr. E. M. Gibbs; Sheffield Master Builders' Association, Mr. J. Biggin and Mr. A. J. Forsdike; Sheffield and District Building Trades Federation, Mr. H. A. Stone.

THE annual meeting of the Glasgow and West of Scotland Master Plumbers' Association was held in the Building Trades' Exchange, Glasgow, last week. Ex-Bailie James Kilpatrick (president) occupied the chair. The directors' report stated that the total membership was 183, there being 117 members in Glasgow and district, and 66 provincial members. Although last year the directors were of opinion that the state of trade in Glasgow and district reasonably warranted a reduction in wages, the rate was, however, not altered. After several meetings with the operatives' associa-

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tion several alterations had been made on the working rules. The treasurer's statement showed that the funds of the association now amount to 1,153*l.* 15*s.* 3*d.*, the sum of 38*l.* having been added during the year. The following office-bearers were appointed:—President, George Munro; vice-president, W. Twaddle; hon. treasurer, W. Johnstone; secretary, J. Wylie, writer, 204 St. Vincent Street.

The Royal Sanitary Institute have arranged lectures and demonstrations on sanitary science as applied to buildings and public works. The demonstrations commenced on the 10th, and the lectures on the 19th inst. The lectures have been arranged to assist those desiring instruction in sanitary science as applied to buildings and public works, builders, and those engaged in allied trades, and anyone desirous of obtaining the certificate of the Institute in sanitary science as applied to buildings and public works. Inspections and demonstrations are arranged. The subjects will be given by well-known authorities, and will be illustrated with diagrams, drawings, models, and lantern slides. The museum of sanitary appliances and the library are open free to students attending the course. Arrangements are made by which students can obtain the loan of books for a small payment. The fee for course is 2*l.* 12*s.* 6*d.* Students and others desirous of attending the lectures are requested to send in their names at once to the Secretary of the Institute, Margaret Street, W. Among the lectures are "Calculations, Measurements, and Plans and Sections," "Building Materials," "Sanitary Building Construction," "Sanitary Appliances," "Details of Plumbers' Work," "House Drainage," and "Water Supply."

A meeting of the Glasgow University Geological Society was held at the University last week, when a paper on "Building stones, with special reference to their behaviour in the Glasgow atmosphere," was read by Mr. R. Boyle, B.Sc. The lecturer remarked that the primary test of a building stone consisted in the microscopic examination of a thin slice, and chemical analysis should only be used to elucidate the petrographical structure. A cementing material of silica is in his opinion the best for the Glasgow atmosphere, and one of carbonates the worst. The presence of alumina up to about 1½ per cent. is only deleterious when in the form of ordinary clay. The Permian red sandstones of the south of Scotland withstand the Glasgow atmosphere best. In them the cementing medium is mostly iron peroxide, to which the red colour is due. Actual crushing tests collected and plotted by the writer show that the strength of a sandstone as determined from cubical specimens should be reduced about 10 per cent. Standard test specimens should have a height equal to 1½ times the least width. Flat surfaces should be avoided in buildings as far as possible. Projecting ledges, cornices, and string courses should be given a top slope, and in the case of some stones should be initially coated with concrete, oil paint, or other preservative.

A NEW FIREPROOF FLOOR.

Messrs. Mark Fawcett & Co. on February 6 gave an exhibition test of their latest floor, which they call Monlithcrete. The peculiarity of this is that rolled steel joists with their top flanges smaller than the lower ones have rhomboidal pieces punched from the web, leaving tension bars pitched at an angle of 45° in opposite directions from the centre, and are then used as the reinforcement of cement concrete. In the floor under test the joists used were 6 inches deep, with flanges 2 inches wide at top and 3 inches wide at bottom, the joists after being punched weighing 7.3 lb. per foot run. These were placed at 18-inch centres to form a floor 16 feet span by 2 feet 6 inches wide, with concrete 7½ inches thick. Spirally twisted bars, ⅜ inch by ⅛ inch, are used to give additional tensile reinforcement to the concrete, and were arranged at right angles to the joists. The concrete was composed of broken brick four parts, sand one part, and Portland cement one part, and was five weeks old at the time of the test. The floor was loaded with ballast, and showed ⅜ inch deflection with a load of 3½ cwt. per foot super, ½ inch with 4 cwt., ⅝ inch with 5 cwt., ⅞ inch with 7.25 cwt., ¾ inch with 7.8 cwt., and ⅞ inch with 8.4 cwt. At this last deflection three hair cracks were just visible, one at the centre of bottom edge, the others about 18 inches on each side of the centre.

The floor having thus been loaded to the breaking-weight (16.8 tons) of two 6 inches by 3 inches by 3 inches by 12 lb. rolled steel British standard beams was allowed to stand until February 13, when the loading was continued to 25.2 tons, or 50 per cent. above the breaking-weight of two

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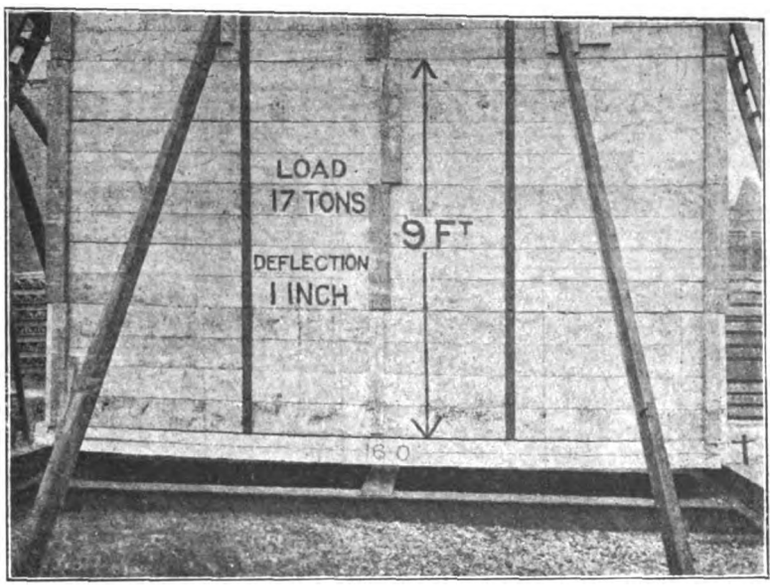
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6 inches by 3 inches by 3 inches by 12 lb. rolled steel British standard beams, and the new type floor still stood. The box containing the ballast was by that time 13 feet 9 inches high, and heaped up to its full capacity the distributed load was 14 cwt. per foot super, and the maximum deflection was 2¼ inches.

On Tuesday, February 16, holes were cut in the sides of the box, allowing the ballast to run out, and as this went on the floor lifted again, and the deflection on clearing all off was found to be 1⅜ inch.

The value of wall-holds for the rolled steel girders, return ends, and longer time for the concrete setting is not here taken into account.

The aim of the inventor, Mr. Mark Fawcett, has been to obtain monolithic construction not by using concrete reinforced by bars and loose or fixed stirrups, but by using what might be described as lattice girders from which the compression members have been removed; in other words, rolled steel girders with large rhomboidal-shaped openings in the webs and tension bars pitched at an angle of 45° to the right and left of the centre, leaving the webs solid at each end to resist shear, whilst the top flanges are reduced to two-thirds the sectional area of the bottom flanges.



The result is that the steel beams, reduced in weight 40 per cent. from the British standard, are capable of carrying at least 50 per cent. more load. The new floor has besides the advantage that an aggregate, as broken brick, can be used for the concrete, possessing greater resistance to fire and less conductive of sound than ballast concrete ordinarily employed in reinforced work.

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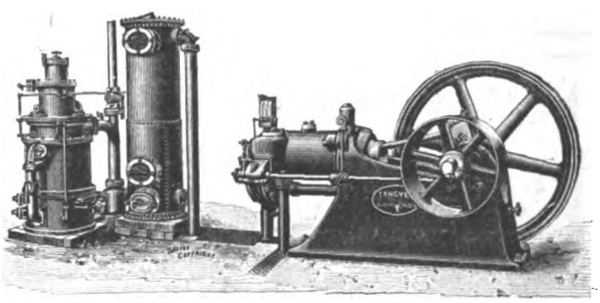
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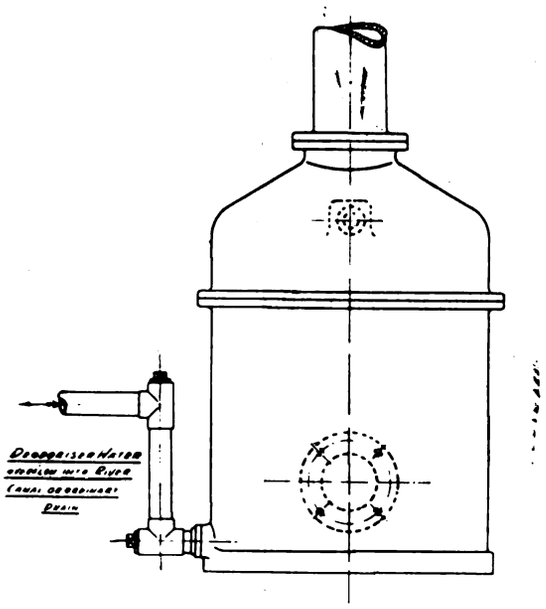
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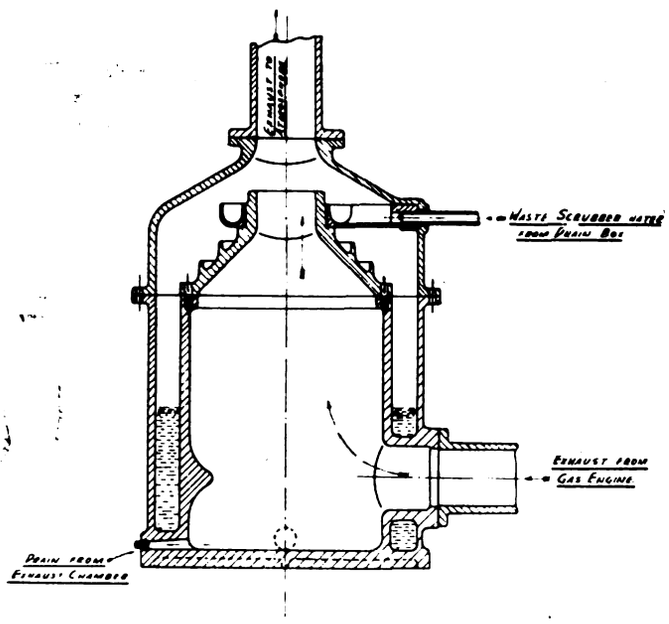
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TANGYES' PATENT DEODORISER.

Many users of "suction" gas-producers have come into conflict with the local authorities through the discharge of the scrubber water, with its offensive smell, into public sewers. In some cases the owner has been compelled to reconstruct his drains at considerable expense before the sanitary authorities will allow of the discharge of this waste water. Tangyes, Ltd., brought their long experience to bear upon this difficulty, with the result that they have produced the "deodoriser" illustrated. The waste scrubber water from the drainbox of the "suction" producer flows through a pipe to the deodoriser, where it trickles through small holes in a circular cup, and distributes itself over the top of the exhaust chamber, which is cast inside an outer casing. This inner chamber is heated by means of the exhaust gases from the gas engine, and thus the water becomes heated and liberates the objectionable smell; the fumes then pass up the exhaust pipe along with the exhaust gases to the atmosphere, the deodorised water passing to any river, canal or ordinary drain. The deodoriser is strikingly simple in construction, automatic in action, and once the moderate first cost is defrayed, no further expense is incurred, since no agent of any kind is needed. Its efficacy is indicated in a letter received from the head engineer at the Hotel-Hydro, Dunblane, Perthshire. In the course of it he thus speaks of the deodorisers which had been fitted to their suction gas-producers five months previously:—"They have given the greatest satisfaction; there is not the slightest smell about the establishment, and they have entirely relieved us of all our troubles with the townspeople."





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PAINTING STRUCTURAL STEEL.*

(Continued from last week.)

Paint and the Painting of Steel.

At one time paint-making was an art, then it became a trick, now it is a science.

The theory that oil, or the binder, is the life of paint—that is to say, the thing that makes it wear—is to a certain extent misleading, and has been the cause of many of the blunders and failures with it in the past. An excess of linseed oil in paint is nearly as much an adulteration as the introduction of a useless or harmful pigment. We work upon the hypothesis that solids are co-efficient with the liquids in producing the best materials, and that the secret—if there be any—lies in the proper adjustment of the amount and kind of each needed to secure a perfect product. No amount of theoretical and empirical knowledge can determine questions of this kind. There are to-day many signs, however, that in the struggle for victory men are accepting the logical conclusion from classified facts—in their mutual relation and sequence—that properly prepared paint is bound to win, because it is based upon sound idealism.

In making paints of value the end aimed at is a close union of solids or pigment and liquids or binders. This is obtained mechanically or chemically, or by a combination of both. Ordinary mechanical mixtures, in which solids and liquids have little or no affinity for each other, or in which powders are feebly suspended in the liquids, scarcely deserve the name of paint.

A perfect paint for structural steel would be one in which the pigment and binder formed a close union, so that there could be no separation, no precipitation of the pigment; in other words, it should form and secure upon the surface of the metal an even covering of an adhesive, cohesive, elastic, harmless and durable cement, impervious to, and unaffected by, either moisture, heat, frost, or climatic changes. It should wear evenly and gradually, and not by disintegration, and should leave a good surface for repainting. It should also be fairly easy of application and dry fast enough.

* Abstract of a paper by Mr. Gaston Despierres, read before the Paint and Varnish Society, London, entitled "Paint and Its Application to Structural Steel."

How best to secure these essential features is a problem which will probably continue for years to come, until some means are devised under which it will be possible to determine quickly what coatings satisfy the requirements of service and use.

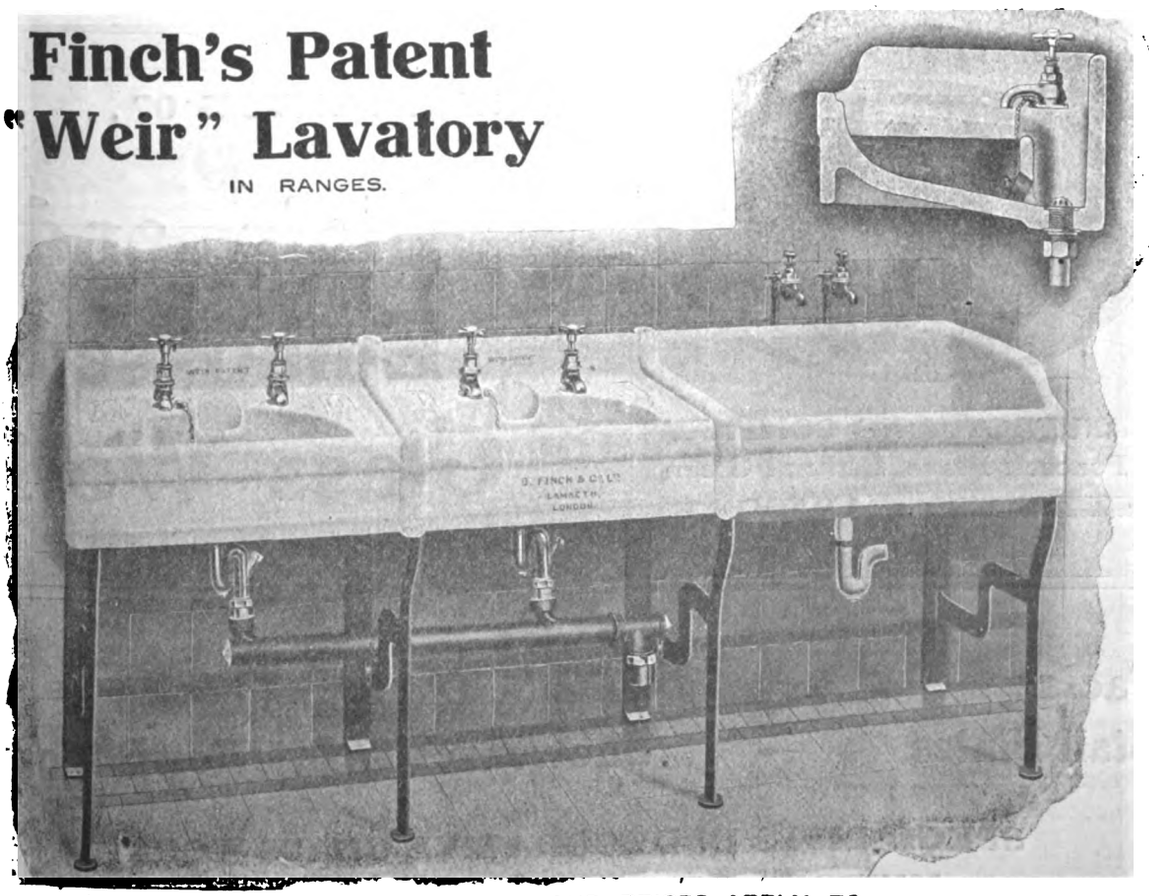
As a manufacturer of both oil and varnish paint, my faith is at the present moment established in varnish paints, because years of study and experience have demonstrated their superiority for steel to coating of any other kind—admitting, of course, that the paints are well made.

Andes, in his work on anti-corrosive paints, in discussing the number of coats of paints that must be applied to iron in order to secure efficient protection against rusting, says that in establishing a standard, preference must undoubtedly be accorded to paints requiring a large portion of oil varnish to make them work properly. He says:—"It may be laid down as a moral standard that, pre-supposing the use of a good paint, one bottoming or priming coat, and three subsequent coatings laid on at suitable intervals, will be required to produce a layer of sufficient thickness on iron to keep moisture away from the metal, and to protect the latter from rust for a certain time." Most men having a practical knowledge of the subject will agree with this.

The first, or priming coat, upon a surface of steel in a fit condition to receive paint is of the greatest importance, in view of the circumstances that the union of the paint and the substratum depends entirely upon the adhesion of this coating, and the first problem to be solved in the painting of steel is necessarily, not which paint sticks best on another coat of paint, but which paint adheres most firmly to iron.

For a long period red lead alone was employed for this purpose, and even now still enjoys a reputation not altogether undeserved, and, when in competent hands, has given very fair results. However, personally, I do not admit that red lead is the best and ideal pigment for priming. After many experiments spread over years, I have come to the conclusion that the most perfect priming coat is obtained by the use of orange lead, a pigment of lower specific gravity—6.85—and of finer texture, which, when mixed in certain proportions with an inert pigment having a great oil-absorption, produces a paint which can be properly ground and mixed for use having, by reason of its fineness, great adhesive power, and capable, owing to the presence of the inert pig-

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ment, of lessening the oxidising action going on between the oil and the lead oxide, thus shortening the life of the linoxyn formed.

The difference between each coat should be gradual, so as to form a layer which, starting upwards, becomes more elastic as it approaches the finishing coat.

As to the character of the pigment that should be used with the linseed oil varnish for making paint for use as top coats, it is quite important that the pigment used shall be pratically both chemically and physically inert; more important still, that it shall be in a fine state of division, and form a perfectly homogeneous product which can only be obtained by repeated grinding.

One of the principal functions of the solids in paint is to protect the dried binder from destructive influences. Some substances, by reason of their stable nature, possess this property in a high degree—they do not act chemically upon the oil, and are not easily changed. They are classed as inert pigments, and should be used simply as a means of improving and increasing the durability of the paint.

Regardless of colour, there is no one pigment that will "answer all requirements, fill all the offices," of a perfect pigment to mix with the linseed oil varnish for paint making, not a single one that will do what pigments must do, until an ideal binder is found to mix with it, that will retain it and prolong the life of the paint. Certain solids, under certain conditions and in certain proportions, have mutual action upon each other; they interchange elements and combine to form new substances, just as metals alloy and form new metals.

Now, applying this truth to pigments:—

In order that chemical combinations may follow, or that which is bad in one pigment may be linked with that which is bad in another to produce a new pigment that is good, it is necessary that the solids under consideration be very finely divided, very closely intermingled; and that the affinity between them be great enough to excite the desired interchanges, and to form the new substance.

It is upon this sound theory that most combination paints are unwittingly made; if such paints are scientifically and honestly manufactured, they are worthy of the utmost confidence. Given these features, whether the pigment is oxide of iron graphite, or "what not," is a matter of little importance as far as durability is concerned. The value of the paint will lie in the proper adjustment or determination of the amount and kind of each—that is, liquid and binder—needed to secure a perfect product.

Various theories are expounded by various authors; but, not wishing to add a fresh one, I will only say that my experiments have convinced me that pure white lead is not a good protective coating for iron.

It is possible to-day to get paint uniformly well prepared for almost any purpose. A painter or paint user of the present time who attempts to mix and grind his own paints is as unlikely to succeed as if he were to attempt to make his own varnish, brushes, &c. It is not my purpose to discuss methods of applying coverings to structural steel other than to insist that a mechanic to do good work must have good tools to work with, and fair conditions under which to do the work set before him. Many worthy paints are ruined because they are flowed on with a broad, thin, flat brush, not much better than a common whitewash brush, instead of being rubbed out and well into the surface with a good full, round bristle brush. Then again, painters are apt—if the paint used is a little heavy or the parts to be covered difficult of access—to add an excess of thinners to save labour and reduce cost of material.

It is known that the durability of any oil paint depends largely upon the number of particles of pigment, the better protection to the binder and to the metal underneath—the evil of thinning paints too much is therefore obvious. A layer of air exists on all surfaces, hence the importance of rubbing out the paint thoroughly, as otherwise bubbles of air may be discovered, which, coming through the paint, render the coating porous.

The spraying of paint upon structural steel by means of air compressors conveys air and moisture to the metal, and helps the formation of rust; besides, its many disadvantages have led to its abandonment by nearly everyone who has tried it.

(To be concluded.)

THE governing body of the Royal Portsmouth Hospital are considering plans for the erection of a nurses' home, at a cost of 12,000*l.*

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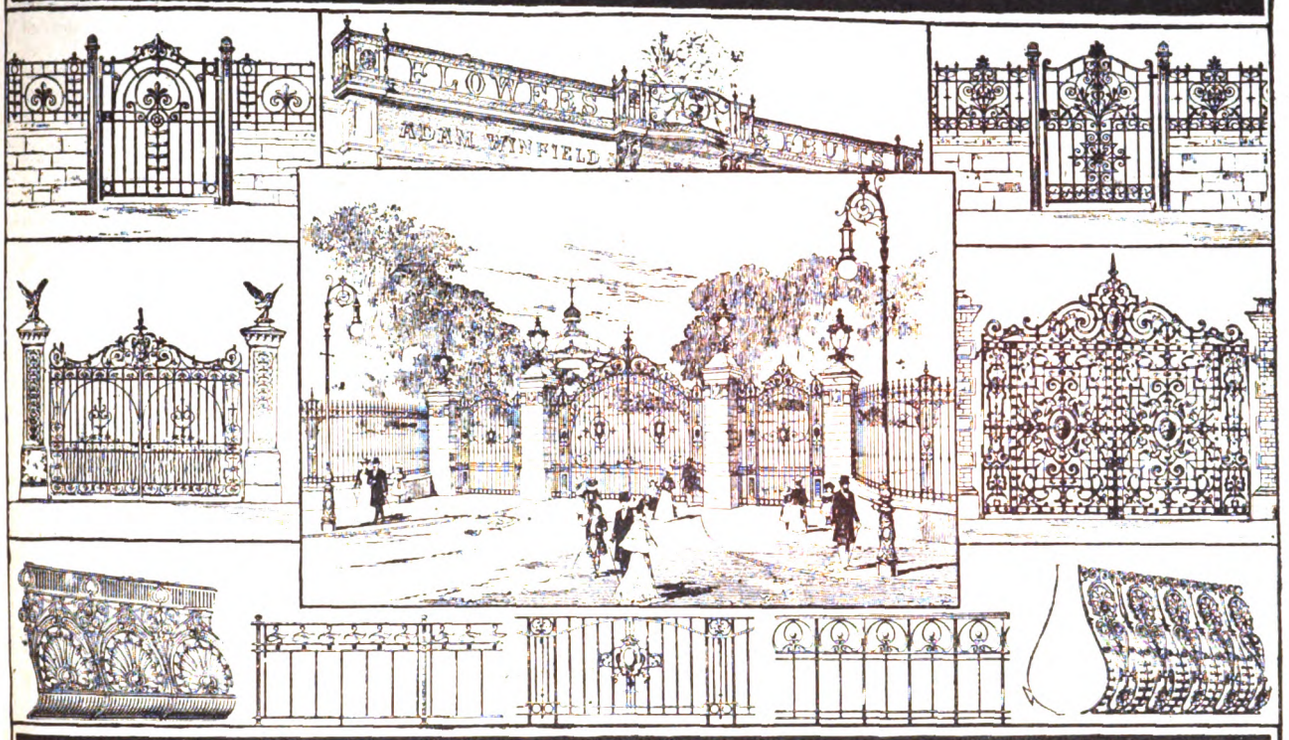
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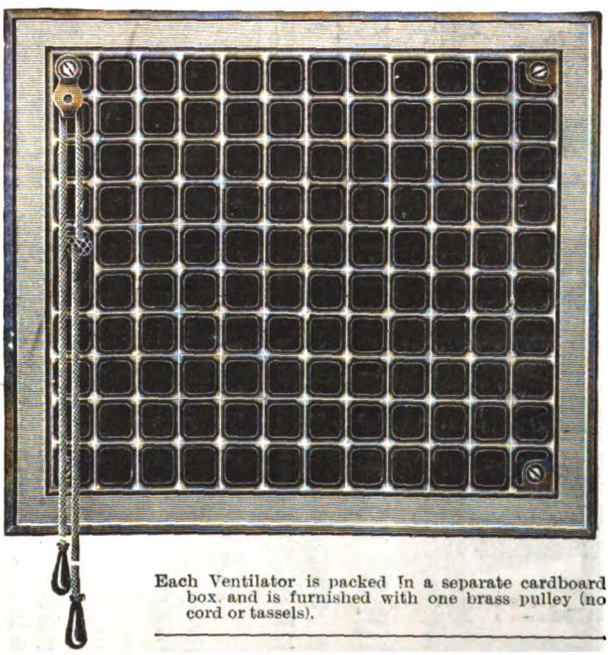
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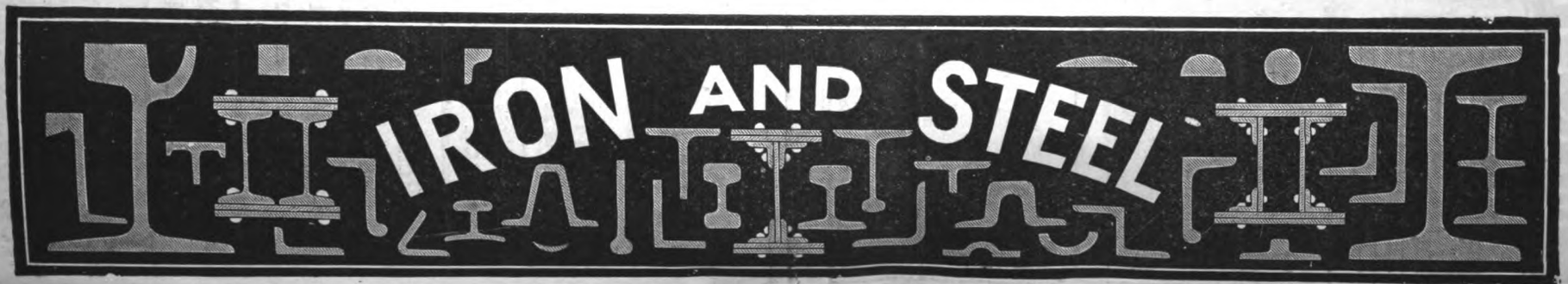
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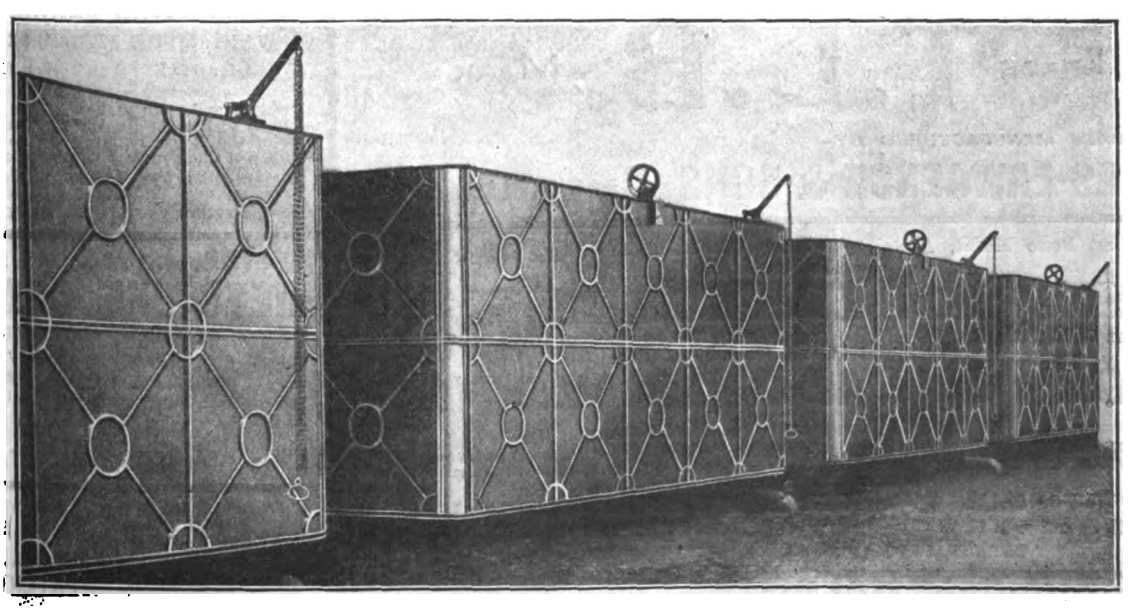
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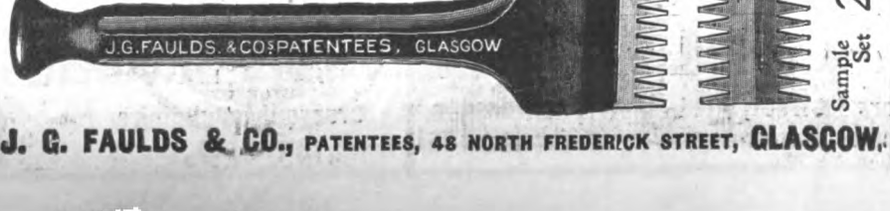
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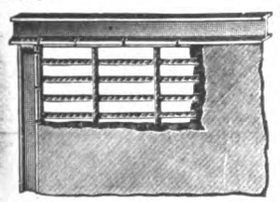
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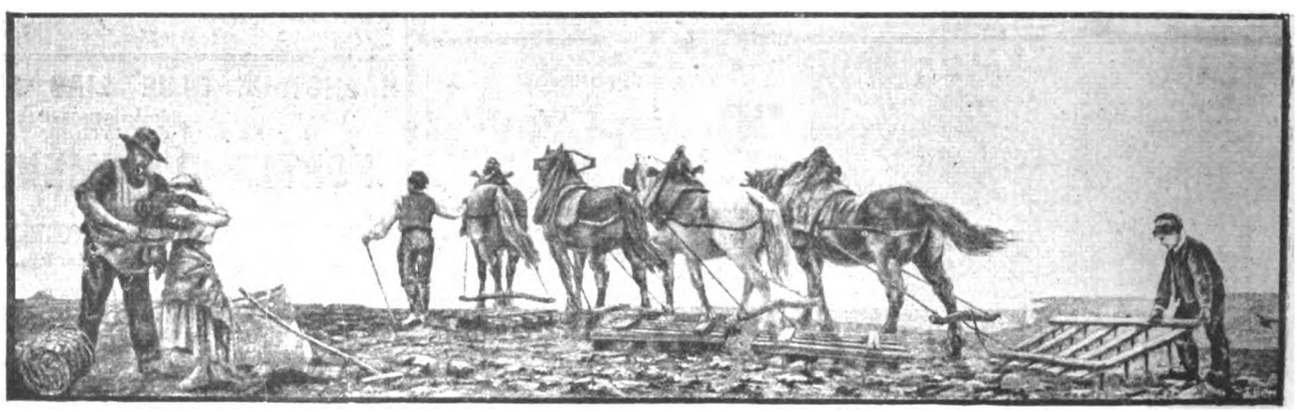
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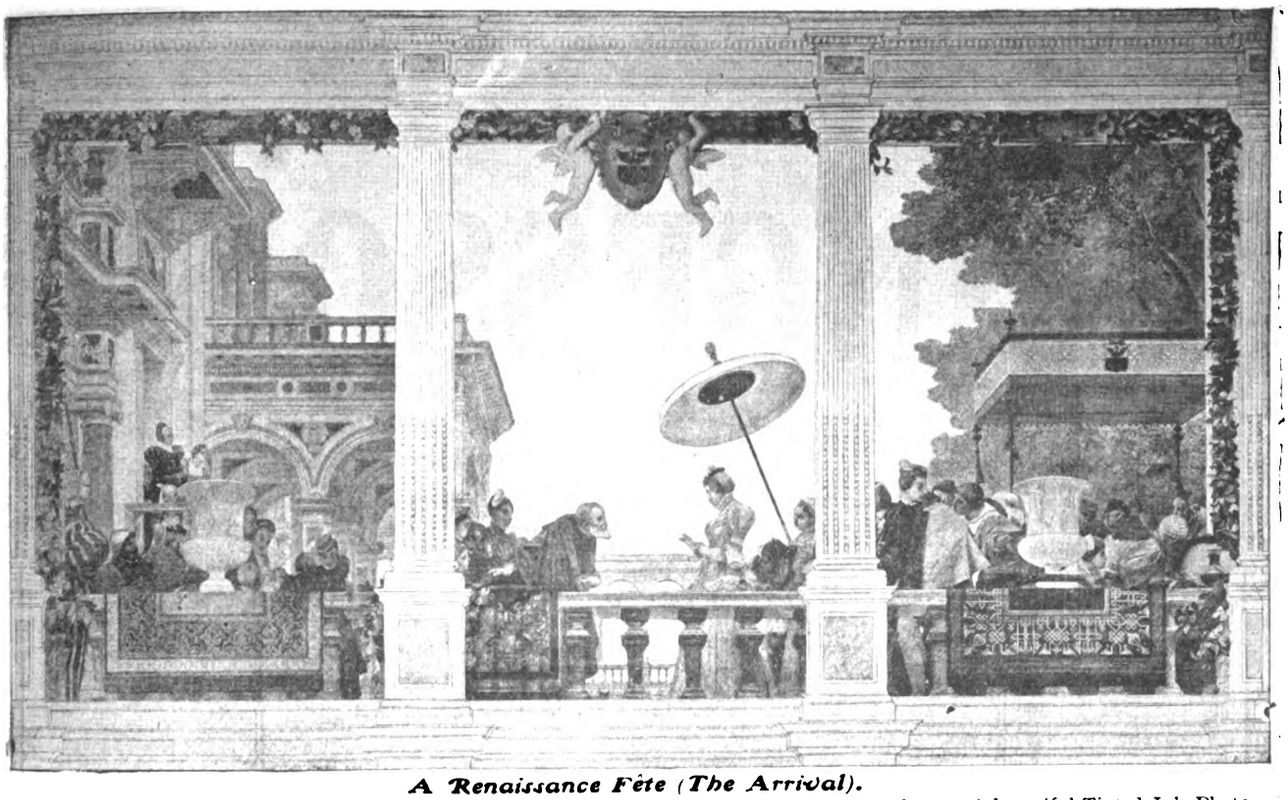
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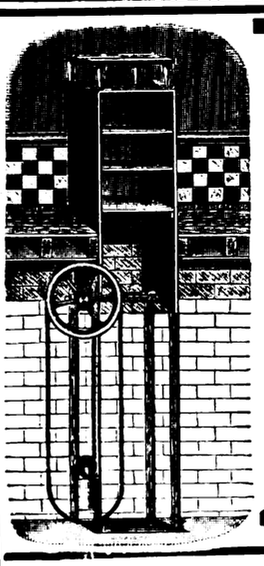
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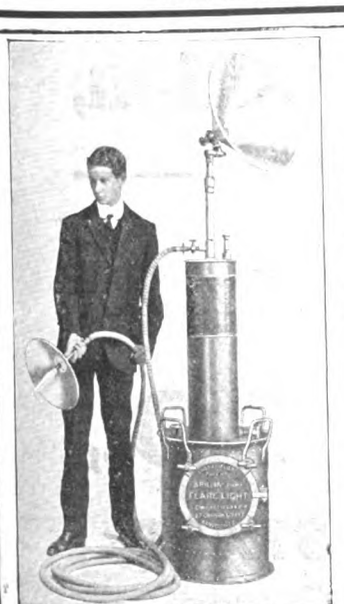
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Under no circumstances whatever can the Proprietors of this Journal guarantee alteration of copy if received after the first post on Tuesday mornings, and no proofs can be submitted if copy arrives later than first post on Saturday mornings.

EDITORIAL NOTICES

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

**** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITIONS OPEN.

EASTLEIGH.—March 24.—The London and South-Western Railway Company invite competitive designs for the construction of a hall, to be erected adjoining the Railway Institute Buildings at Eastleigh, near Southampton. Deposit 1*l.* 1*s.* The Secretary, London and South-Western Railway Company, Waterloo Station, London, S.E.

GLASGOW.—July 31.—The patrons of the Royal Incorporation of Hutchesons' Hospital invite designs for laying out for feuing and building about 195 acres of their lands of Thornliebank, Eastwood. Premiums of 100*l.*, 75*l.*, 50*l.* and 25*l.* will be awarded. Deposit 3*l.* 3*s.* Messrs. Hill & Hoggan, 194 Ingram Street, Glasgow.

CONTRACTS OPEN.

BIRKENHEAD.—March 15.—For erection and completion of twenty-two double tenement Corporation dwellings on land bounded by Egerton Street, Getley Street, and Tunnel Road. Deposit 1*l.* 1*s.* Mr. Chas. Brownridge, M.I.C.E., borough engineer and surveyor, Town Hall, Birkenhead.

BITTON.—March 20.—For erection of an elementary school at Bitton, near Bristol. Deposit 2*l.* 2*s.* Apply by March 5 to Mr. R. S. Phillips, architect, Midland Bank Chambers, The Cross, Gloucester.

BLACKWATER.—March 6.—For proposed addition to Blackwater Council school, Cornwall, according to plans and specifications. Mr. Sampson Hill, architect to the committee, Green Lane, Redruth.

BOOTLE.—March 19.—For erection of a public elementary Council school in the Orrell district of Bootle, Lancs. Deposit 2*l.* 2*s.* The Borough Engineer's Office, Bootle.

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BRADFORD.—March 13.—For the joiner, slater, plumber, and ironfounder trades required in alterations and additions to Paddock Dye Works, Pasture Lane (Clayton), Bradford. Mr. Sam Spencer, architect, &c., Old Bank Chambers, Great Horton, Bradford.

BRIERLEY HILL.—March 10.—For erection and completion of a Council school for 324 girls at Mill Street, Brierley Hill, South Staffs. Deposit 1*l.* 1*s.* Apply Mr. Graham Balfour, director of education, County Education Offices, Stafford.

BURY (LANCS.).—March 24.—For the following contracts in connection with erection of an electricity generating station at Chamber Hall:—Contract No. 2, structural steelwork; No. 3, reinforced concrete retaining wall; No. 4, steel window frames; No. 5, patent glazing. Deposit 2*l.* each contract. Mr. Arthur W. Bradley, A.M.I.C.E., borough engineer, Bank Street, Bury.

BRISTOL.—March 8.—For erection of a chancel with vestries and other work at the church of St. Anne's, Brislington. Mr. Henry M. Bennett, architect, 36 Corn Street, Bristol.

CAMBRIDGE.—March 9.—For erection of five cottages in Albion Row. The Surveyor, Guildhall, Cambridge.

CLECKHEATON.—March 19.—For the various works in the erection of a secondary and technical school. Mr. W. H. Thorp, architect, Phœnix Chambers, South Parade, Leeds.

CLEETHORPES.—March 18.—For completion of building of an elementary school for infants at Cleethorpes, Lincs. Deposit 2*l.* 2*s.* Apply by March 6 to Messrs. Scorer & Gamble, architects, Bank Street Chambers, Lincoln.

DARLINGTON.—March 13.—For works required in additions and alterations to the day nursery and building of a children's attendant's room; also for supplying and erecting a fire escape at the Union workhouse. Apply by March 8 to the Union Offices, Crown Street, Darlington.

DURHAM.—March 16.—For new Council school at Shotton Colliery, and alterations and repairs to Tanfield Council school. The County Education Architect, Shire Hall, Durham.

EAST FERRY.—March 18.—For building an elementary school at East Ferry, Lincs. Deposit 2*l.* 2*s.* Apply by March 6 to Messrs. Scorer & Gamble, architects, Bank Street Chambers, Lincoln.

EAST GRINSTEAD.—March 8.—For alterations to court house and police buildings. Apply to Mr. F. J. Wood, M.S.A., county surveyor, County Hall, Lewes.

EDINBURGH.—March 8.—For asphalte floors, &c., at the new Corn Market, Gorgie. Mr. J. A. Williamson, A.R.I.B.A., Public Works Office, City Chambers.

ENFIELD.—March 16.—For erection of a block of schools at Lavender Road. Deposit 3*l.* 3*s.* Apply by February 27 to Mr. G. E. T. Laurence, architect, 22 Buckingham Street, Adelphi, W.C.

GUNTHORPE.—March 18.—For building an elementary school at Gunthorpe, Lincs. Deposit 2*l.* 2*s.* Apply by March 6 to Messrs. Scorer & Gamble, architects, Bank Street Chambers, Lincoln.

HECKMONDWIKE.—March 11.—For the following trades in the reconstruction of the offices at Central infants' school. Victoria Street, for the West Riding County Council Education Department:—Builder, joiner and carpenter, slater, plumber, and painter. The Education Offices, High Street, Heckmondwike.

HUDDERSFIELD.—March 10.—For erection of post-mortem room, &c., at the Storthes Hall Asylum, near Huddersfield. Deposit 1*l.* Mr. J. Vickers-Edwards, county architect, County Hall, Wakefield.

IRELAND.—March 8.—For building additional offices in connection with the County Courthouse, at a cost not exceeding 750*l.*, for the Armagh County Council. Mr. Joseph Atkinson, county secretary, County Courthouse, Armagh.

IRELAND.—March 6.—For erection of a manse at Donemanagh. Mr. W. Stuart, B.E., M.R.S.I., Strabane.

IRELAND.—March 11.—For erection of school and parochial hall building in Keady. Mr. H. C. Parkinson, architect, Russell Street, Armagh.

HULL.—March 24.—For the construction in reinforced concrete of a swimming pond 90 feet by 35 feet, together with sub-structure of main building 109 feet by 76 feet, including foundations, floors, gallery and main walls to gallery level. Deposit 1*l.*; charge for plans, 5*s.* Mr. A. E. White, M.I.C.E., city engineer, Town Hall, Hull.

LONDON.—March 25.—For erection of new iron buildings and other works at Swaffield Road, Wandsworth, S.W. Deposit 1*l.* The Guardians' Offices, St. John's Hill, Wandsworth, near Clapham Junction railway station.

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LONDON.—March 17.—For the reconstruction of the upper boiler house and coal store (building contract) at the South Western Fever Hospital, Landor Road, Stockwell, S.W., for the Metropolitan Asylums Board. Deposit 2*l.* Mr. W. T. Hatch, M.I.C.E., M.I.M.E., engineer-in-chief, the office of the Board, Embankment, E.C.

MILFORD HAVEN.—March 15.—For erection of a house in North Road. Mr. C. Launcelot Blethyn, architect, Milford Haven.

NEWQUAY.—March 6.—For erection of shop and office buildings, Bank Street. Messrs. Ennor & Bladen, architects, Harbour Crescent, Newquay.

NOTTINGHAM.—March 10.—For erection of a junior and infants' school and technical centre, Stanley Road. Deposit 2*l.* 2*s.* Mr. Frank B. Lewis, city architect, Guildhall.

PADSTOW.—March 10.—For erection of three dwelling-houses at Padstow, near Hensingham. Messrs. J. S. Moffat & Bentley, architects, 53 Church Street, Whitehaven.

PEMBURY.—March 11.—For alterations to and new buildings at the Infirmary, and men's day room at the workhouse, Pembury, Kent. Mr. S. Philpott, architect, 65 High Street, Tunbridge Wells.

ROCHDALE.—March 10.—For erection of convenience and alteration of existing buildings at Sudden. Mr. S. S. Platt, borough surveyor, Town Hall, Rochdale.

ST. AUSTELL (CORNWALL).—March 10.—For erection of three cottages at Slades, St. Austell. Mr. B. C. Andrew, M.S.A., Biddick's Court, St. Austell.

SCOTLAND.—March 10.—Designs and estimates for a bandstand to be erected in Saughton Park. Mr. J. A. Williamson, A.R.I.B.A., Public Works Office, Edinburgh.

SCOTLAND.—March 15.—For the construction of a goods shed, on Riverside Quay, York Hill, 1,370 feet by 100 feet. Engineer Clyde Navigation Trustees, Glasgow.

STALLING BUSK (YORKS).—March 13.—For building church at Stalling Busk, Askrigg. The Vicarage, Askrigg, Yorks, or at Messrs. Barclay's Bank, Hawes.

STOCKBRIDGE.—March 11.—For erection of a Council school for 220 children, at Stockbridge (Hants). Deposit 2*l.* 2*s.* Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

STOKE-UPON-TRENT.—March 8.—For erection of shelters and conveniences for the Cliffe Bank and Field Place recreation grounds. Mr. A. Burton, A.M.I.C.E., &c., borough engineer and surveyor, Town Hall, Stoke-upon-Trent.

TATTENHALL.—March 10.—For erection and completion of a house at Tattenhall, near Chester. Mr. E. Norcross, estate office, The Grange, Beaconsfield, Bucks.

TONBRIDGE.—March 15.—For erection of a stamping station for weights and measures (consisting of two rooms), in Lyons Crescent, Tonbridge, Kent. The County Architect, 86 Week Street, Maidstone.

WALES.—March 6.—For erection of a church at Ogmore Vale. Mr. J. Cook Rees, architect, Parade Chambers, Neath.

WALES.—March 8.—For erection of thirty houses at Groesfaen, near Bargoed, for the Rhymney Iron Company, Ltd. Mr. J. Llewellin Smith, M.S.A., architect, Aberdare.

WALES.—March 9.—For erection of a villa at Hirwain, Glam. Mr. T. Roderick, architect, Clifton Street, Aberdare.

WALES.—March 15.—For erection of chapel, vestry and classrooms, for the Trustees of Tabernacle C.M. Church, Ynyshir. Deposit 1*l.* 1*s.* Mr. R. S. Griffiths, M.S.A., architect and surveyor, Tonypandy.

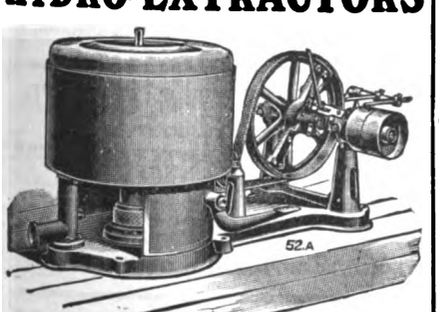
WALES.—March 15.—For building a church at Senghenydd, near Cardiff. Deposit 2*l.* 2*s.* Mr. E. M. Bruce Vaughan, F.R.I.B.A., architect, Cardiff.

WALES.—March 16.—For the following works for the Glamorgan County Council, viz.:—(1) New school at Caerau; (2) foundations for temporary building at Port Talbot Central Council school; (3) boundary wall at Bargoed girls' school. The County Council Offices, Westgate Street, Cardiff.

WREXHAM.—March 9.—For alterations and additions required at the Electricity Works, Willow Road. The Borough Engineer's office, Willow Road, Wrexham.

YORKS.—March 12.—The West Riding education committee invite whole or separate tenders for the following works:—Wombwell, new school; Aston-with-Aughton, Aughton new school. Mr. Francis Alvey Darwin, clerk of the County Council, County Hall, Wakefield. Deposit 1*l.* with West Riding Treasurer, County Hall, Wakefield.

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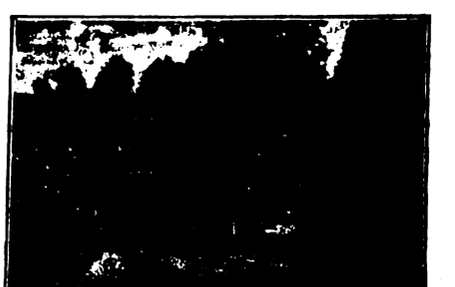
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York.—March 10.—For erection of a motor garage for the North-Eastern Railway Company. Mr. William Bell, the company's architect, York.

Yorks.—March 19.—The West Riding education committee invite whole or separate tenders for the following works:—Dodworth new school, near Barnsley; Castleford, Pontefract Road new school; Wickersley temporary school. The West Riding Architect, County Hall, Wakefield. Deposit 1*l.* for each contract with the West Riding Treasurer, County Hall, Wakefield.

TENDERS.

BIRTLEY FELL.

For erection of two shelters, one dining-hall and a laundry block at the Council consumptive sanatorium, Birtley Fell, near Chester-le-Street. Mr. John H. Mole, surveyor.

Norman	£358 0 0
Burnett & Son	350 0 0
Thompson & Son	339 19 0
Wears	308 0 0
Mole & Sons, Chester-le-Street (*accepted*)	296 0 0
Oares & Sons	234 10 0
Surveyor's estimate	348 15 0

EASTBOURNE.

For erection of a pavilion at the bowling green. Mr. A. E. Prescott, borough surveyor.

Martin	£365 0 0
Thompson	346 0 0
Bodle	340 0 0
Dennis & Co.	324 0 0
Hookham, Eastbourne (*accepted*)	321 9 0
Llewellyn	285 0 0

EDINBURGH.

For the erection of new slaughterhouses at Gorgie. Mr. J. A. Williamson, city superintendent of works.

Kinnear, Sons & Co., Edinburgh (*accepted*)	£30,608 0 0

EXMOUTH.

For construction of roads and paths in Phear Park. Messrs. Ellis, Son & Bowden, surveyors and architects, Bedford Chambers, Exeter.

Lacey & Co.	£596 0 0
A. W. Taylor	574 6 1
Mudge	555 0 0
Lacey	483 0 0
Setter	460 0 0
Perry	458 0 0
Harris	453 0 0
Cooper & Son	424 1 9
Cooper	419 10 0
Grounds & Newton, Bournemouth (*accepted*)	368 0 0
W. H. Taylor	331 6 4

ELLESMERE PORT.

For the making of eight new streets or roads, viz. Westminster, Fleming, Eleanor, Cook, Carnegie, Brierley, Grafton and Livingstone. Mr. J. M. Hudson, surveyor, Ellesmere Port.

A. Harris	£3,427 0 0
Warrington	3,193 0 0
Meikle	3,052 0 0
J. W. Harris	2,938 0 0
Ward, Cook & Co.	2,890 0 0
Oxley	2,794 0 0
Warren	2,631 0 0
Parker, Ellesmere Port (*accepted*)	2,620 0 0

For the making of Oldfield Road.

A. Harris	£483 0 0
Cook & Co.	318 0 0
J. W. Harris	310 0 0
Meikle	305 0 0
Warren	284 0 0
Flather	263 0 0
Jones & Hough (*accepted*)	225 0 0

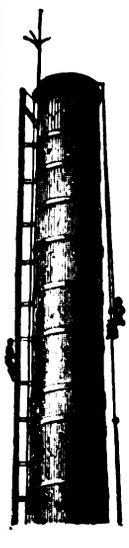
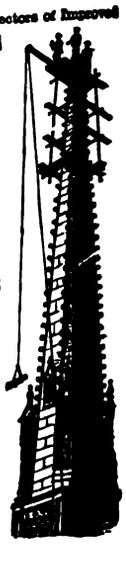
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ELLESMERE PORT—*continued.*

For the making of passage at the rear of Stanlow Villas.

A. Harris	£291	0	0
Oxley	186	0	0
J. W. Harris	180	0	0
Meikle	179	0	0
Cook & Co.	172	0	0
Warren	145	0	0
FLATHER (*accepted*)	109	0	0

HUDDERSFIELD.

For erection of the Palace Theatre, Kirkgate. Messrs. R. HORSFALL & SON, architects, Halifax.

Law, Stead & Sons	£13,173	0	0
Pickles	12,950	0	0
Parkinson & Sons	12,763	0	0
Wade & Co.	12,400	0	0
Graham & Jessop	11,940	0	0
Radcliffe & Sons	11,771	0	0
Bottomley & Son	11,693	0	0
SMITH BROS., Burnley (*accepted*)	11,600	0	0

IRLAM.

For the construction of 276 lineal yards of 12-inch and 605 lineal yards of 9-inch stoneware pipe sewers, together with the necessary manholes, &c., in Cadishead. Mr. G. H. KAY, A.M.Inst.C.E., Irlam.

New Moss Road and Moss Road.

F. & H. Taylor	£311	8	7
Clegg	308	2	7
Hayes	304	15	7
Etheridge & Clark	296	9	4
Snape & Sons	296	7	3
Johnson & Hindley	295	16	0
Clark	275	14	5
Meikle	269	0	10
Barrick	268	16	0
Owen	266	13	2
Williams & Farley	262	6	0
Woodfine	250	5	4
WHITTAKER BROS., Flixton (*accepted*)	242	9	1
Estimated cost	250	19	5

Moss Side Road.

WHITTAKER BROS., Flixton (*accepted*)	63	2	7
Estimated cost	68	11	2

KELVEDON.

For the relaying of the sewer at Kelvedon, for the Braintree Rural Council.

Hyde & Co.	£244	10	0
Bate & Co.	171	19	0
Siggers	155	0	0
Eary & Rayment	145	15	0
Wilson Border & Co.	138	1	5
Jackson	133	0	0

LEYTON.

For erecting Canterbury Road Council schools. Mr. W. JACQUES, A.R.I.B.A., Fenchurch Street, E.C.

Pasterfield & English	£10,697	0	0
Perry & Co.	10,433	0	0
Webb	9,997	0	0
Cracknell	9,568	0	0
Brown Bros.	9,379	15	9
Spencer, Santo & Co.	9,320	0	0
Lole & Co.	9,154	0	0
Harris & Wardrop	9,093	0	0
F. & E. Davey	8,977	0	0
Mattock & Parsons	8,975	0	0
Bateman	8,966	0	0
Henson & Son	8,868	14	10
Nightingale	8,860	0	0
Luton	8,797	0	0
Symes	8,794	0	0
F. & G. Foster	8,680	0	0
Coxhead	8,483	0	0
E. & A. Willmott	8,464	0	0
Carter	8,432	0	0
Maddison	8,384	0	0
Brand, Petit & Co.	8,342	0	0
HORSWILL, Forest Gate (*accepted*)	8,310	0	0

LOSTWITHIEL.

For erection of five houses at Lostwithiel.

Elliott & Son	£2,147	0	0
Endean & Co.	1,880	0	0
Bennett	1,829	0	0
Treherne & Son	1,769	0	0
Sholbrook	1,711	10	0
Bassett Bros.	1,641	0	0
CONYBEARE, Plymouth (*accepted*)	1,483	12	10

BOX GROUND TRADE MARK

THE BATH STONE FIRMS LTD

MONK'S PARK TRADE MARK

BATH·&·PORTLAND·QUARRY·OWNERS

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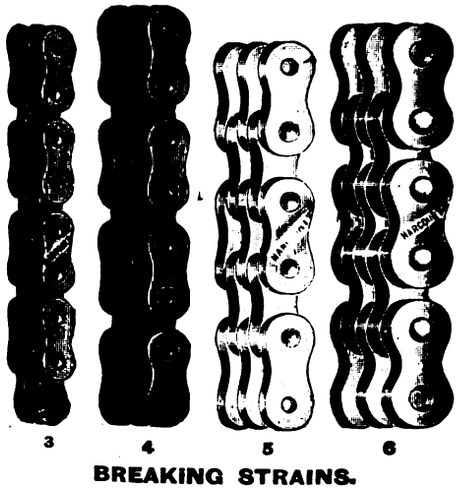
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132, Grosvenor Road, Pimlico.

HEAD OFFICES:- ABBEY YARD, BATH.

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Sash Chains

MADE of COPPER with C.M. RIVETS.
WORKS SMOOTHLY AND NOISELESSLY.
— NO COGS NEEDED. —
SOLD BY ALL HARDWARE MEN.
BEST AXLE PULLEYS TO SUIT.

AMONG MANY OTHER PLACES:

The City Hall, Belfast.
The Technical Institute, Belfast.
The "Scotsman," Edinburgh.
"The Times" Office, London.
The Royal Exchange, Liverpool.
The Convalescent Home, Aldford.
The Post Office, Montreal.
The New Lunatic Asylum, Bristol.
The Houses of Parliament, Brisbane.
The Holborn Viaduct Buildings, London.
The New Library, Pollokshields.
The Asylum, Letterkenny.
The Dykebar Asylum, Paisley.
The Metropolitan Carriage Works, Saltley.
The Royal Artillery Barracks, Manchester.
The Cottage Hospital, Walsall.
The Fever Hospital, Bristol.
The Stores of A.T. Stewart, Esq., New York.
The Mansion of T. Wilson, Esq., Hull.
The City Asylum, Birmingham.
Also on all the leading Steamship Lines, including "The Cunard," "The White Star," "The Dominion," "The P. & O.," "The North German Lloyd," &c., &c.

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LONDON.

For erection and formation of the sub-structure for the blocks of model dwellings on the City Road site, for the trustees of the Sutton estate. Mr. E. C. P. MONSON, F.R.I.B.A., F.S.I., M.S.A., architect, Finsbury Pavement House, E.C. Quantities by Messrs. STANGER & SON, 21 Finsbury Pavement, E.C.

Wallis & Sons	£6,933 0 0
Willcock & Co.	6,787 0 0
Kirk & Randall	6,772 0 0
Dorey & Co.	6,684 0 0
Godson & Sons	6,488 0 0
Higgs & Hill	6,484 0 0
Trollope & Colls	6,483 0 0
Parnell & Sons	6,477 0 0
Holloway Bros.	6,440 0 0
Minter	6,286 0 0
Nightingale	6,247 0 0
Patman & Fotheringham	6,171 0 0
Lawrence & Sons	6,131 0 0
Monk	6,088 0 0
Holliday & Greenwood	5,959 0 0
Sheffield Bros.	5,950 0 0
Dove Bros.	5,925 0 0
Kilby & Gayford	5,636 0 0
Cubitt & Co.*	5,555 0 0

* Accepted subject to the approval of the Court of Chancery.

For the provision of accommodation for women at the underground convenience at Eastcheap, for the Corporation.

Kavanagh & Co.	£3,520 0 0
H. & E. Lea	3,489 0 0
Jennings	3,244 0 0
Fryer & Co.	3,191 6 10
Doulton & Co.	3,181 0 0
Shurmur & Sons	3,043 0 0
McCormick & Sons	3,020 0 0
Adamsez	3,009 7 3
Jarman & Co.	2,992 0 0
Davis, Bennett & Co.	2,923 8 0
Wagstaff & Sons	2,866 10 0
Greenwood	2,772 0 0
ROBERTS & Co. (*accepted*)	2,753 0 0

LONDON—*continued.*

For the making-up and paving of Parklands Road, Streatham. Mr. P. DODD, borough engineer, Wandsworth.

Wall	£1,058 0 0
E. & E. Iles	1,040 0 0
Mann	1,034 0 0
Kavanagh & Co.	1,021 0 1
Mowlem & Co.	970 0 0
Adams	965 0 0
Dykes	928 0 0
Lane & Co.	915 15 0
Parry & Co.	898 0 0
Harringdon & Co.	856 0 0
Harber & Co. (*recommended*)	783 6 0
Borough engineer's estimate	791 17 6

For the repair, cleaning, painting and decorating of the disinfecting station and mortuary, for the Hackney Borough Council.

Rogers	£347 0 7
Wilkes	264 5 9
Rowley	256 14 5
George	236 16 10
Watson & Minton	228 15 11
Butters	219 7 9
Runham Brown Bros.	204 13 3
Castle & Son	195 3 5
Dearsley & Son (*recommended*)	185 12 11
Woollaston Bros.	146 7 5

For making up and paving Galloway Road and a strip of land in front of Nos. 436 to 448 Uxbridge Road, for Hammersmith Borough Council. Mr. H. MAIR, borough surveyor, Hammersmith, W.

Galloway Road.

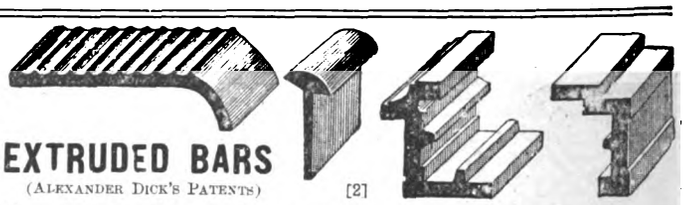
Champniss & Co.	£1,308 0 0
J. & W. Drake	1,257 0 0
Dykes	1,460 0 0
GREENHAM (*accepted*)	1,185 0 0
Mears	1,250 0 0
Wimpey & Co.	1,329 0 0

Uxbridge Road.

MEARS (*accepted*)	78 0 0

The DELTA METAL COMPANY, LIMITED,
East Greenwich,
London, S.E.





EXTRUDED BARS
(ALEXANDER DICK'S PATENTS) [2]
In BRASS, BRONZE, and other Alloys.

IRON & STEEL BOILER TUBES
EDWIN LEWIS & SONS
TUBE MANUFACTURERS, WOLVERHAMPTON, STAFFORDSHIRE.
SCREWED TUBES FOR GAS STEAM OR WATER



WM. DUNCAN TUCKER & SONS, LD.
TELEPHONE 2 TOTTENHAM. TOTTENHAM. N. TELEGRAMS "HORTICOLE LONDON"
JOINERY OF EVERY DESCRIPTION
MOULDINGS TO ANY DESIGN

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LONDON—*continued.*

For works of hardwood (and granite sett) carriageway paving at Mare Street, Lower Clapton Road, Upper Clapton Road and Clapton Common, for the Hackney Borough Council.

Dick, Kerr & Co.	£13,703 18 9
Improved Wood Pavement Co.	12,742 11 6
Acme Flooring and Paving Co. (1904)	12,679 1 7
Griffiths & Co., Bishopsgate Street Without, E.C. (*recommended*)	12,269 15 9

MANSFIELD.

For making-up Bowling Street, Hope Street and part of Frederick Street. Mr. L. A. WESTWICK, surveyor, Mansfield.

Bowling Street.

Fulcher	£356 13 0

Hope Street.

Fulcher	94 0 0

Frederick Street.

Fulcher	82 15 6

MEXBOROUGH.

For rebuilding premises in Main Street, for the Barnsley British Co-operative Society, Ltd. Mr. H. L. PATERSON, A.R.I.B.A., architect, Sheffield.

Accepted tenders.

Marlow & Sons, Sheffield, excavator, mason and bricklayer	£970 0 0
Hawley & Co., Barnsley, carpenter and joiner	345 10 0
Hudson & Doré, Sheffield, plasterer	55 0 0
Dawber, Townsley & Co., Hull and Barnsley, tiler	41 10 0

SCAMPTON (LINCS.).

For erecting a new chapel and class-room. Mr. W. GREENFIELD, architect, Boston.

Co-operative Building Society	£308 17 2
Clarke	241 14 6
HILL & SWINTON, Scampton, Lincoln (*accepted*)	238 0 0

PONTYPOOL.

For building a wing to the hospital.

SAINSBURY (*accepted*)	£2,593 16 1

REDHILL.

For erecting an elementary school at Cromwell Road, for the education committee of Reigate. Messrs. T. R. & V. HOOPER, architects, Redhill.

Lawrence	£9,760 0 0
Ellis	9,353 0 0
Hunt & Son	8,747 0 0
Martin	8,490 0 0
Wright	8,385 0 0
Hodge & Son	8,380 0 0
Peskett & Co.	8,369 0 0
Potter Bros.	8,350 0 0
Smith & Sons	8,245 0 0
Jones & Andrews	8,235 0 0
Stenning	8,184 0 0
Wallis & Sons	8,146 0 0
Lawrence & Sons	8,048 0 0
G. Potter	8,000 0 0
Turtle & Appleton	7,980 0 0
Ballard & Co.	7,979 0 0
Sykes & Son	7,970 0 0
Wallis	7,892 0 0
Pink	7,890 0 0
Cropley Bros.	7,890 0 0
Battley, Sons & Holness	7,887 0 0
Minter	7,850 0 0
Davison	7,776 0 0
Parren & Sons	7,750 0 0
W. Potter	7,750 0 0
Adams	7,710 0 0
Patrick	7,700 0 0
F. & G. Foster	7,697 0 0
Gough & Co.	7,684 0 0
Hyde & Co.	7,609 0 0
Worssell	7,600 0 0
Cook & Sons	7,585 0 0
Tanner	7,100 0 0
Evans	7,079 0 0
LOWE & Co., Chislehurst (*accepted*)	6,948 0 0

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STEEL ROLLING SHUTTERS

(KINNEAR PATENT).

ARTHUR L. GIBSON & COMPANY,

19, 20 and 21 TOWER STREET,

Upper Saint Martin's Lane, London, W.C.

For Index of Advertisers, see page X.

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ST. AUSTELL.

For erecting a gallery, vestry, entrances, &c., at the United Methodist Church, Bugle. Messrs. F. C. JURY & SON, architects, St. Austell.

Stanbury	£710 0 0
Smith	579 3 0
Stevenson	570 0 0
Jacob	435 0 0
WILLIAMS & BURT, Wadebridge (*accepted*)	428 0 0

TODMORDEN.

For erection of a Secondary school on the Stile estate. Mr. J. HORSFALL, F.R.I.B.A., architect, Manchester and Todmorden.

Accepted tenders.

Lumb, Todmorden, mason and bricklayer.
Taylor, Keighley, carpenter and joiner.
Blacka, slater.
Waller, plumbing.
Dawson & Co., Staly Bridge, heating.
Fox & Co., Batley, electric lighting.
Blacka, plasterer.
Wrigley & Sons, painter.
Total 8,975*l*. Architect's estimate, 9,560*l*.

WALES.

For alterations to Llangan Rectory, near Bridgend. Mr. G. E. HALLIDAY, F.R.I.B.A., Cardiff.

Card & Powell	£900 0 0
Knox & Wells	897 0 0
Cox & Bardo	882 18 0
Rees & Sons	865 0 0
Gayland	831 0 0
Hallett	830 0 0
THOMAS, Cowbridge (*accepted*)	735 4 6
Cox	657 0 0

For the construction of an engine-house, filter-bed and other works at Llyn Traffwll, for the Holyhead Waterworks Co.

LESTER, Plymouth (*accepted*)	£2,274 8 2

WALES—*continued.*

For the following works:—(1) Excavations for the foundations, building in masonry, abutments and other works in connection with the bridge; (2) excavations, &c., building a retaining wall, together with constructing a urinal; (3) construction, delivery and erection of a steel girder bridge over River Avon at Cymmer, for the Glyncorrwg Urban District Council. Mr. W. P. JONES, surveyor.

Evans Bros.	£2,555 0 0
Chaplin	2,202 0 0
Williams	2,300 0 0
Rees	2,088 0 0
Finch & Co.	2,085 0 0
Palmer	2,032 0 0
Collins & Co.	2,019 0 0
Pomeroy & Co.	2,008 0 0
Scott	2,000 0 0
Morgan	1,999 0 0
THOMPSON & Co., Birmingham (*accepted*)	1,771 0 0
Engineer's estimate	2,025 0 0

For new shop fronts at Tonypandy. Mr. R. S. GRIFFITHS, M.S.A., architect, Tonypandy.

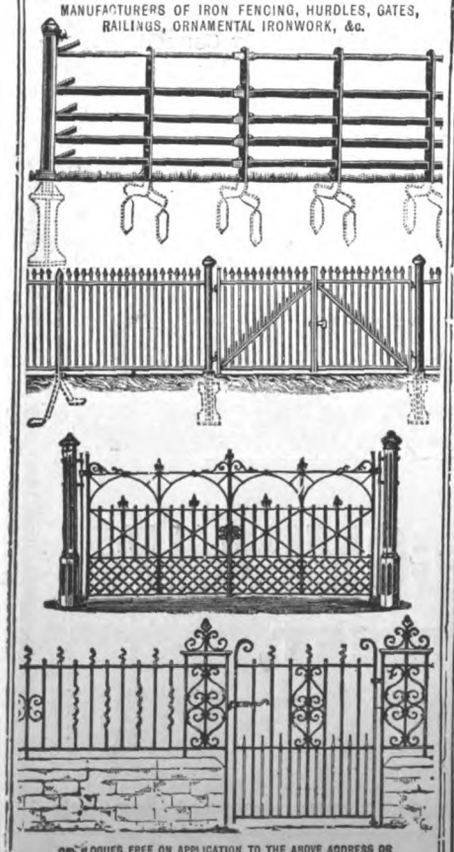
Bute Steam Joinery Co.	£345 0 0
Davies & Sons	270 0 0
PARNALL & SONS, Bristol (*accepted*)	253 16 0
Bristol Joinery Co.	230 0 0
Couzens & Sons	225 15 0
Waterman & Slade	176 0 0

WESTCLIFF-ON-SEA (ESSEX).

For building boarding establishment, Pembury Road. Mr. DOUGLAS H. SMITH, architect, Westcliff.

Campkin	£1,807 10 0
Barley	1,590 0 0
Green	1,585 0 0
HOUGHTON, Southend (*accepted*)	1,520 0 0

HILL & SMITH
Brierley Hill Ironworks, Staffs.
MANUFACTURERS OF IRON FENCING, HURDLES, GATES, RAILINGS, ORNAMENTAL IRONWORK, &c.



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Advertisements for current issue cannot be guaranteed after 2 o'clock on Thursday.

P. A. GILBERT WOOD,
Publisher,
6-11 IMPERIAL BUILDINGS,
LUDGATE CIRCUS,
LONDON, E.C.

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WALTON-ON-THE-NAZE.

For the erection of Holiday Home in Naze Park Road.

Niskin & Son	£3,890	0	0
Grover & Son	3,787	0	0
Strange & Son	3,615	0	0
Jones	3.509	0	0
Haines & Son	3,498	0	0
GLADWELL, Walton-on-Naze (*accepted*)	3,444	0	0

WREXHAM.

For erection of church at Hightown. Messrs. PROTHERO, PHILLOTT & BARNARD, architects, Cheltenham.

Lewis Bros.	£8,555	0	0
Woolley	7,345	0	0
Samuel	7,122	0	0
Gardner & Bradley	6,959	0	0
Wycherley & Co.	6,905	0	0
Jones	6,744	0	0
Colborne	6,580	0	0
Williams	6,579	0	0
Long & Sons	6,447	0	0
Bowman & Sons	6,405	0	0
Collins & Godfrey	6.330	0	0
Hayes	6.264	0	0
BOWERS & Co., Hereford (*accepted*)	6.210	0	0

Received too late for Classification.

COLCHESTER.

For the erection and completion of the superstructure of the main building of the lunatic asylum at Mile End. Messrs. F. WHITMORE & W. H. TOUN, architects.

McCormick & Sons	£212,632	0	0
Bennett	203,600	0	0
Perry & Co.	201,049	0	0
Pattinson & Sons	199,832	0	0
Rowbotham	196,392	0	0
Allen & Sons	195,590	0	0
Lovatt	195,186	0	0
Arnold & Son	192,500	0	0
Byrom	191,687	0	0
Waring & White (1906)	191,139	0	0
Leslie & Co.	190,403	0	0
Bateman	189,889	0	0
KING & SON (*accepted*)	189,691	0	0

TRADE NOTES.

THE new schools, Gravesend, are being supplied with Shorland's patent Manchester grates by Messrs. E. H. Shorland & Bro., of Manchester.

UNDER the direction of Mr. Brian E. F. Sheehy, architect, Limerick, the "Boyle" system of natural ventilation, embracing the latest patent air-pump ventilators, has been applied to boys' school, Kilfman.

MESSRS. C. W. LEAVITT & Co., importers and selling agents of ores, metals and alloys, New York, announce that on and after March 20 next their offices will be located in the Hudson Terminal (Cortlandt Building), 30 Church Street, New York.

THE tender of Mr. G. Percy Trentham, Handsworth, Birmingham, amounting to about 3,000*l*., has been accepted for kerbing, paving and roadwork in twenty-five streets by the Yardley Rural Council.

MESSRS. C. H. HUNT & SON, High Wycombe, are the contractors for the new railway station at Abingdon, and the work will be put in hand about the middle of March. Enlarged premises will be erected over the present site.

THE Carlton Engineering Company, of 69 Leadenhall Street, E.C., have secured the order for one of their patent "Carlton" revolving sprinklers, 55 feet diameter, to be fitted with their patent self-cleaning and self-dosing arrangement, and erected at the new sewage works at Ferryhill.

BUILDING AND BUILDERS.

THE Walton school managers, Surrey, have agreed to carry out alterations to the Walton schools at a cost of 1,690*l*., to erect a special subjects two-storey building to cost 800*l*., and to improve the infants' school at a cost of 465*l*.

THE York City Council referred back on Monday a recommendation by the streets committee to make a new road from Leeman Road to Waterworks Lane, at a cost of nearly 5,000*l*. It is hoped to come to arrangements with owners to secure not only enough land to make the road, but also adjacent building sites.

DURESCO

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The FIRST in the Field. The FOREMOST ever since

THE SILICATE PAINT CO.

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J. B. ORR & CO., Ltd.,

CHARLTON, LONDON, S.E.

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THE Birmingham education committee have adopted plans for the proposed Council school in Sladefield Road, Saltley. The school was planned in two blocks, with accommodation for 1,000 children, but it is proposed at present to provide only for 650. The cost of the school for 1,000 children would be 16,000*l.*, but the building to be erected will cost 11,229*l.*

THERE was an interesting discussion at the Liverpool health committee last week, as to the importation of Scandinavian granite. It arose out of an application of a Liverpool firm, acting as agents for principals in Norway, to be placed on the list of contractors for the supply of granite. In view of the fact that the applicants were agents for a Norwegian firm, their request was marked "Declined," after a short debate.

THE War Office has decided to carry out some important works at Woolwich. New married quarters for troops will be erected at a cost of 13,000*l.*, and a new mess and quarters will be built for officers of the Royal Army Medical Corps, at a cost of between 11,000*l.* and 12,000*l.*, at Woolwich Dockyard. The saddlery inspection shed, pattern room, and offices will be rebuilt, at an estimated cost of 16,000*l.*, and the east pumping station will be improved at a cost of nearly 7,000*l.*

A STRIKE of painters in St. Helens, Lancs., seems imminent. The masters wish their employés to commence work an hour or an hour and a half later in the morning, giving as the reason that it is inconvenient to customers that workmen should enter their premises or dwellings so early as six o'clock. The men regard this as a move to do away with the breakfast half-hour, and, moreover, they do not look with favour upon the possibility of working until a later hour in the evening. Their society has had the masters' proposals under consideration, and has, it is understood by the *Liverpool Courier*, declined to agree to them. If the masters enforce their requirements the men will tender their notices.

WE complete in this supplement an abstract of a paper on "Painting Structural Steel," which was recently read before the Paint and Varnish Society by Mr. Gaston Despierres. This society was formed towards the end of last year "for the discussion of all matters of technical interest, and the advancement of scientific knowledge amongst all concerned in the manufacture or application of oils, colours, varnishes, and similar products, or with the arts and crafts connected with such materials." Monthly meetings are held at St. Bride's Institute, Fleet Street, E.C. The president is Mr. J. Cruickshank Smith, and the hon. secretary is Mr. Noel Heaton, B.Sc.

THE Builders Clerks' Benevolent Institution held last week their forty-second annual meeting at the offices, 21 New Bridge Street, the president, Mr. E. C. Hannen (of Messrs. Holland & Hannen), occupying the chair. The annual report stated that the income represented a total of 965*l.* 1*s.* 9*d.*, including annual subscriptions, 213*l.* 3*s.*; donations, 559*l.* 2*s.* 6*d.*; and dividends on investments, 172*l.* 10*s.* Of that sum 707*l.* had been expended on pensions for 29 widows and two aged clerks, while 39*l.* had been granted in temporary relief. Mr. Leonard Horner (Messrs. Ashby & Horner) has been elected president for the ensuing year.

THE Surrey education committee at their last meeting adopted the report of their building sub-committee. A classroom is to be added at Monument Hill school, Woking, at once, and the infants' school at Church Street, Woking, is to be enlarged by 100 places. The plans of the proposed additions to the Goldsworth Road school, Woking (costing 1,720*l.*), have been approved. A temporary infants' school is to be erected at Horsell on a part of the voluntary school premises at a cost not exceeding 375*l.* The tender of Messrs. Hawkins & Co., of Westminster, for 3,941*l.* 17*s.*, has been accepted for the erection of the New Malden infants' school; and that of Messrs. Darvill, of Watford, amounting to 2,400*l.*, for the erection of the Walton-on-the-Hill infants' school.

ILLUSTRATIONS.

HARCOURT HOUSE, CAVENDISH SQUARE, W.

SMALL COUNTRY HOUSE AT POTTERS BAR.

CHURCH OF ST. JOHN BAPTIST, HOLLAND ROAD, KENSINGTON.—REREDOS IN CHANCEL—REREDOS IN LADY CHAPEL.

PREMIATED DESIGN FOR PRIMITIVE METHODIST CHURCH AND HALL, CONSETT, DURHAM.

DESIGN FOR A TOWN RESIDENCE.



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A CASE to test the liability of employers for the loss of their workmen's tools was brought recently in the Manchester County Court by a carpenter and joiner, of Gorton, with the support of the General Union of Carpenters and Joiners. He claimed 1*l.* 11*s.* 11*d.* from Messrs. Davenport, Sons & Co., contractors, of Platt's Park, Manchester. Evidence stated that the plaintiff's tools were removed from a lock-up shed to an open motor-shed, and that while there some were taken away. Judge Parry after plaintiff and his counsel had given evidence, said he did not think it necessary to call any other witnesses. The case was an important one to the workmen. The rules, in addition to providing that the employers should furnish a place of safety for the tools, provided that the men should be at the place at the proper time for starting work. Although it might not be a contract by which an employer could be bound, still a custom acted upon by masters and men would be regarded as a reasonable one. In any case, here it was acted upon to such an extent that there was a lock-up shed, and as the plaintiff's tools were removed from that shed he was entitled to the right of action. There would be judgment for the plaintiff for the amount claimed ; and as no money had been paid into court, and it was an important case in which counsel might have been called upon to argue a point, the costs would be on the highest scale, with certificate for counsel.

VARIETIES.

THERE were about 400 applicants for the post of foreman at the Cardiff Mental Hospital, at a salary of 110*l.* a year with house, coal and light.

NORTH DUBLIN workhouse and four dispensaries are to be lighted by electricity instead of gas as at present. The estimated cost per annum is 523*l.*

THE Preston Town Council have decided by twenty-seven votes to thirteen not to proceed with the scheme for the erection of new baths, for which borrowing powers had been obtained.

THE new school about to be erected at Luton, Kent, will accommodate 500 boys and a similar number of girls. It is hoped also that a boys' secondary school will be erected at Gillingham, and a girls' school at Chatham.

A HEAD post-office will shortly be erected in Bank Road, Matlock, at a probable cost of about 15,000*l.* The new building is to be completed by 1910.

THE Great Eastern Railway Company have given orders for the whole of their steamers on the Harwich-Antwerp service to be fitted with the same system of wireless telegraphy as installed on their Hook of Holland steamers.

THE new central offices for the Admiral-Superintendent and the heads of departments of Devonport Dockyard and their staffs are to cost 16,000*l.* The buildings, which are shortly to be commenced, will take two years to complete.

ST. MARK'S CHURCH, Sheffield, is to be enlarged by the erection of vestries for clergy and choir in the south-east corner of the church according to plans prepared by Mr. J. D. Webster, architect, Sheffield.

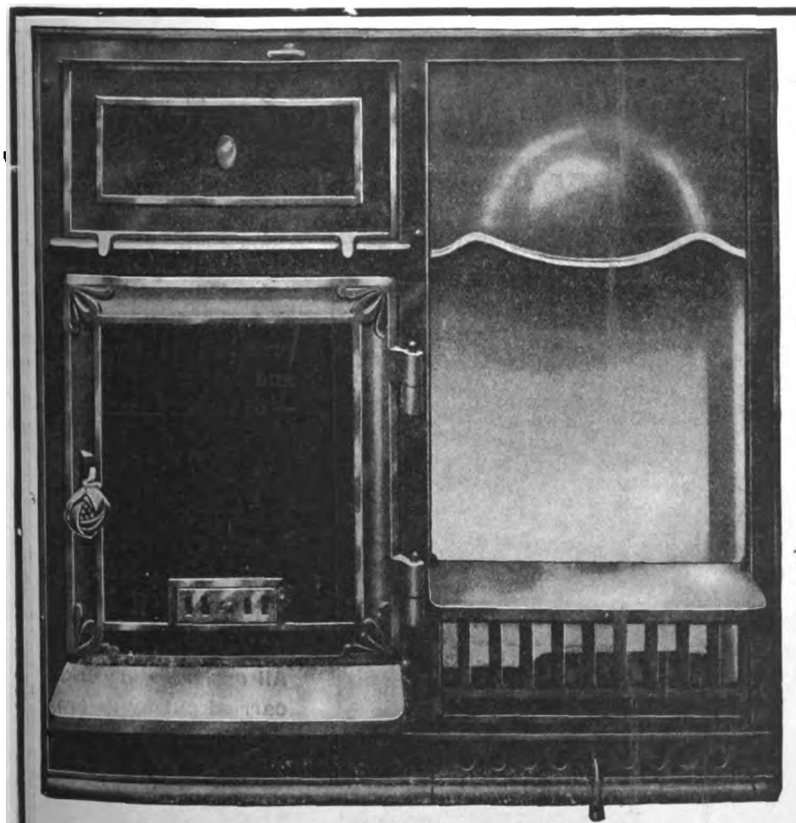
THE Dundee free library committee have approved of plans prepared by the city architect for the erection of central reading rooms at the corner of Ward Road and Barrack Street at a cost of 11,000*l.*

AT the monthly meeting of the Eastleigh and Bishopstoke Urban District Council it was reported that the sanitary committee had approved plans for sixty-four houses in Chamberlayne Road, seven at Newtown, and one at Bishopstoke.

THE Spennymoor Urban Council have agreed, after a discussion extending over seven years, that application be made to the Local Government Board for sanction to borrow 25,000*l.* for the purpose of carrying out the proposed sewerage and sewage-disposal scheme as submitted by Mr. C. F. Murphy (Morpeth) for the whole of the urban district.

MR. F. H. TULLOCH, C.E., held a Local Government Board inquiry at Todmorden on Friday last concerning the application of the borough of Todmorden to borrow 26,471*l.* for paving Burnley Road, Halifax Road, Rochdale Road, and Water Street, and 3,645*l.* for works of street improvements on Stansfield Hall estate.

THE Governors of the West End Hospital, London, are considering plans for the reconstruction of the hospital. A site has been obtained contiguous to the present building in Bulstrode Street. A travelling committee recently visited the principal European hospitals for the treatment of nervous diseases for the purpose of obtaining the best possible scheme.



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THE Great Central Railway Company has posted notices in its locomotive and carriage and waggon department that from this week full time will be reverted to instead of four and three-quarter days per week, which has been the rule during the past seven months.

MIDDLESEX County Council has agreed to obtain the advice of an expert respecting a proposal to demolish the Guildhall, Westminster, and to erect a new structure on the same site and the adjoining ground belonging to the Council.

PLANS for the reconstruction of the Theatre Royal, Hull, have been submitted to the works committee of the Hull Corporation by the Sefton-Parry Syndicate, Ltd., but they have been returned for amendment. The theatre was recently closed for structural reasons.

THE Brass Masters' Association of Birmingham at their annual meeting adopted the following resolution:—"That this meeting of master brassfounders regrets that the School of Art and Technical School are under different committees, and considers that there will be no satisfactory technical and artistic training in Birmingham until both schools are under the same management."

THE executive committee of the Blantyre Cottage Hospital, N.B., decided last week to proceed with the erection of a cottage hospital. The plans of Messrs. Hutton & Taylor, architects, Glasgow, have been accepted. The building is of the pavilion type, comprising male and female wards, operating theatre, and the usual administrative accommodation for a cottage hospital.

THE education committee of the Birmingham Corporation have been authorised to acquire the Greyhound public-house, at the corner of Navigation Street and Summer Street, and Nos. 28 to 34 Navigation Street, containing together about 1,058 square yards, at a total estimated cost of 7,000*l*., for the purpose of extending the Municipal Technical School. The committee were also instructed to negotiate for the purchase of Nos. 35 and 36 Navigation Street, and 59 to 62 Suffolk Street, containing an area of 714 square yards.

WITH the object of encouraging original research in sanitary science the Grocers' Company have determined to offer two scholarships, each of 300*l*. a year, with an allowance to meet the cost of apparatus and other expenses in connection with the work, tenable for one year, but renewable for a second or third year, subject to the conditions of the scheme under which they are established. The next election will take place in May. Applications must be sent in before April 1 to the clerk of the Grocers' Company, Grocers' Hall, London, E.C.

THE Treasury have issued a return of all contracts made in the United Kingdom for manufactured articles by the Government Departments in the year ended March 31, 1908, either with contractors outside the United Kingdom or with contractors or agents who obtained the articles from abroad. This shows that the various departments spent a total of 408,577*l*. 3*s*. 3*d*. The return includes the Office of Works (England), who sent 25,622*l*. abroad, 10,812*l*. being for marble work, 8,240*l*. for wood-block flooring, and 5,102*l*. for mosaic. On the extermination of rats 31*l*. was spent in Danysz virus. In the Irish department only 42*l*. 5*s*. 6*d*. went abroad, 7*l*. 5*s*. 6*d*. of this being for Austrian bentwood chairs.

OWING to the death of Lord Nunburnholme, the executors have placed on the market the family mansion, No. 41 Grosvenor Square, which was designed by the late George Devey. It was specially erected about 1883 to suit the late peer's requirements with a view to entertaining on an extensive scale. The elevation is of bold design carried out in red brick and Portland stone. It has many notable features, such as the great marble hall and staircase, the Louis Quinze ball-room which is 88 feet long and has a minstrels' gallery, the Georgian dining and drawing-rooms adorned with carvings after the manner of Grinling Gibbons, and the boudoir, which has some rare Spanish steel work of the sixteenth century as cupboard fittings. Unless a private sale takes place the house will come under the hammer of Messrs. Knight, Frank & Rutley on March 26.

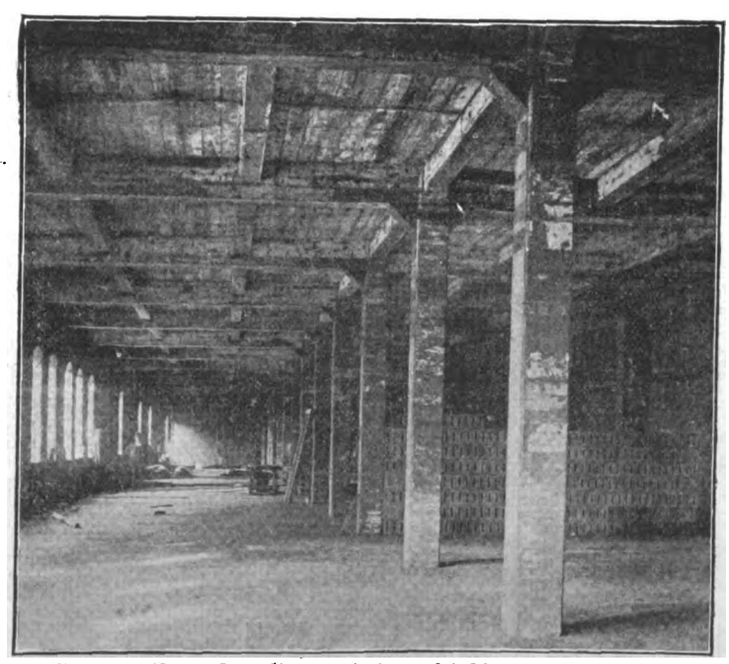
THE medical officer to the Bideford Rural Council in his annual report states there is no redundancy of cottages in the neighbourhood, and consequently the inability to find accommodation for the evicted renders it impracticable to deal with any but the most glaring cases. A boon to the district would be the erection of modern houses within the means of those earning from 12*s*. to 14*s*. a week. Therein was propounded a knotty problem, and the case was emphasised there by the absence of railway accommodation, and the

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necessity of conveying building materials vast distances by road.

THE work of rebuilding the spire on the north tower of Ottery St. Mary parish church has now been completed, and the old weathercock has again been put on the summit. The rebuilding of the spire has been carried out according to designs prepared by Mr. J. D. Coleridge, the honorary architect. The framework is of British steel, and is covered with lead on an under covering of felt on wood battens The old framework, most of which has been in existence for many centuries, was of oak, which had badly decayed, and had long been in a dangerous condition. The weathercock, which was originally constructed to whistle in a strong wind, but which has been silent for many years, has been restored to its original condition.

THE directors of the Worthing Pier Company advocate the enlargement and improvement of the pier. They have definitely adopted plans which, with respect to the superstructure, have been prepared and designed by Mr. S. D. Adshead, of 45 Great Russell Street, London, in co-operation with Messrs. James Mansergh & Sons, the engineers for the substructure and steel and girder work. The scheme provides for the erection of an arcade of ten shops and a pavilion, which is approached through a vestibule, and has seating accommodation for 540 people on the ground floor and 160 people in the gallery. To provide for skating, the floor of the pavilion and vestibule will be maple. The estimated cost is 8,500*l*.

RETURNS have been tabulated from eighty-three American cities as to the expenditure on building operations. For these American cities the aggregate for January was $47,829,108, as compared with $23,935,222 in the month of January last year. This is a decrease of 3 per cent. on December, but an increase of about 99 per cent. on the corresponding month of last year, when the depression was so extreme. Building operations therefore are now about double what they were a year ago. Of the eighty-three cities reported on, only nineteen show decreased expenditure on building, and thirty show expenditure more than double a year ago.

A JOINT deputation from Glasgow recently paid a visit to various markets and slaughter-houses on the Continent. Their object was to obtain information to assist the markets committee in carrying out the proposed extension of the slaughter-houses at Moore Street. On the subject of material for construction the deputation report that in view of the high price paid by the Corporation for the ground acquired for the extension of the slaughter-houses and the limited area at their disposal, and having seen many excellent examples of reinforced concrete used in the construction of slaughter-houses on the Continent, that class of material be used in the construction of the new slaughter-houses, as they are advised that while it would be as endurable as brick it would be cheaper and economise space to the extent of about 450 square yards.

AT a special meeting of the Wellington Rural District Council, Mr. Raikes, engineer, Wolverhampton, submitted plans of a scheme for the disposal of the sewage of the village of Admaston, with an estimate of the cost, and it was resolved to apply to the Local Government Board for sanction for a loan of 2,700*l*. to carry out the work. Mr. Raikes also submitted plans of a similar scheme for Hadley, and it was decided to apply to the Local Government Board for a loan of 700*l*.

DIFFICULTIES have arisen in connection with the proposal by Dumfermline Town Council to lay a new main sewer from the town through the Admiralty's and Lord Elgin's land down to a point in the Firth of Forth. The Government have stated that on no account will they allow unfiltered sewage to be discharged into the Forth. If the Council wish to provide sewage facilities at Rosyth, they will have not only to lay a sewer pipe to the Forth at the estimated cost of 26,000*l*., but also erect sewage purification works near the shore, bringing the total cost of the undertaking up to 50,000*l*.

THE district auditor, Mr. F. B. Cockerton, has prepared a report on the accounts of the London County Council, 1907-8. With regard to the Norbury brickfield, the auditor points out that the average price per 1,000 bricks at March 31, 1907, exceeds the expert valuation made twelve months later by 11*s*. 1*d*., and that the cost price as shown on March 31 last exceeds the price which the Council would have had to pay to a building contractor by 8*s*. 1*d*., and the price as shown by the expert valuation by 19*s*. 2*d*. per 1,000. In his opinion



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these figures show conclusively that the valuation of the bricks should always be made upon some uniform basis. The aggregate deficiency to March 31, 1908, on the brickfield account was 6,342*l.*, of which amount 2,868*l.* represents the deficiency in respect of the year under review. He adds that this would have been increased by 1,744*l.* if the whole of the bricks in stock on March 31 last had been valued at the average price stated by the expert valuer. The reason given for valuing a portion of the stock at cost price was that certain bricks had been reserved for building purposes. As, however, all the bricks were produced for building purposes, the auditor cannot agree that it is a sound principle to separate any portion of the stock and use a different valuation. When the bricks are actually used their cost price will be charged as part of the cost of the building.

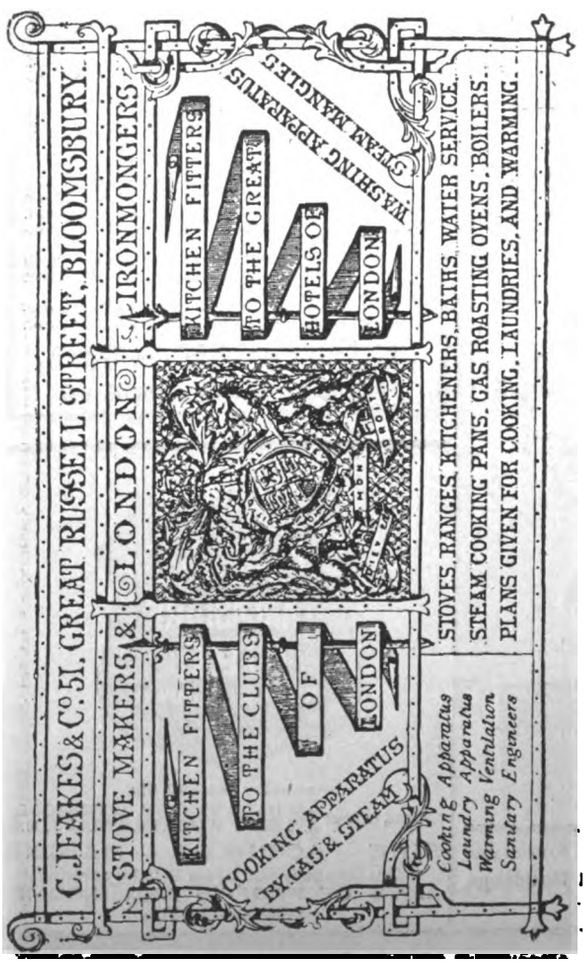
THE apprentices' prize competition inaugurated by the Yorkshire Master Painters' Federation attains its majority this year, and the anniversary is being kept in York. There were two classes, the first being for apprentices over eighteen years and under twenty-one years of age, and the second for those under eighteen, the prizes given being for sign writing, various kinds of graining, tinting, marbling, plain painting, and decoration, designed and stencilled frieze in oil. E. Dean, of Bradford, as being the most successful competitor in the first class was given a handsome gold medal by the president (Mr. J. W. Bellerby), Mr. A. J. Dodsworth (vice-president) giving a silver medal of artistic design to C. E. Wood, of Hull, who gained the most awards in the second class.

MESSRS. IVOR JONES & P. E. THOMAS, architects, Cardiff, have been given first place in a competition for Y.M.C.A. premises at Merthyr. Sixty-one drawings were adjudicated upon by Mr. Gerald C. Horsley. On the ground floor there will be two shops and a café, the entrance stairway being placed between the café and the shops. On the first floor there will be a large reception hall, secretary's offices, billiard-room, bagatelle-room, smoking-room, conversation room, committee rooms, and two rooms for ladies. On the floor above there will be accommodation for juniors, including games rooms, also bathing accommodation, with slipper and shower baths. Above these rooms there will be a rifle range. At the rear, with an entrance from Park Terrace, there will be a hall, accommodating 700, which can be used as a gymnasium. The building will be carried out in brick and buff terra-cotta.

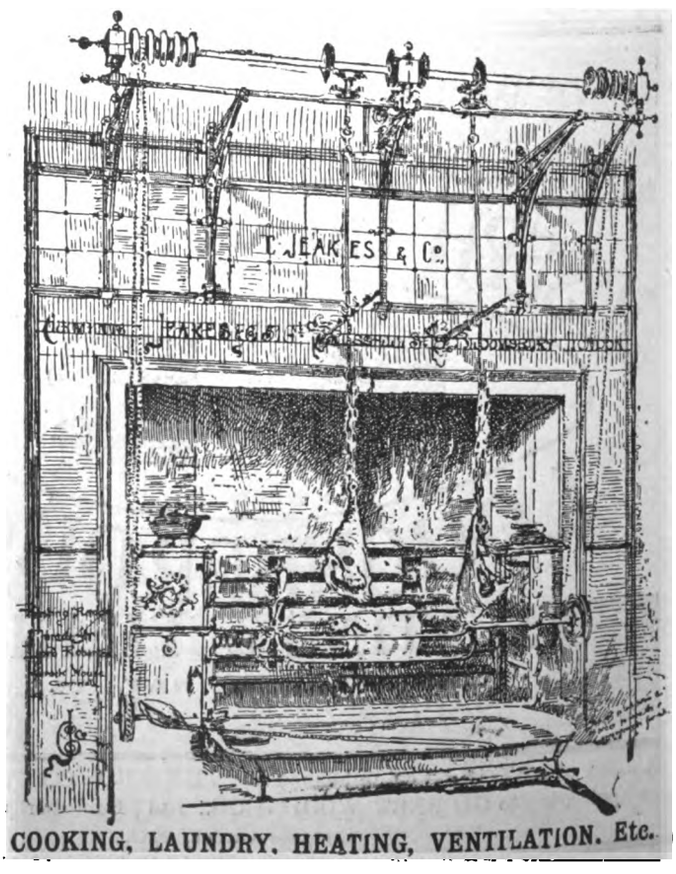
THE sub-committee appointed by Glasgow Corporation in connection with the proposed smallpox hospital at Robroyston have instructed the town clerk to write for information in regard to buildings for and other matters connected with smallpox administrative treatment to the Metropolitan Asylums Board, the Port Local Authority of London and the municipalities of Liverpool, Manchester, Birmingham, Leeds, Sheffield, Nottingham, Edinburgh, Aberdeen, Berlin, Vienna, Buda-Pesth, Copenhagen, New York, Chicago, Buenos Ayres, Ottawa, Quebec, Montreal and Toronto. The medical officer of health and the city engineer are to prepare a report on the history of hospital accommodation for the treatment of smallpox in Glasgow.

THE inquiry into the claim by the Manchester Corporation against the New Moss Colliery, Ltd., for 81,448*l.*, for damages to their Audenshaw reservoirs, caused by the colliery company's mining operations, before Mr. Pollock in the Official Referee's Court, London, after continuing for some days, was settled by mutual arrangement. It was agreed that the defendants should pay 17,500*l.* in three instalments—one on August 1, the second on February 1, 1910, and the third on August 1, 1910—each instalment if not paid at once to carry interest at 2½ per cent., and any instalment being in arrear for more than a month the Corporation to claim for the immediate payment of the whole sum. The costs of the inquiry are to be paid by the defendants as part of the costs of the action.

THE Torquay Tramways Company have received the conditional consent of the Town Council for the extension of their tram lines from the present terminus in Torbay Road to the borough boundary towards Paignton, in connection with the proposed extension to that town. Splendid road improvements will be made by the tramway company, including the widening of the main road to about 36 feet in several places, towards the cost of which the Torquay Corporation will make a contribution. The Board of Trade not being favourable to the surface-contact system of tramways, which is carried out in Torquay, the overhead trolley system is to be adopted in the extension to Paignton, and the Torquay Corporation will supply from their electricity works the power to run the trams so far as the borough boundary.



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KINLOCHLEVEN WATER POWER WORKS.

ON Saturday last the first furnaces in the extensive aluminium works at Kinlochleven, N.B., were lighted. This marks the practical completion of the great water power and electric works which have been in course of construction at Kinlochleven during the last five years. The works have been the joint enterprise of the Lochleven Water Power and Electric Company and the British Aluminium Company, and comprised the construction of an enormous concrete dam—said to be the largest in Europe—at a point 1,068 feet above mean sea level, on a site 5½ miles from the head of Loch Leven, and its construction has absorbed the chain of lochs in the Blackwater into the reservoir lake, which has an area of nine square miles and a capacity of 20,000 million gallons. The native granite, which has been excavated to a depth of 5 feet over the whole site, has provided an excellent foundation for the work of building the dam, which has a width at base of 63 feet, gradually diminishing to 10 feet at cope level. The height of the dam varies in order to provide for the escape of flood water, the maximum being 86 feet, and regulation of the reservoir contents is achieved through a valve tower. From the reservoir the water passes through an upper penstock chamber into a covered conduit built in reinforced concrete, having a length of 3½ miles. Provision has been made against any possible shortage in the main water supply by connecting the conduit with three streams below the level of the dam. The internal dimensions of the conduit are 8 feet square, and the rate of flow of water through it is about 8 feet per second.

At the lower end of the conduit the water passes through a second penstock chamber which has been located on an eminence about 1,000 feet above the factories, the water being carried thence to the turbines by a six track pipe-line 2,000 feet in length. The pipes, which vary in thickness with the pressure from 11 millimetres to 22 millimetres, have an internal diameter of 39 inches, and are of welded steel, constructed in lengths of 20 feet. They were laid in 20 feet lengths, on concrete pedestals, anchorages being provided at each fall in gradient. The working head of water is 890 feet, and the power-house plant includes nine Escher Wyss turbines of 3,200 b.h.p. and two of 830 b.h.p., the large turbines running at 300 revolutions per minute. Messrs. Dick, Kerr & Co. have supplied eighteen 1,100 k.w. direct current shunt-wound generators working at 250 volts, which are coupled in pairs in parallel to the large turbines. Two other machines have been installed for lighting and traction. A small-gauge railway electrically operated serves the power-house and different parts of the factory. In addition to the main factory a small carbon factory has been erected to meet the needs of aluminium manufacture, and employment will be found for some 1,500 workmen, for whose accommodation one village has already been built, while a second is to be put in hand. Pending the opening of the main factory, work has been carried on in a small temporary works served by an independent water-power plant. The undertaking has been carried through in the face of enormous difficulties. Before any headway could be made Loch Leven had to be widened and dredged at Caolis-nan-con, to allow of large steamers passing up with material—half a million tons of gravel dredgings being removed—wharves had to be constructed, and an elevated rope railway on trestles constructed for the conveyance over the intervening 5½ miles of hill and glen of the materials used in the construction of the dam. Besides the large factories which have been erected for the manufacture of aluminium and allied industries, a compact little town has been built, connected with the two wharves at the head of the loch by an electric railway about three-quarters of a mile long. The town is on the most modern plan, with public and private electric lighting, and water supply and drainage on scientific principles. A permanent school is now being erected, and four different denominations are building places of worship for the spiritual needs of the permanent population. During the progress of the construction work 2,000 to 2,500 men have been regularly employed by the various contractors, and the cost of the undertaking has been nearly one and three-quarter million. Kinlochleven is situated about eight miles from Ballachulish (Glencoe), which is the terminus of the Caledonian Railway in the West Highlands. The consulting engineers for the main works, executed by Sir John Jackson, are Messrs. Meik, and for the turbines and electrical plant Messrs. Kennedy & Jenkin. The total cost of the scheme has been about 1½ million.

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A NEW TEST FOR CONCRETE.

A PAPER was read on Monday last before the Society of Engineers by Mr. J. S. Owens, M.D., A.M.I.C.E., entitled "A New Test for Concrete." In this paper the author described the origin and application of a new test for determining the end of the mixing process in preparing concrete. He referred to a weakness in our specifications, which devoted great attention to the nature of the ingredients, but did not assure thereby a sound concrete, the quality of which depends to a great extent on thorough mixing. In the former case the nature of the materials is specified, but in the latter the method of mixing only. The author then went on to describe the test which he had devised, the object of which is to enable the engineer to satisfy himself that mixing is efficiently done. The methods which have been tried in the past to achieve this result were described, three such being referred to:—(1) Inspection; (2) making briquettes, breaking when set, and noting if of uniform strength; and (3) mixing pigment with the concrete, making briquettes, breaking when set, and examining fracture for even distribution of pigment. The author criticised these methods, and showed their lack of value for the purpose. He stated that it had been ascertained experimentally that inspection alone could not detect the difference between concrete having one part of cement to two of ballast and that having one to three.

The following definition of properly mixed concrete was then given:—"Concrete in which the various ingredients are as uniformly distributed as the size of the particles composing them will admit." He went on to say:—"The question therefore is how to determine when this uniformity of distribution has been attained." The principle on which the author's test is based was thus described:—"If we take a few small samples from different parts of the heap of concrete, and if we can tell in some simple way whether all the samples contain the same relative proportions of stone, sand and cement, we have a means of telling whether the concrete is properly mixed or not." The author's method of comparing the samples is simply to place each in a tall glass cylinder nearly filled with water, shake them up and allow them to settle. The rate of settlement of the cement in water was shown to be about thirty times as slow as that of sand; which, in turn, was slower than that of the larger particles of stone; this caused the stones, sand and cement to settle on the bottom in distinct layers. It was shown that the depth of these layers was proportional to the amount of the material present in the sample, and that in this way it was possible to tell whether each sample had the same amount of cement, sand, and stone.

A series of experiments bearing on the evolution of the test and its accuracy was then described, and tables given showing the results. The method of carrying out a test was gone into fully, and the results of some actual tests made by the author described. These include one of a concrete mixing machine, and several of hand-mixed concrete. The contrast between the uniformity of mixture obtained by the machine and that by hand mixing was forcibly brought out, as well as the evil effect of the human factor in hand mixing. Tables were given showing the results of these tests.

A summary was given showing the precautions necessary in making a test; and the author concluded by expressing the hope that the test would be of value in enabling engineers to determine whether their concrete was being properly mixed or not; and, in relation to mixing machines, in fixing the time necessary with any machine to mix properly, and thus to determine its legitimate output.

PAINTING STRUCTURAL STEEL.*

(Concluded from last week.)

THE adherence of paint would no doubt greatly increase if it were possible to heat the surface by artificial heat; however it is a good plan to apply the paint heated to a temperature of 100 to 120 degrees Fahrenheit, especially when the temperature of the air is below fifty-five degrees. This is easily attained by placing the cans of paint in pails of hot water.

* Abstract of a paper by Mr. Gaston Despierres, read before the Paint and Varnish Society, London, entitled "Paint and Its Application to Structural Steel."

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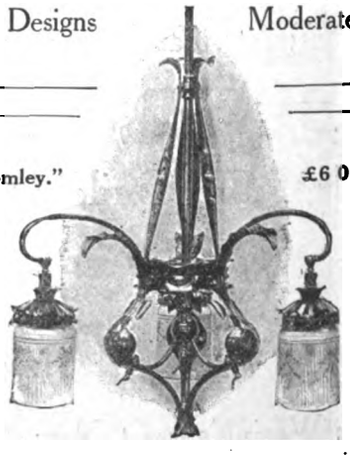
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It is important to always note the atmospheric conditions when painting is being done—a temperature of seventy degrees Fahrenheit, and an atmosphere free from moisture, favour the right kind of drying; in fact, the humidity is more harmful than a low temperature. Nothing retards drying more than dampness and darkness.

To aid in the inspection of new work, a shop-coating of linseed oil is often specified. This does, in a measure, protect the iron from rust; but a very uneven film of dried oil is often obtained by this method of treatment. Oil applied to a vertical surface runs off until the layer reaches a certain thickness. When the current meets with an obstruction it piles up into a thick and uneven coating. The thick parts of the layer may require months to harden into a substance firm enough to be fit to paint over.

The results are also most disastrous in cold weather, when oil thickens and contracts, and—as painters express it—"Oil, when applied to a cold steel, crawls, wrinkles and crinkles."

If oil is used as a primer on steel, it should be used hot, not warm; then it will penetrate the skin of the metal, and we shall probably obtain a thin and even film, hard enough to form a surface fit to receive paint.

Many places, such as the under and inner sides of girders, boltheads, nuts, rivets, &c., which should be painted with the greatest care to prevent the incursion of water, are often neglected.

To aid inspectors and clerks of works, a proper check upon the workmanship can be secured by selecting different colours for several coatings, so that the uncoated or defective places may be readily detected.

To secure durability with paint it should always be used fairly thick, and then well rubbed out with the brush into thin and even layers. An experiment with an ocular micrometer in connection with a microscope showed that a single coat of dried paint varied in thickness from 1/500th to 1/1000th of an inch, the difference being due no doubt to the manner of application—that is to say, whether under light or heavy pressure of the brush. We do not realise enough the thinness of a coat of paint, or the strains to which its dried film is subjected.

Much has been said and written of late regarding the apparent failure of paints enjoying a good reputation when applied to structural steel. From a limited personal knowledge, and from information gained from others, I am led to conclude that some contractors use less of the paint specified than has been presumed. What they do use is frequently applied in the open, under such unfavourable weather conditions, and under conditions of painting contracts at such a low rate as to preclude the possibility of either employing competent workmen to apply the paint, or such application of same as to prevent corrosion. The best paint in the world illegitimately thinned with cheap oils, japans or turpentine substitutes, is practically rendered of little protective value; and to apply it to structural steel more or less covered with rolling-mill scale, dew, frost, snow, slush, grease, &c., is waste of time and material throughout.

The only way to secure better painting is to employ competent and vigilant inspectors and clerks of the works, who will carefully superintend the painters' work.

The Testing of Paint.

Paint tests may be of three kinds—viz. chemical, mechanical and physical.

Chemical Tests.—A chemical analysis is applied to very small quantities of the substance used, and the accuracy of the results obtained from it depends largely upon the method of sampling. When one considers that all pigments are allotropic, that no two lots of paint liquids are really alike, and that any prepared paint changes more or less in one way or another with age, the chemists' test is proved to be of value, in so far as it relates to the matter, subject to his analysis and determination, and no further. "Essentially heterogeneous bodies excite chemical affinity." Can it be supposed that a chemist can possible know the affinities that exist between the various materials used by the paint-maker as well as can the competent paint-maker himself? The quality of a paint depends as much upon its physical as it does upon its chemical properties.

Mechanical Tests.—i.e. the tests made by a competent and skilful painter. No one can determine the working qualities of paint as well as the man whose eye, hand and arm are perfectly trained through practice.

The importance of the proper application of paint receives less attention than it deserves. A poor painter may use 50 per cent. more material than a good painter will use, and

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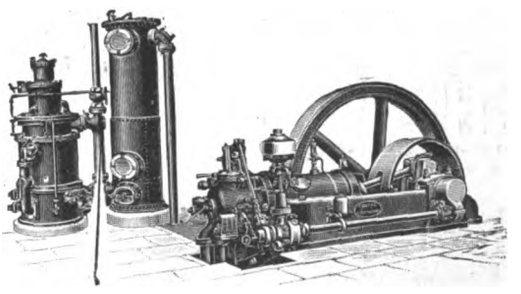
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get poorer results with it. Engineers and architects should demand the employment of competent artisans to do their painting, for results are quite as much dependent upon the intelligence and goodwill of the painter as upon the quality of the paint used. In confirmation of this, I may say that during all the years the company with which I am connected has been making tests of paints upon roofs, bridges and test-plates of wood, iron, steel, and glass (while, of course, results have often been non-concordant, and we have noted great difference in durability, covering and drying properties), yet we have never had the paint blister, scale, or peel off, the reason being that each coat has been applied under proper supervision by an expert painter, with thought and care, to a clean surface in a fit condition to receive it, and the paint was in each instance protected when drying.

Physical Tests.—By this is meant weather tests, or the exposure of the dried paint or metallic or other surfaces to the destructive forces of nature, or to agencies which are frequently present in atmospheric air that shortens the life of dry paint, such as acid, gases and vapours.

Comparative tests on limited surfaces—that is to say, small plates of steel or glass—are often misleading. In order to make such tests more reliable they should be repeated a number of times to note whether the results are concordant.

Actual service tests under normal conditions give the most conclusive data to guide us; but so long as it takes years to make them, common sense dictates that paint users are right in holding fast to materials that have proved trustworthy until better are found.

Accelerated tests under "abnormally severe conditions" have little value unless the results obtained by the method selected will be in complete harmony with "long time service tests." It is easy to test the effects of artificial heat upon dried paint, but this does not determine with perfect accuracy the power of the paint to withstand sunshine.

No quick test exists to determine the probable life of paint under given conditions; but one intimately acquainted with the properties of the paint, and with the forces of nature, may reasonably predict its life, if he knows the method of application, the conditions under which it is to be exposed, and the state of the surface upon which it is to be applied.

Efforts have repeatedly been made by various Governments and institutions to establish a standard in the testing of anti-corrosive paints; but when these specifications are carefully studied by a competent paint-maker he soon realises that they fail almost completely to secure that for which they were intended. A good many specifications only possess the advantage of relieving the monotony of daily routine by causing much amusement; in fact, some are quite impossible to fulfil.

Guided by the study of phenomena pertaining to subject matter, and reasoning by analogy from practice and experiments, the following conclusions can be reached with regard to structural steel coatings:—

1. That the surface of steel must be in fit condition to receive paint; otherwise it is better to use a cheap paint, tar, or anything.

2. That to know the probable results to be obtained from the use of paint materials one must know the following things about them:—

(*a*) Their history and mode of preparation.

(*b*) Their physical properties.

(*c*) Their chemical properties.

3. That a competent paint-maker can design a paint to meet any reasonable conditions of location, atmosphere, temperature, surface, application, drying and wear; but that in order to do so he must know the conditions; that these being known, he should be entrusted with the manufacture of a coating to accomplish the result desired.

4. That the priming coat upon the surface is the most important one, and that it should form a perfect foundation for those to follow.

5. That under coats should dry harder and more quickly than those above, and that the difference in drying and elasticity between adjoining coats should not be very great.

6. That the quality of the binder is equally as important as the quality of the pigment.

7. That the quantity or weight of pigment used is equally as important as its quantity or volume.

8. That the method of application is equally as important as the quality of the paint.

9. That no accelerated tests can be the equivalent of a lifetime service test.

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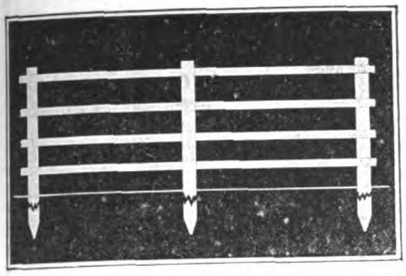
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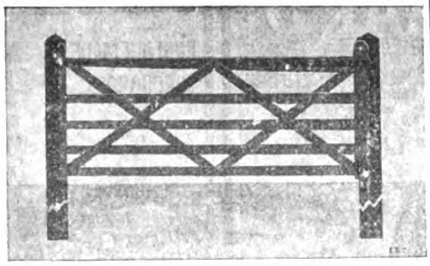
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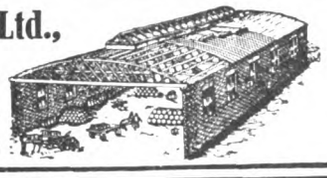
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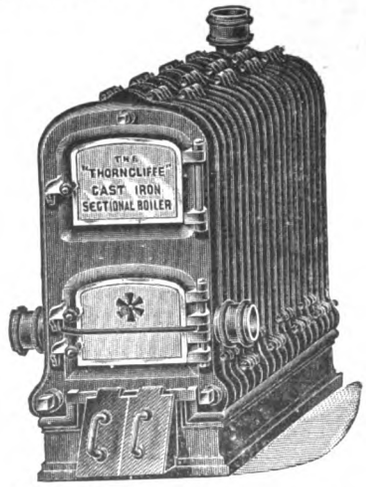
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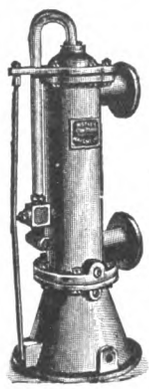
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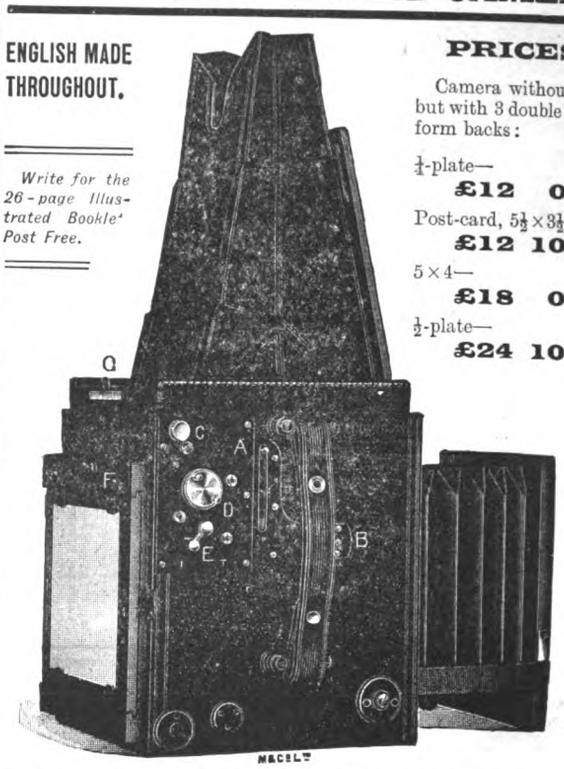
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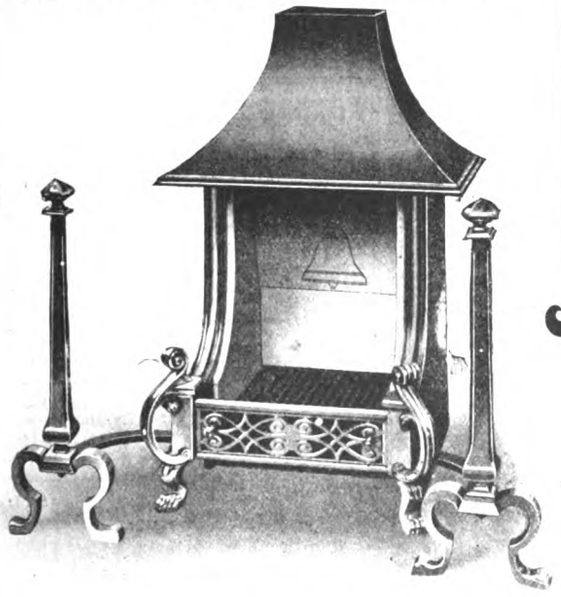
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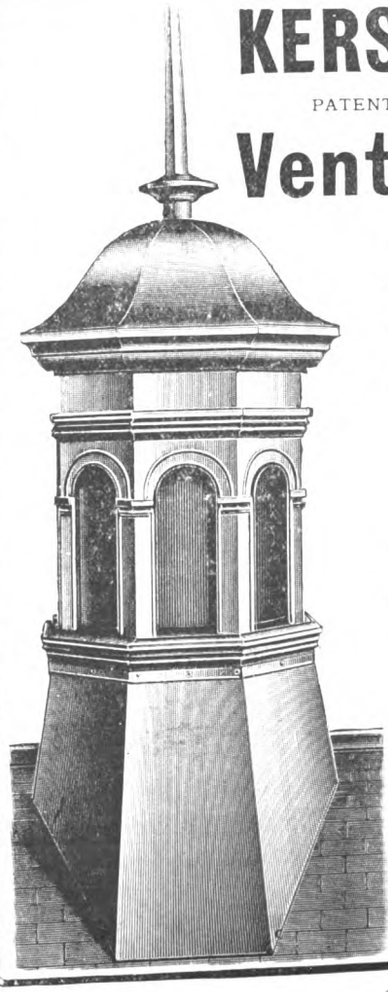
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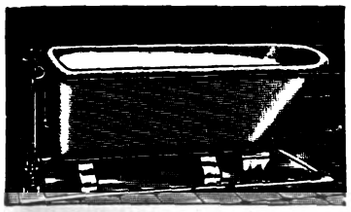
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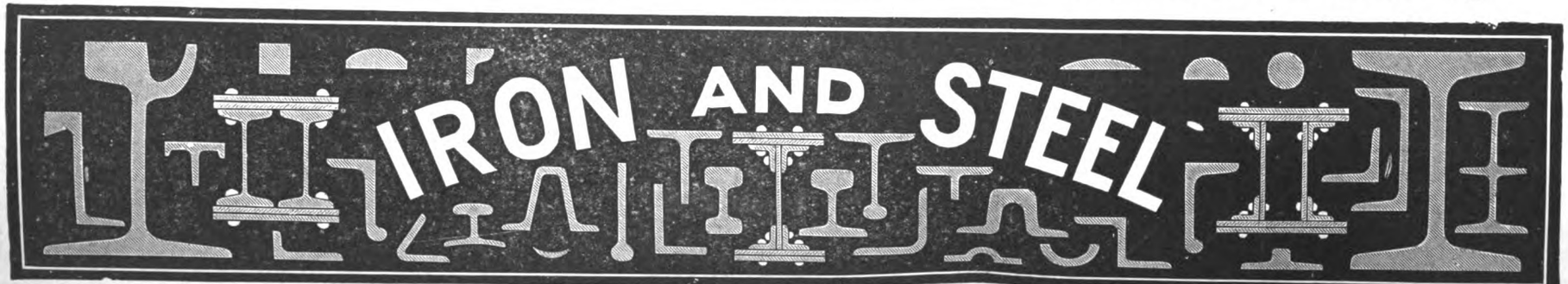
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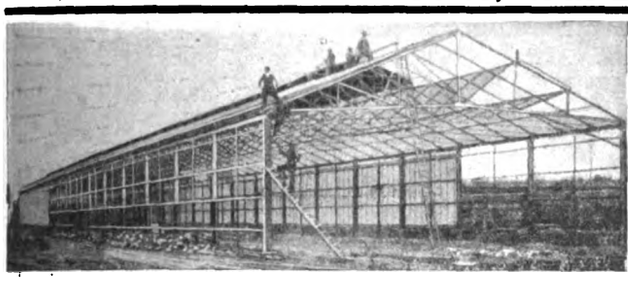
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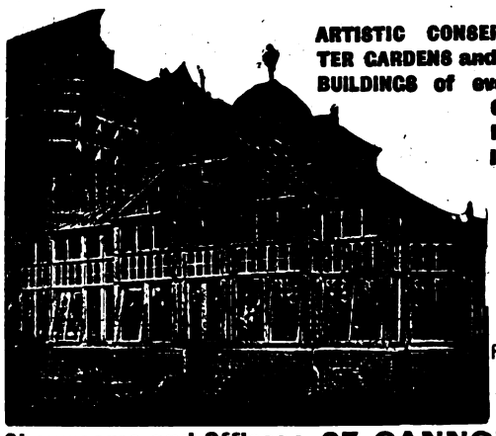


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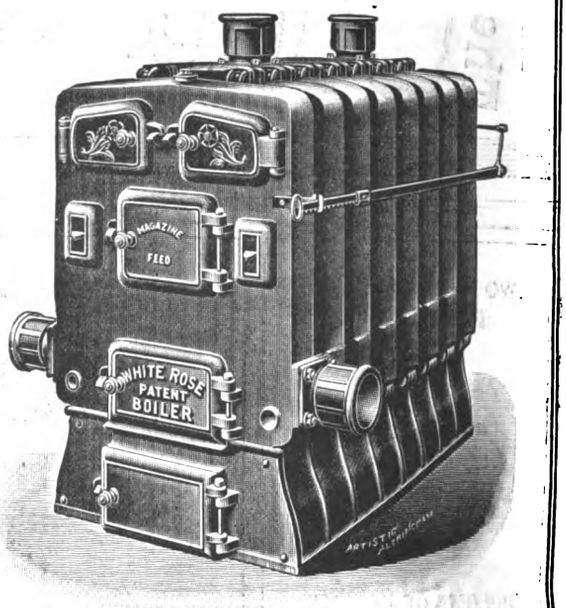
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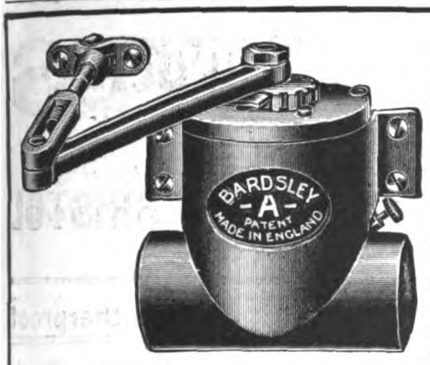
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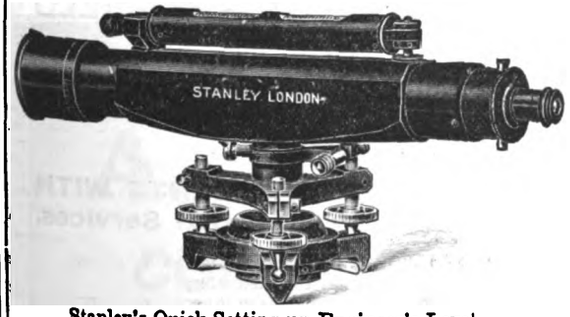
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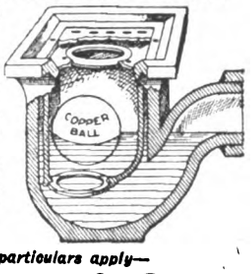
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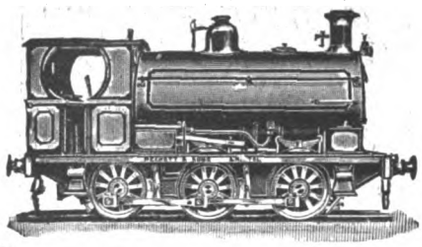
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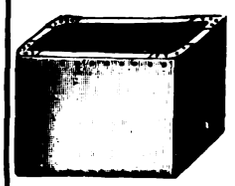
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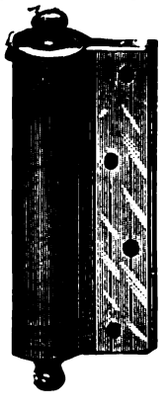
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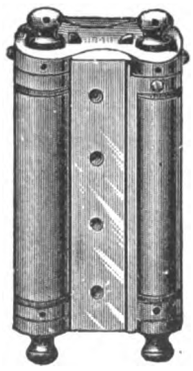
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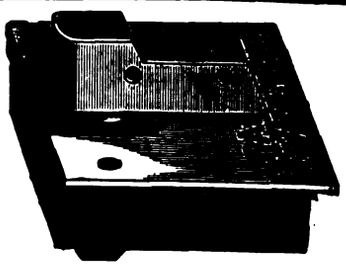
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Architect and Contract Reporter.

FRIDAY, MARCH 12, 1909.

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Under no circumstances whatever can the Proprietors of this Journal guarantee alteration of copy if received after the first post on Tuesday mornings, and no proofs can be submitted if copy arrives later than first post on Saturday mornings.

EDITORIAL NOTICES

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

**** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITIONS OPEN.

EASTLEIGH.—March 24.—The London and South-Western Railway Company invite competitive designs for the construction of a hall, to be erected adjoining the Railway Institute Buildings at Eastleigh, near Southampton. Deposit 1*l.* 1*s.* The Secretary, London and South-Western Railway Company, Waterloo Station, London, S.E.

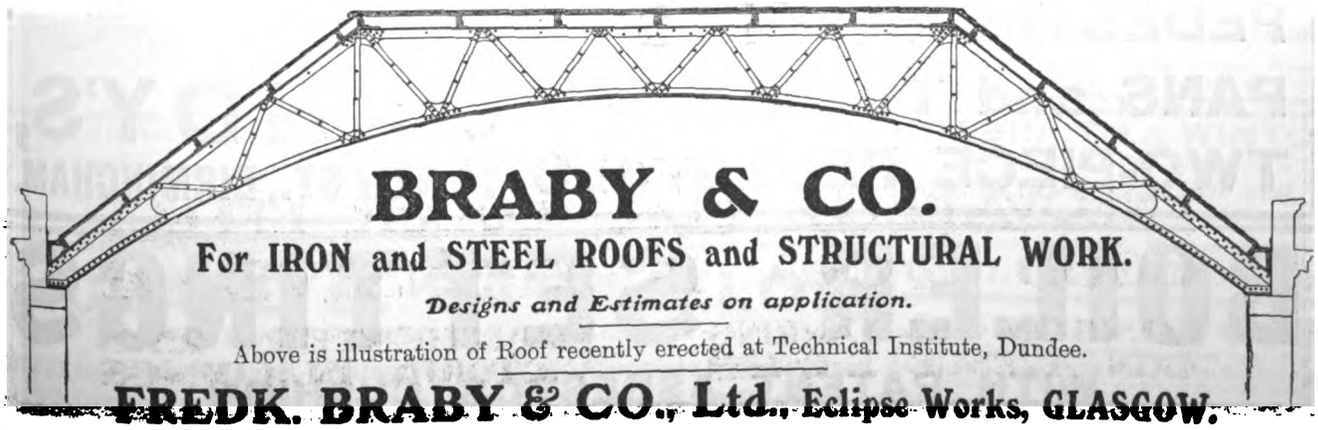
GLASGOW.—July 31.—The patrons of the Royal Incorporation of Hutchesons' Hospital invite designs for laying out for feuing and building about 195 acres of their lands of Thornliebank, Eastwood. Premiums of 100*l.*, 75*l.*, 50*l.* and 25*l.* will be awarded. Deposit 3*l.* 3*s.* Messrs. Hill & Hoggan, 194 Ingram Street, Glasgow.

CONTRACTS OPEN.

AYLESFORD.—March 23.—For the erection of two cottages at the new sewage disposal works. The Borough Surveyor, Fair Meadow, Maidstone.

BAILDON.—March 15.—For erection of a pair of semi-detached houses on the Park Mount Avenue Estate, Kirklands Road, Baildon, Yorks. Apply to Mr. J. Harper Bakes, architect and surveyor, Calverley Chambers, Victoria Square, Leeds.

BIRKENHEAD.—March 15.—For erection and completion of twenty-two double tenement Corporation dwellings on land bounded by Egerton Street, Getley Street, and Tunnel Road. Deposit 1*l.* 1*s.* Mr. Chas. Brownridge, M.I.C.E., borough engineer and surveyor, Town Hall, Birkenhead.



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BOOTLE.—March 19.—For erection of a public elementary Council school in the Orrell district of Bootle, Lancs. Deposit 2*l.* 2*s.* The Borough Engineer's Office, Bootle.

BRADFORD.—March 13.—For the joiner, slater, plumber, and ironfounder trades required in alterations and additions to Paddock Dye Works, Pasture Lane (Clayton), Bradford. Mr. Sam Spencer, architect, &c., Old Bank Chambers, Great Horton, Bradford.

BRISTOL.—March 17.—For erection of a police and fire station at Calcott Road, Knowle. Deposit 2*l.* 2*s.* Mr. Thomas Henry Yabbicom, M.I.C.E., city engineer, 63 Queen Square, Bristol.

BURY (LANCS.).—March 24.—For the following contracts in connection with erection of an electricity generating station at Chamber Hall:—Contract No. 2, structural steelwork; No. 3, reinforced concrete retaining wall; No. 4, steel window frames; No. 5, patent glazing. Deposit 2*l.* each contract. Mr. Arthur W. Bradley, A.M.I.C.E., borough engineer, Bank Street, Bury.

CARLETON.—March 20.—For erection of cowhouse for thirty-two beasts at Baits Hill Farmstead, Carleton, Yorks. Mr. James Heseltine, architect and surveyor, Old Castle Drawing Office, Pontefract.

CLECKHEATON.—March 19.—For the various works in the erection of a secondary and technical school. Mr. W. H. Thorp, architect, Phœnix Chambers, South Parade, Leeds.

CONISBOROUGH.—March 22.—For erection of a school. Mr. H. L. Smethurst, architect, Conisborough, Rotherham. Deposit 1*l.* with West Riding Treasurer, the County Hall, Wakefield.

COVENTRY.—March 15.—For erection of building for the refuse destructor, Bishopsgate Green. Deposit 1*l.* 1*s.* Mr. J. E. Swindlehurst, city engineer and surveyor, St. Mary's Hall, Coventry.

DERBY.—March 18.—For alterations to old slaughterhouses, Cattle Market. Deposit 1*l.* 1*s.* Mr. John Ward, M.Inst.C.E., borough surveyor, Babbington Lane, Derby.

DURHAM.—March 16.—For new Council school at Shotton Colliery, and alterations and repairs to Tanfield Council school. The County Education Architect, Shire Hall, Durham.

ELLAND.—March 26.—For the various works required in erection of three shops at Elland, Yorks. Mr. C. H. Petty, architect, 12 Waterhouse Street, Halifax.

ENNERDALE.—March 15.—For erection of a churchyard wall at St. Mary's Church. Rev. T. Price, Vicarage, Ennerdale.

GOLBORNE.—March 27.—For alterations and additions at Parkside Mill School, Golborne, near Wigan. Deposit 2*l.* Mr. Henry Littler, county architect, 16 Ribblesdale Place, Preston.

HOLGATE.—For the erection of Sunday schools, &c.. Mr. T. Monkman, architect, St. Martin's House, Micklegate.

HULL.—March 24.—For the construction in reinforced concrete of a swimming pond 90 feet by 35 feet, together with sub-structure of main building 109 feet by 76 feet, including foundations, floors, gallery and main walls to gallery level. Deposit 1*l.*; charge for plans, 5*s.* Mr. A. E. White, M.I.C.E., city engineer, Town Hall, Hull.

IRELAND.—March 15.—For erection of a national school at St. Johnston. Mr. Dowds, teacher, Schoolhouse, St. Johnston.

IRELAND.—March 18.—For work to be done and materials to be used in building seating and flues for two Cornish boilers and group of economisers, at Magherafelt workhouse. Mr. F. D. Brown, engineer, Bank of Ireland Chambers, Queen's Bridge, Belfast.

IRELAND.—March 22.—For erection of a station building, 60 feet by 11 feet, of timber, with slated roof, at Milford, about 2½ miles from Armagh, for the Castleblayney, Keady, and Armagh Railway Company. Mr. W. H. Mills, engineer-in-chief, G.N.R. (I.) Co. Amiens Street Terminus, Dublin; or, the District Engineer, Belfast.

IRELAND.—March 22.—For erection of a building on the site of the Union Hall, High Street, Carrickfergus. Messrs. Samuel P. Close & Son, architects, 13 Donegall Square North, Belfast.

IRELAND.—April 2.—For the erection of a sanatorium at Crooksling, Brittas, co. Dublin. Deposit 2*l.* Mr. G. T. Moore, architect, 1 & 2 Foster Place, Dublin.

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IRELAND.—March 16.—For the erection of a motor-house in the Town Hall yard, Blackrock. Mr. R. F. Heron, town clerk, Town Hall, Blackrock.

KEDINGTON.—April 2.—For works at Kedington workhouse, near Haverhill, as follows, for the Guardians of Risbridge Union, viz.:—Sinking a well, erecting a pump-house, supplying a pump, shafting, &c. Mr. G. E. Mitchell, Ashen Road, Clare, Suffolk.

LEEDS.—March 24.—For erection of shelters to bowling greens at various parks, and cricket pavilion at Roundhay Park; repairs and painting works to Cobble Hall; and supply of shoulder boards, &c., and of stone flags for cemeteries. Mr. W. T. Lancashire, Municipal Buildings, Leeds.

LONDON.—March 17.—For the reconstruction of the upper boiler house and coal store (building contract) at the South Western Fever Hospital, Landor Road, Stockwell, S.W., for the Metropolitan Asylums Board. Deposit 2*l*. Mr. W. T. Hatch, M.I.C.E., M.I.M.E., engineer-in-chief, the office of the Board, Embankment, E.C.

LONDON.—March 19.—For taking-up and relaying new floor in the Nurses' Home, Raine Street, E. The Clerk to the Guardians of St. George-in-the-East, Raine Street, Old Gravel Lane, E.

LONDON.—March 23.—For the extension of the existing stables and repairs to the roof thereof at the Islington Council's Depôt, Liverpool Road, N. Deposit 2*l*. 2*s*. Mr. J. Patten Barber, borough engineer, Town Hall, Upper Street, N.

LONDON.—March 25.—For erection of two house coal stores at the Eastern Fever Hospital, Homerton Grove, Homerton, E. Deposit 1*l*. Mr. W. T. Hatch, M.I.C.E., M.I.M.E., engineer-in-chief, Metropolitan Asylums Board, Embankment, E.C.

LONDON.—March 25.—For erection of new iron buildings and other works at Swaffield Road, Wandsworth, S.W. Deposit 1*l*. The Guardians' Offices, St. John's Hill, Wandsworth, near Clapham Junction railway station.

MAIDENHEAD.—March 15.—For repairs to the parapet of Maidenhead Bridge. Mr. P. Johns, borough surveyor, the Guildhall. Maidenhead.

MANCHESTER.—March 20.—For work and materials required in taking down and rebuilding retort-house walls, &c., at the Rochdale Road Gas Station. Deposit 1*l*. 1*s*. Mr. J. G. Newbigging, M.I.C.E., Rochdale Road Gas Station, Manchester.

MANCHESTER.—March 22.—For the construction of about 560 super. yards of reinforced concrete flooring at the Harrison Street lodging-house, Ancoats. Deposit 1*l*. 1*s*. The City Architect, Town Hall, Manchester.

MASBRCUGH.—March 16.—For erection of warehouse adjoining the Great Central Railway, Northfield, Rotherham. Deposit 2*l*. 2*s*. Apply by March 16, to Mr. J. Platts, architect and surveyor, Old Bank Buildings, High Street, Rotherham.

MILFORD HAVEN.—March 15.—For erection of a house in North Road. Mr. C. Launcelot Blethyn, architect, Milford Haven.

NEWCASTLE-UNDER-LYME.—For erection of Sunday schools, &c. Forward names to Messrs. Garside & Pennington, architects, Ropergate, Pontefract; Central Chambers, Castleford.

NEW SHOREHAM.—March 16.—For erection of a drying-room at the Children's Homes at New Shoreham, Sussex. Mr. Till, superintendent of the homes, New Shoreham.

PAIGNTON.—March 15.—For constructing a public convenience at the Shelter, Esplanade, and at the Torbay entrance to Victoria Park. The Surveyor's Office, Town Hall, Paignton, Devon.

PORTSMOUTH.—March 17.—For reconstructing and maintaining in thorough repair for six months the urinal and w.c. at the rear of the North Lodge, at the Kingston Burial Ground, New Road. The Borough Engineer's Office, Town Hall, Portsmouth.

READING.—March 18.—For the construction of public conveniences for men and women at the junction of King's Road and Kennet Street. Mr. John Bowen, A.M.I.C.E., borough engineer and surveyor, Town Hall, Reading.

SCOTLAND.—For the construction of station buildings at Denny. Deposit 2*l*. 2*s*. The Engineer to the Caledonian Railway Company, Buchanan Street Station, Glasgow.

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SCOTLAND.—March 15.—For the construction of a goods shed, on Riverside Quay, York Hill, 1,370 feet by 100 feet. Engineer Clyde Navigation Trustees, Glasgow.

SCOTLAND.—March 19.—For the mason, carpenter, plumber, slater, plaster, and painter's work of a new house to be erected near Elgin. Mr. John Wittet, architect, Elgin.

SHOTTON COLLIERY.—March 16.—For erection of Council school at Shotton Colliery, and alterations and repairs to Tanfield school. The County Education Architect, Shire Hall, Durham.

SLEAFORD.—March 22.—For alterations and additions to the Wesleyan church premises, Sleaford, Lincs. Deposit 1*l.* Mr. A. E. Lambert, architect, 22 Park Row, Nottingham.

STARBECK.—March 19.—For whole or separate trades in rebuilding St. Andrew's Church. Messrs. Austin & Paley, architects, Lancaster.

STOCKPORT.—March 17.—For Methodist church and schools, Edgeley. Deposit 1*l.* 1*s.* Messrs. Wrathmell & Blackshaw, architects, Queen's Buildings, St. Peter's Square, Stockport.

TONBRIDGE.—March 15.—For erection of a stamping station for weights and measures (consisting of two rooms), in Lyons Crescent, Tonbridge, Kent. The County Architect, 86 Week Street, Maidstone.

UTLEY (YORKS).—For the various works required in erection of a house. Messrs. John Haggas & Sons, architects, North Street, Keighley.

UXBRIDGE.—March 16.—For erection of a stable at Uxbridge Station, for the Great Western Railway Company. The Engineer at Paddington Station.

WAKEFIELD.—March 15.—For pulling down old property and rebuilding the Dolphin Inn and outbuildings at Warrengate Corner. Apply by March 15 to Messrs. Simpson & Firth, architects and surveyors, Southgate Chambers, Wakefield.

WALES.—March 15.—For erection of chapel, vestry and classrooms, for the Trustees of Tabernacle C.M. Church, Ynyshir. Deposit 1*l.* 1*s.* Mr. R. S. Griffiths, M.S.A., architect and surveyor, Tonypandy.

WALES.—March 20.—For enlarging the Middle Rhymney mixed Council school, Monmouthshire. Deposit 2*l.* 2*s.* Mr. C. Dauncey, secretary, County Council Offices, Newport, Mon.

WALES.—March 15.—For building a church at Senghenydd, near Cardiff. Deposit 2*l.* 2*s.* Mr. E. M. Bruce Vaughan, F.R.I.B.A., architect, Cardiff.

WALES.—March 16.—For the following works for the Glamorgan County Council, viz.:—(1) New school at Caerau; (2) foundations for temporary building at Port Talbot Central Council school; (3) boundary wall at Bargoed girls' school. The County Council Offices, Westgate Street, Cardiff.

WALES.—March 16.—For erection of forty-seven or more houses at Bournville Road, near Tyler's Arms, Blaina, Mon. Mr. W. Thomas, architect, Preswylfa, Nantyglo.

WALES.—March 18.—For erection and completion of a house and shop at Cardiff Road, Bargoed. Mr. Idris Leyshon, architect, Hanbury Road, Bargoed.

WALES.—March 24.—For erection of a police-station at Aber-Bargoed. Deposit 1*l.* 1*s.* Mr. William Tanner, F.S.I., county surveyor, Aber-Bargoed.

WALES.—March 24.—For erection of business premises at Brynmawr. Mr. Hy. Waters, architect and surveyor, Market Chambers, Ebbw Vale.

WALES.—March 23.—For building a residence at Govilon, near Abergavenny. Mr. John W. Rodger, architect, 14 High Street, Cardiff.

WALES.—March 19.—For erection of a Welsh Congregational chapel, school, and class-rooms, &c., at Onllwyn, near Neath. Deposit 3*l.* 3*s.* Mr. W. Beddoe Rees, architect, 3 Dumfries Place, Cardiff.

WALES.—March 22.—For erection of a school to accommodate 260 infants at Pontllanfraith, Mon. Deposit 2*l.* 2*s.* Mr. John Bain, architect, County Council Offices, Newport.

WIDNES.—March 29.—For alterations to the Warrington Road Council school. Deposit 1*l.* 1*s.* The Education Department, Town Hall, Widnes.

WIGTON.—For erection of syruping rooms with cement floors, for Messrs. Carr, White & Co., Wigton.

YORKS.—March 19.—The West Riding education committee invite whole or separate tenders for the following works:—Dodworth new school, near Barnsley; Castleford, Pontefract Road new school; Wickersley temporary school. The West Riding Architect, County Hall, Wakefield. Deposit 1*l.* for each contract with the West Riding Treasurer, County Hall, Wakefield.

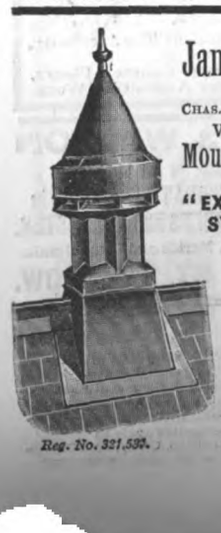
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TENDERS.

ARBROATH.

For the erection of a gas-holder of the spiral-guided type.

DEMPSTER & SONS, Elland (*accepted*)	£4,561 0 0

ARDLEIGH.

For alteration and addition to two houses. Mr. H. STEWARD-WATLING, architect, Kingsway House, Dovercourt, Ipswich.

PYKE (*accepted*).

BRIDGNORTH.

For the erection of a filter-house adjoining the present water works.

LAY (*accepted*)	£215 17 0

BRISTOL.

For main block of new buildings at Saithmead, for the Bristol School of Industry for the Blind. Messrs. EDMESTON & GABRIEL, architects, 42 Old Broad Street, E.C.

		Additional for Glazed Tiling.
Clark & Son	£27,440 0 0	£650 0 0
Perkins & Son	26,150 0 0	700 0 0
Downs & Son	25,600 0 0	690 0 0
Ridd	25,450 0 0	710 0 0
Walters & Son	25,367 0 0	720 0 0
Chancellor & Son	25,366 0 0	683 0 0
Stephens, Bastow & Co.	24,949 0 0	700 0 0
Long & Sons	24,944 0 0	650 0 0
Cowlin & Son	24,928 0 0	711 0 0
Love	24,925 0 0	715 0 0
Willcox & Co.	24,875 0 0	750 0 0
Hayes & Son	23,912 0 0	708 0 0
WILKINS & SON, Bristol (*accepted*)	23,846 0 0	737 0 0
Lovell & Son	23,600 0 0	630 0 0

BLYTH.

For additions to Crofton schools. Mr. R. GRIEVES, surveyor, Blyth, Northumberland.

Swann Bros.	£967 18 6
Baxter	860 0 0
Cook Bros.	801 11 2
Robson & Waddle	798 10 0
J. & W. SIMPSON, Blyth (*accepted*)	759 16 0

BOURNE.

For erecting five cottages in West Street. Mr. J. H. ROBERTS, architect, Bourne, Lincs.

Rawlinson Bros.	£800 0 0
Smith	800 0 0
Watson & Co.	662 0 0
Roberts	640 0 0

CHELTENHAM.

For supply of sludge-pumping machinery, for the Town Council.

Tangyes (*recommended*)	£335 0 0

DOVERCOURT.

For the erection of four houses, Fronks Road and Long Battneys estate. Mr. H. STEWARD-WATLING, architect, Kingsway House, Dovercourt, Ipswich, &c.

YOUNGS (*accepted*)	£1,730 0 0

For the erection of five houses, St. Michael's Road. Mr. H. STEWARD-WATLING, architect.

NORMAN (*accepted*)	£1,840 0 0

For alteration and addition to the Hotel Alexandra, Dovercourt. Mr. H. STEWARD-WATLING, architect.

Saunders	£225 10 0

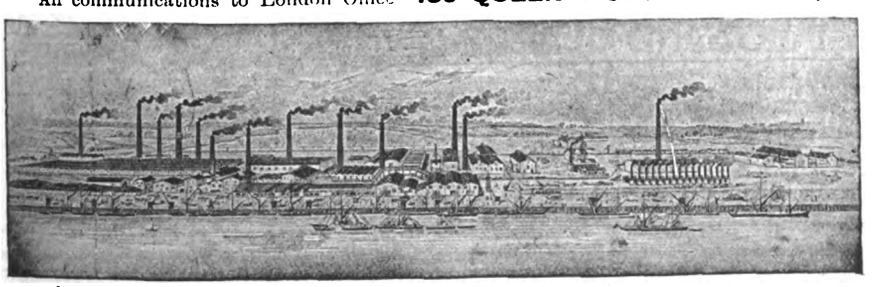
FELIXSTOWE.

For alteration to residence and stabling. Mr. H. STEWARD-WATLING, architect, Felix Chambers, Felixstowe, Ipswich, Dovercourt, &c.

Watkins	£375 0 0

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GREAT LEIGHS (ESSEX).

For stabling, &c., at St. Ann's Castle Inn. Mr. R. MAWHOOD, architect, Chelmsford.

Harman	£273 14 0
Smith & Son	273 0 0
Harris	263 16 0
MILLBANK & SON (*accepted*)	262 10 0

GREENWICH.

For paving roadway and footways of Eversley Road.

Peters	£598 0 0
Fry Bros.	532 0 0
Etheridge	530 0 0
Woodham & Sons	527 0 0
MOWLEM & Co., Westminster (*accepted*)	499 0 0

HAYWARD'S HEATH.

For sewerage works, for the Cuckfield Rural District Council. Messrs. STRACHAN & WEEKS, engineers, 9 Victoria Street, Westminster.

Edwards & Co.	£19,463 15 1
Pedrette & Co.	12,524 2 4
J. & T. Binns	12,373 8 1
F. Osenton	11,925 7 9
Hutchinson & Co.	11,368 11 4
Ewart	11,135 8 11
Kelletts	10,416 13 3
Macdonald	10,327 0 0
Adams	10,319 10 9
Rayner	10,152 0 6
Bell & Sons	9,945 0 0
Price & Co.	9,878 10 0
Ford	9,507 13 4
Moran & Son	9,347 2 10
Murray & Co.	9,132 14 0
A. G. Osenton	9,089 5 11
Pedrette	8,911 0 5
Rowlingsons & Co.	8,885 13 10
Osman	8,818 0 0
MANDERS (*accepted*)	8,529 9 6

HORRABRIDGE.

For erection of two semi-detached houses at Queen's Park, Horrabridge, Devon. Messrs. KING & LISTER, architects, Plymouth.

Hoskin	£1,635 0 0
Wilkins & Sons	1,535 0 0
Maddock & Sons	1,486 0 0
Cook Bros.	1,459 6 7
Roberts	1,422 18 3
Kelley	1,367 2 6
Badcock	1,364 2 7
Cockerell	1,311 0 1
Stanbury	1,306 11 9
Andrews	1,264 0 0
Hill	1,230 6 11
Nankivell & Co.	1,223 13 10
Paynter	1,202 0 0
Stevenson	1,179 9 0
Endicott	1,146 15 3
LEAMAN, Plymouth (*accepted*)	1,140 0 0

HORWICH.

For sewering, levelling, paving, flagging, &c., a number of streets, for the Horwich Urban District Council. Mr. T. GREEN, surveyor.

Kearns	£1,235 12 9
Worthington	1,137 14 3
Sykes	1,135 14 5
Cowburn & Son	1,115 18 2
Slater	1,065 0 2
Pollitt & Co.	1,063 8 5
Horrocks	1,047 16 5
YATES, Horwich (*accepted*)	1,007 8 2

IPSWICH.

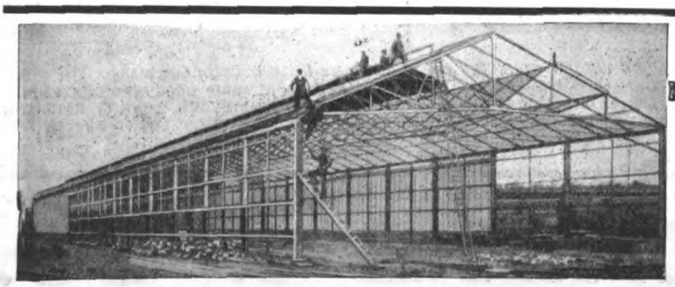
For three houses, Corder Road, Ipswich. Mr. H. STEWARD-WATLING, architect, Tavern Street, Ipswich, Dovercourt, &c.

Harris, at per schedule.

For a pair of houses, Rashmere Road, Ipswich. Mr. H. STEWARD-WATLING, architect.

Kenny, at per schedule.

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KINGSTON-UPON-THAMES.

For erection of a small building for a chemical laboratory at the sewage works, Down Hall Road.

Oldridge & Sons	£172 0 0
Laurence	168 0 0
Hyde & Co.	165 0 0
Yarley	159 0 0
Budd	154 0 0
IDE & SON (*accepted*)	148 0 0

KINGSWOOD.

For alterations and additions, Samuel White's Council school. Mr. R. S. PHILLIPS, architect to the education committee, Gloucester.

Walters & Son	£1,187 0 0
Cowlin & Son	1,138 0 0
Ridd & Sons	1,073 0 0
Long & Sons	1,042 0 0
Hayes & Sons	1,017 0 0
Adams & Jefferies	998 0 0
CLARK & SONS, Bristol (*accepted*)	985 0 0

LETCHWORTH.

For detached cottage. Messrs. UNDERWOOD & KENT, P.A.S.I., architects.

Hurst	£467 0 0
Beckley & Turpie	455 0 0
Jeffs	380 0 0
COLLINS (*accepted*)	350 0 0

LINCOLN.

For alterations to the Saracen's Head Hotel Tap, Lincoln. Messrs. W. WATKINS & SON, architects.

Halkes Bros.	£1,292 0 0
S. & R. Horton	1,225 1 9
Wright & Son	1,198 0 0
LINCOLN CO-OPERATIVE SOCIETY BUILDING DEPARTMENT (*accepted*)	1,040 0 0

LONDON.

For supply of one 2,000-kw. steam turbine generating set, with condenser, for the Hammersmith Borough Council.

Motor-driven exciter.

General Electric Co. (*recommended*)	£218 0 0

Condensing plant.

Willans & Robinson (vacuum augmenter) (*recommended*)	1,173 0 0

2,000-kw. steam turbine electric generator set.

Richardson, Westgarth & Co. (*recommended*)	5,613 0 0

For the installation of electric lighting and bells and the wiring for ventilating fans at the L.C.C. School of Building, Brixton.

Smith & Co.	£1,920 0 0
Pullan	1,530 0 0
Penrose & Co.	1,320 0 0
Bryden & Sons	1,282 0 0
Tilley Bros.	1,248 0 0
Taylor & Co.	1,199 0 0
Pinching & Walton	1,167 5 9
Estimate of the chief engineer	1,200 0 0

For cleaning and painting L.C.C. schools.

Mantle Road, Deptford.

Parker & Sons	£797 0 0
Mitchell & Son	693 0 0
J. & C. Bowyer	675 0 0
Kent	658 0 0
Groves	625 0 0
Proctor & Sons	549 0 0
Holliday & Greenwood (*recommended*)	546 0 0

Wordsworth Road, Hackney.

Brand, Pettit & Co.	848 10 0
Mather	822 15 0
Porter	803 0 0
Bull	797 5 0
Stewart	740 0 0
Willmott	645 0 0
Shurmur & Sons	599 10 0
Snewin Bros & Co.	597 10 0
Price	584 0 0
Silk & Son (*recommended*)	557 0 0

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(Signed) WILLIAM F. GEPP.
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The Forster, Islington.

Grover & Son	698	0	0
Hawkins & Sons	676	0	0
Reason	664	0	0
Patman & Fotheringham	661	0	0
Roberts & Co.	653	0	0
McCormick & Sons	642	0	0
Stevens & Sons	618	0	0
Marchant & Hirst (*recommended*)	539	0	0

Basnett Road, Battersea.

Triggs	362	0	0

Gideon Road, Battersea.

King & Son	337	0	0

Devon's Road, Bow and Bromley.

Woollaston & Co.	348	0	0

Rolls Road, Camberwell.

Holliday & Greenwood	458	0	0

Chequer Street, Finsbury.

Stevens & Sons	287	0	0

Star Lane, Fulham.

Bristow & Eatwell	315	0	0

Randall Place, Greenwich.

F. & T. Thorne	483	10	0

Chatham Gardens, Hoxton.

Stevens & Sons	237	0	0

Gloucester Grove East, Kensington.

Lole & Co.	318	0	0

Johanna Street, Lambeth.

Rice & Son	243	0	0

Lollard Street, Lambeth.

Glendinning	480	0	0

Gordonbrock Street, Lewisham.

Holliday & Greenwood	295	0	0

Holbeach Road, Lewisham.

Young	368	0	0

Rathfern Road, Lewisham.

Young	386	0	0

LONDON—*continued.*

St. Paul's Road, Mile End.

F. & T. Thorne	454	10	0

Effra Parade, Norwood.

Leonard	337	14	0

Reddins Road, Peckham.

Holliday & Greenwood	325	0	0

East Lane, Rotherhithe.

F. & T. Thorne	470	5	0

Farncombe Street, Rotherhithe.

F. & T. Thorne	341	0	0

Silwood Street, Rotherhithe.

Holliday & Greenwood	315	0	0

Blakesley Street, St. George-in-the-East.

Woollaston & Co.	357	0	0

Flint Street, Walworth.

Holliday & Greenwood	277	0	0

King and Queen Street, Walworth.

Holliday & Greenwood	356	0	0

Warple Way, Wandsworth.

Triggs	263	0	0

Conway Road, Woolwich.

Proctor & Sons	245	0	0

Vicarage Road, Woolwich.

Kirk & Randall	294	0	0

For electric lighting at Redman's Road school, for the London County Council.

Pullan	£1,070	0	0
Kaye & Co.	850	13	9
Smith & Co.	597	10	0
Tredegar & Co.	524	0	0
Miller	520	0	0
Lund Bros. & Co.	510	12	0
R. H. & J. Pearson	464	0	0
Tilley Bros.	457	0	0
Burley & Co.	442	12	0
Pinching & Walton	436	0	0
Taylor & Co.	433	0	0
Wallis & Watson	335	0	0
Harper Electric Co. (*recommended*)	335	0	0
Chief engineer's estimate	375	0	0

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For erection of working-class dwellings in Manor Street, for the Chelsea Borough Council.

Abbott & Charlton	£20,534 14 0
Heath	18,500 0 0
Roberts & Co.	18,400 0 0
Fryer	18,247 0 0
Frost & Son	17,950 0 0
Griggs & Son	17,790 0 0
Allen & Sons	17,665 0 0
Holliday & Greenwood	17,280 0 0
Appleby & Son	17,137 0 0
Hyde	16,965 0 0
Davis	16,800 0 0
Wallis	16,752 0 0
Barker & Co.	16,689 0 0
Pattinson & Sons	16,643 0 0
Kirk & Randall	16,543 0 0
Strange & Sons	16,490 0 0
Bailey	16,391 0 0
Gorham	16,354 0 0
Johnson & Co.	16,268 0 0
Spencer, Santo & Co.	16,142 0 0
McCormick & Son	15,999 0 0
Coles	15,931 0 0
F. & G. Foster	15,898 0 0
Lawrence & Son	15,884 0 0
Patman & Fotheringham	15,771 0 0
Jarman & Co.	15,595 0 0
Minter	15,570 0 0
Nightingale	15,414 0 0
Carmichael	15,376 0 0
Downs	15,300 0 0
Lole & Co.	15,214 0 0
Lowe & Co.	14,772 0 0
Gathercole Bros.	14,688 0 0
Architect's estimate	17,571 0 0

NARBOROUGH AND WHETSTONE (LEICS).

For construction of 950 lineal yards of stoneware pipe sewers, &c., for the Blaby Rural District Council. Mr. J. TURNER, engineer and surveyor, South Wigston.

Pedrette	£4,415 0 0
Thorpe	3,295 0 0
Hutchinson & Sons	3,295 0 0
Watson	3,195 0 0
Halford & Sons	3,177 0 0
Garlick	3,116 0 0
Hawley & Sons	3,054 0 0
Jewell	3,054 0 0
Firth & Co.	3,046 0 0
BUCKLEY (*accepted*)	2,992 13 8

OKEHAMPTON.

For making footpaths at Hatherleigh.

HOOPER (*accepted*)	£694 5 7

OSWESTRY.

For constructing and erecting steel roof principals and columns and corrugated iron roofs at the Smithfield. Mr. G. W. LACEY, C.E., borough engineer, Oswestry.

ROBERTS, Oswestry (*accepted*)	£445 4 0
Borough surveyor's estimate	498 0 0

OULTON BROAD.

For the erection of detached house, also shop and stabling, Oulton Broad. Mr. H. STEWARD-WATLING, architect, London Road, Lowestoft, and Oulton Broad, &c.

Youngs	£510 0 0

SALISBURY.

For making up Bourne Avenue.

WART & WAY (*accepted*)	£319 10 0

SEDGEFIELD.

For the Ferryhill North Side sewage works.

CARRICK, Durham (*accepted*)	£1,590 0 0

ARCHITECTURAL PHOTOGRAPHY

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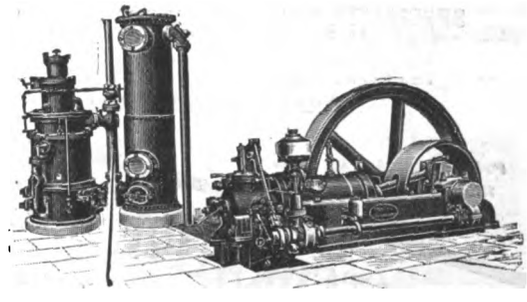
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For providing and laying about 8,000 yards of 3-inch and 4-inch cast-iron water mains and the construction of a ferro-concrete reservoir. Messrs. Taylor, Wallin & Taylor, engineers, Newcastle-upon-Tyne.

Brebner & Co.	£4,247 0 0
Ackland Bros.	3,396 0 0
Jewell	3,099 0 0
Wildgoose	3,027 0 0
Riley & Sons	3,012 0 0
Doleman & Sons	2,967 0 0
Walker	2,928 0 0
Ashley	2,927 0 0
Downham	2,904 0 0
Firth & Co.	2,894 0 0
Mitchell & Son	2,890 0 0
Trentham	2,874 0 0
Clarke	2,870 0 0
J. & J. Warner	2,862 0 0
Barber & Co.	2,862 0 0
Bower Bros.	2,860 0 0
Parker & Sharp	2,827 0 0
Tomlinson	2,795 0 0
Johnson & Son	2,794 0 0
Mackay & Son	2,716 0 0
Bateman	2,713 0 0
Cuncliffe	2,674 0 0
Streeter & Co., Guildford (*accepted*)	2,644 0 0

TAUNTON.

For the erection of a detached residence for the headmaster of Taunton School. Mr. F. W. Roberts, F.R.I.B.A., Taunton.

Pittard & Son	£2,265 0 0
Coles	1,980 0 0
Pollard & Son	1,971 0 0
Spiller & Son	1,970 0 0
Potter	1,949 0 0
Manning	1,894 0 0
Pollard & Co.	1,866 0 0
Moggridge & Son	1,860 0 0
Spiller	1,852 0 0
Small	1,820 0 0
Smith, Taunton (*accepted*)	1,784 0 0

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For excavating for and constructing in concrete the carcassing of the new filter-beds. Mr. E. J. Barrett, A.M.Inst.C.E., Staines.

Kavanagh & Co.	£1,797 15 0
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Jordan	1,585 0 0
Tryhorn & Son	1,548 10 0
Wheeler & Co.	1,548 0 0
Ford	1,541 0 0
Chapman	1,425 0 0
Dixon	1,302 0 0
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Wickstead & Beardsell	1,259 16 0
Bate & Co.	1,237 3 3
Pedrette	1,223 0 0
Watson	1,211 3 6
Fitt	1,187 0 0
Langley & Johnson, Slough (*accepted*)	1,098 0 0

WALES.

For construction of an outfall sewer at Fishguard, Pembroke. Mr. D. J. Wilcox, surveyor.

Williams	£1,503 1 7
Morgans	1,507 7 6
Jackson & Morgans	1,343 13 0
Treglown & Co.	1,394 0 0
Powell	1,296 15 7
Heatherley	1,083 0 0
Dyson & Parfitt	998 0 0
Williams & Farley, Liverpool (*accepted*)	829 14 9

For street works, Stanley Street and Cross Street, Senghenydd. Mr. A. O. Harpur, surveyor, Caerphilly.

Webb & Son	£1,024 13 4
Davies & Lloyd	993 15 11
Rutter	964 1 6
Williams	948 2 9
Morgan, Caerphilly (*accepted*)	923 17 9

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TRADE NOTES.

MESSRS. WM. POTTS & SONS, LTD., Leeds and Newcastle, have received instructions to thoroughly overhaul a large turret striking clock at Denholme, Yorkshire, and fix new illuminated dials. They are also making and fixing a new stable clock in Cheshire.

THE new schools, Derby, for the Royal Institution for Deaf and Dumb, are being ventilated by means of Shorland's patent exhaust roof and special inlet ventilators, the same being supplied by Messrs. E. H. Shorland & Brother, of Manchester.

A LARGE chiming clock with three dials is to be erected on Rangemore church tower, Burton-on-Trent, as a memorial to the late Lord Burton by the inhabitants of Rangemore and neighbourhood. The work has been placed in the hands of John Smith & Sons, Midland Clock Works, Derby, who made the Burton-on-Trent town hall clock twenty-eight years ago for the late Lord Burton.

MESSRS. J. B. JOYCE & Co., Whitchurch, Salop, have received the order for a large quarter clock with two dials for St. Andrew's Church, Droitwich. The same firm have in hand clocks for St. Nicholas Church, Worcester; Deeping St. Nicholas Church, Spalding; Sambrook Church, Newport; Apley Park, Bridgnorth, and also one for the colonies.

AT Kettering it is proposed to build a dual school for 200 boys and 200 girls in connection with the secondary education scheme of the Northants education committee. The capital expenditure was estimated at 17,800*l*., and the annual expenditure 6,000*l*.

CORRESPONDENCE.

[The Editor will not be responsible for the opinions expressed by Correspondents.

Altrincham Baths Competition.

SIR,—It is extraordinary how some public authorities take advantage of competitors, but I think the action of the Altrincham Council in the above beats all previous records: they have returned my drawings in this competition after keeping them for about two years.

Why they should not be satisfied with what they pay for, that is, the winning plans, I do not know; but to retain work they do not pay for seems most unfair and unreasonable.—Yours, &c.,

HENRY GOLDSMITH.

Manchester: March 5, 1909.

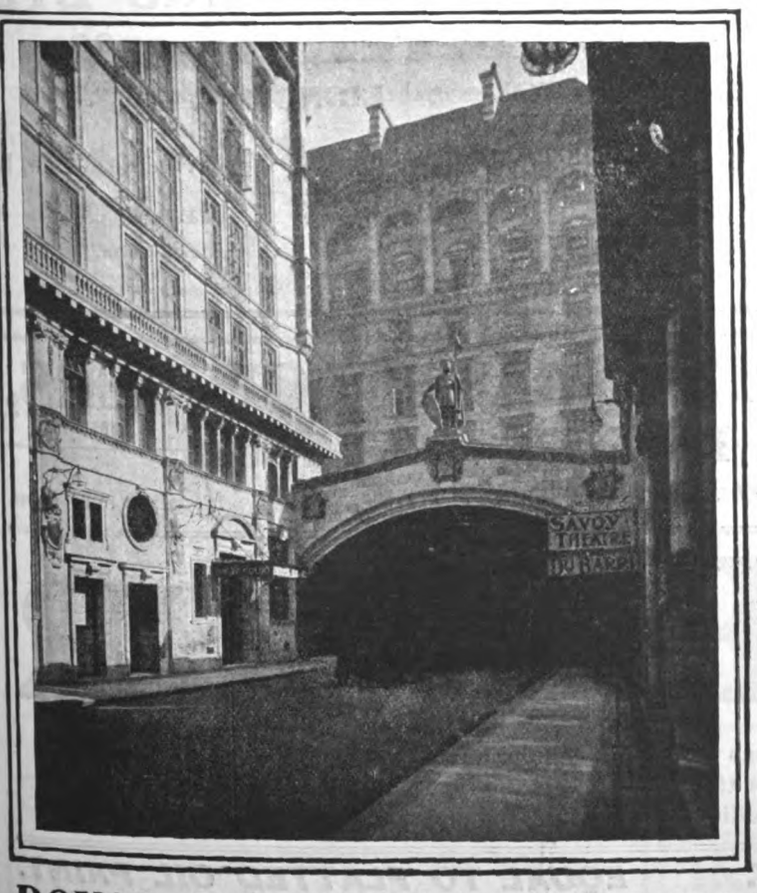
"Stikko?"

SIR,—We take the liberty of addressing you on the subject of ceilings. Our foreign friends have heard of a material called "Stikko," and ask us to procure particulars. They unfortunately can give us no information as to where it is made, and who are the makers, and it has occurred to us that you might be able to help us. We cannot say whether it is English, continental, or Yankee, but through the medium of your paper you may be able to put us on the right tack. Thanking you in anticipation, we are, yours truly,

COWIE BROS. & Co.

Glasgow: March 10, 1909.

AT the last meeting of the Loughborough Town Council a discussion arose on a proposal of the general purposes committee to pay the borough surveyor a fee of 5*l*. for preparing plans and alterations to the drill hall, which is to be used as headquarters of the 5th Batt. Leicestershire Regiment. An alderman questioned whether this was not within the province of the surveyor's duties, and thought that if the surveyor's duties did not include alterations to town buildings it was quite time some agreement in the matter was reached. It was opening the door wide for a pernicious state of things. An amendment to refer the matter back found little support, and was defeated by a large majority, only four voting in its favour.



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VARIETIES.

THE War Office has decided to rebuild the stables and waggon sheds at the Royal Artillery and the Army Service Corps Barracks at Aldershot, at a cost of 25,000*l.*

THE Harrogate Corporation have received the sanction of the Local Government Board for the borrowing of 8,800*l.* for extensions to the Royal Baths.

A PERMANENT shelter for the audiences at the new bandstand in Leamington is to be provided. Both the shelter and the bandstand have been given to the town.

THE five different municipal housing schemes in Sheffield at present in operation have each proved a financial failure, involving a total loss of 6,261*l.*

THE Admiralty have accepted the tender of Mr. A. Carkeek, of Redruth, amounting to about 16,000*l.*, for the erection of Dockyard central offices on a site which is being cleared between Keyham main gate and the R.N.E. College.

THE Dunfermline Town Council have decided to advertise for a burgh engineer, on practically the same conditions as those existing during Mr. W. A. Bell's tenure of office, excepting that the salary offered is 250*l.* per annum.

PLANS for the extension of the Epsom Technical Institute and School of Art have been approved by the county authority and the urban district council. The cost is estimated at 1,300*l.*

THE architect of the Notts education committee has been directed to prepare plans for a school for 450 to 500 children, to act as an upper standard school for Kirkby-in-Ashfield, to be erected on the site in Cemetery road.

UP to March 31 last 22,921 cottages had been erected in Ireland under the Labourers' Acts. The number actually authorised to be erected up to date is approximately 44,000, not including 2,000 which are at present provisionally authorised.

THE City of London Corporation have adopted a report of the general purposes committee recommending the expenditure of 1,150*l.* in providing greater protection and means of escape at the Mansion House in the event of an outbreak of fire. The plans involve the addition of new exits, the erection of iron doors between certain rooms, and the setting up of automatic and other fire alarms.

A RADIUM Institute is to be erected on a site in Riding House Street, Portland Place, as soon as possible, according to plans by Mr. T. P. Figgis, 28 St. Martin's Lane, Cannon Street, E.C.

THE Oswestry Town Council have adopted a scheme for the purification of sewage and the treatment of storm water on land adjoining Maesbury Road. Application is to be made to the Local Government Board for sanction to borrow 6,000*l.* to carry out the scheme.

DUMFRIES Town Council last week considered a report from a committee regarding the proposed erection of a new town hall and municipal chambers. The probable cost was stated at 17,500*l.*, and the committee estimated that to finance it would entail a probable addition of 2½*d.* per 1*l.* to the rates. Consideration of the matter has been delayed for a month.

THE Westmorland County Council at their annual meeting on the 5th inst., framed a new bylaw with a view to preventing unsightly advertisements and hoardings, and a number of places were scheduled where such advertisements and hoardings cannot be placed, the only condition being that where they already exist they shall cease to do so at the expiration of five years.

THE Teignmouth Urban Council have decided to pay Mr. H. Jackson, A.M.I.C.E., for advising the Council in regard to the waterworks contract, a retaining fee of 26*l.* 5*s.*, 3*l.* 3*s.* a day for preparing the necessary statements, and a further fee of 26*l.* 5*s.*, and 5*l.* 5*s.* a day for preparing for and giving evidence in arbitration or other legal proceedings if such were taken.

A CORRESPONDENT of the *Scotsman* writes:—Notwithstanding all that has been said about the use of Norwegian granite at the Rosyth Naval Base, I am in a position to state that Messrs, Easton Gibb & Co., the successful offerers for the construction of the docks, have so large a financial interest in the Rubislaw granite quarries, in Aberdeenshire, that there is no doubt that a large quantity of home granite will be shipped from the Dee to the shores of the Forth. It is believed that the whole of the output of the quarries at Rubislaw will be utilised, and that, if that is not sufficient, the products of other quarries in Aberdeenshire will be drawn upon.

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THE Brentwood Urban Council have passed a formal resolution approving of the amended estimate of Messrs. Willcox & Raikes for the drainage scheme. The original estimate of the scheme was 20,000*l.*, but it was thought advisable to make more provision for increase of population, and the 1,500*l.* increase is for the extra cost of the filtering beds.

SIR W. P. HARTLEY, of Liverpool, announced on Tuesday at the annual meeting of the Liverpool Maternity Hospital and Ladies' Charity his willingness to build a new maternity hospital with seventy-five beds (fifty for patients and twenty-five for the staff and pupils) for the service of the poorer people of Liverpool. The hospital will cost about 15,000*l.* The committee must find the site and an endowment fund of 20,000*l.*, limited to fifteen years must be raised.

THE designs submitted by Messrs. George Baines & Son, of 5 Clement's Inn, Strand, London, W.C., have been adopted for the New Southgate Christ Church Congregational church and institute, and the church section is to be proceeded with at once. The block is designed in late Gothic freely treated; a bold square tower is the main feature at the corner. Red-brick facings and stone dressings are to be used. Accommodation for about 600 persons will be provided.

MR. C. J. DAWSON, in his capacity as consulting architect to the Barking Urban Council, has been instructed to report upon (1) the capability of the present hospital site, as regards the proposed extensions; (2) the approximate cost of purchasing additional land adjoining the present hospital site; and (3) the advisability of removing the hospital from its present site to a new one of sufficient area to allow for the proposed extensions.

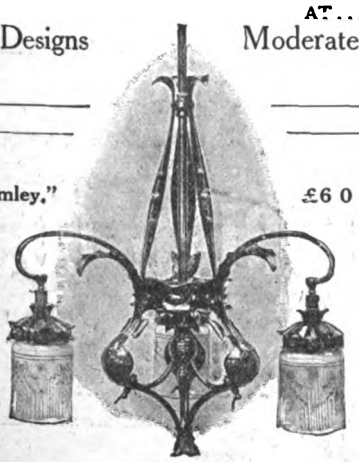
AT the request of the Local Government Board Mr. C. H. Priestley, waterworks engineer at Cardiff, has prepared a report upon afforestation at the Corporation waterworks in the Brecknock Beacons. The report states that some eight to ten acres of the mountain side of the Beacons reservoir was planted in 1906, and considerable loss had taken place there, but on the whole the trees were doing fairly well, considering that the situation was 1,400 feet to 1,500 feet above sea level. All the seedlings planted at Cwmtaff came from abroad, but he hopes that in future they will be obtained from local sources, as there is less loss with local seedlings.

AN interesting case under the Workmen's Compensation Act came before his Honour Judge Ingham in the county court at Evesham. Mrs. Mawson sued the Evesham Borough Council for compensation by reason of the death of her husband, Robert Collett Mawson, who had been borough surveyor for twenty-five years at a salary of 190*l.* a year, and had died in April last, leaving a widow and two young children. Counsel for claimant said that in January 1908, Mr. Mawson had to superintend the cleaning out of a most offensive pond in the recreation ground, which seemed to have been a rubbish shoot for the town, the contents including dogs, cats, tin cans, and vegetable matter. This affected his health, and he consulted a doctor on March 5, who attended him until his death. Dr. Gordon Evans said that Mr. Mawson suffered from severe laryngeal ulcerations due to septic poisoning. The cause was micrococci, which he had inhaled not more than two months before March 5. His Honour dismissed the application with costs, considering that the point was covered by the decision in the Court of Appeal where a workman failed to recover compensation for enteritis contracted while working in a sewer.

Now that public attention has been attracted to the subject of the country's defence, it may be of interest, a correspondent writes, to note the attitude of a great mercantile firm like the Royal Exchange Assurance to the question in past years. The corporation has been carrying on business for close on 200 years. A large part of their records were burnt in the destruction of the Second Royal Exchange in 1838. When England was in a ferment in 1798, fearing an invasion by Napoleon, a large contribution was made amongst the staff of the office towards the "Voluntary Contribution for the Defence of the Country," and in 1815 a substantial donation was made to the Waterloo subscription, while during the trying period succeeding the Indian Mutiny a fund was raised for the sufferers. To come to a more recent date, the corporation was well represented in the South African War, while the recent notice that the directors afford every encouragement to their staff serving in the Territorials, will keep their appointments vacant in the event of mobilisation, and have made money grants to cover the necessary expenses in the days of the Volunteers, are evidences that the attitude of the great business houses to the subject of national defence is as sympathetic as that of our predecessors.

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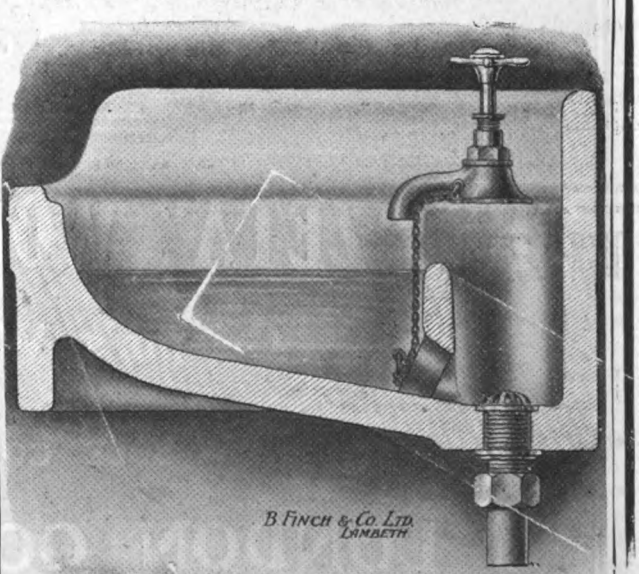
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HORSE GUARDS IMPROVEMENTS.

IN the House of Commons on Monday the First Commissioner of Works was asked whether his attention had been drawn to a scheme which was being put forward for alterations on a large scale in St. James's Park and the Horse Guards Parade; whether it had been submitted to and considered by him; and whether he had any intention of adopting or recommending these alterations.

In his reply Mr. L. Harcourt said:—I have seen some reference in the Press about this scheme, but I have received no official representation on the subject. I am sure my hon. friend and other members will be relieved to hear that I have not the slightest intention of doing anything to destroy the historic associations or the present beauties of one of the most charming of the London parks.

This statement was received, we are told, with "loud cheers." It would be interesting to discover how many of those present in the House had given any attention to the scheme proposed by Mr. F. W. Speaight for the improvement of the shapeless Horse Guards' Parade and the eastern half of St. James's Park. The First Commissioner apparently has made up his mind to condemn a scheme before he has in any way gone into it. The parade ground at present is shut off from St. James's Park by mean-looking railings. The proposal is to clear these away and construct a semicircular stone platform of impressive dimensions with the historic Achilles statue as the key stone, to finish the review ground. From its centre, running straight to Marlborough Gate, Mr. Speaight would then construct a broad, stone-flagged promenade, with a canal 40 feet wide and 500 feet long running through the middle. A series of semicircular recesses in the clipped hedges on either side of this broad walk would afford space for a series of military or historical statues, twelve of which would be removed from their present positions in various parts of London.

Messrs. J. Leaning & Sons estimate the cost of the scheme, including the purchase of nineteen new statues and the removal of twelve others, to be 58,750*l*., and they consider it could be completed in twelve months.

Mr. F. W. Speaight has been assisted in the architectural treatment by Mr. C. E. Mallows, F.R.I.B.A. The result of their joint labours is most satisfactory, and it is only to be hoped that the powers that be, or the powers that are to be, will not refuse to consider the scheme under the delusion that by so doing they are heroically saving the country from the Philistines.

MESSRS. FREDERICK WHEELER, SON & SEARLE, of 6 Staple Inn, London, W.C., have removed to 7 Stone Buildings, Lincoln's Inn, London, W.C., to which address all communications should be sent.

THE general purposes committee of the Middlesbrough Corporation recently considered a report by Mr. H. M. Taylor, the borough electrical engineer, on a proposed system of trackless trolley tramways. The route he suggested was a circular one of two and a half miles, which he estimated could be constructed at a capital expenditure of 12,000*l*. The estimated running cost would be 7*d*. per mile. It was decided to have the report printed and circulated amongst the members of the Corporation. An extensive system of track electric cars is at present run in Middlesbrough by the Imperial Tramways Company.

THE Dean of Winchester has received a letter from the consulting engineer, Mr. Francis Fox (Sir Douglas Fox & Partners), in which he states that he visited the work, and finding that a drift under the north wall of the chancel was nearly ready for inspection, made an examination under water. The depth of water was only 5 feet, the thickness of the peat 3 feet, thus showing that the level of the gravel bed is high at this point. The peat was of the same density and gravity as before, and the gravel-bed similar to and as good in quality as that in the previous drifts. The length of the excavation was 15 feet and the width 9 feet. The steel rods and girders are in place, and as soon as the Horsley Company send the few remaining bolts and angle plates they will all be finally tightened up and concreted and grouted in. A very great improvement has been effected amongst the disintegrated masonry of the north and south gables of the transepts, and none too soon. It was particularly interesting to see how thoroughly the grouting machine has done its work. On cutting into the wall to fix a loose stone, the crack could be seen completely filled up with cement. Every day is now rendering the cathedral safer and stronger than it has ever been.

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A TREASURE ISLAND.

IT is nearly two years since it was first announced that the Chartered Bank of India, Australia and China proposed to pull down Crosby Hall in Bishopsgate Street, E.C., and to erect bank premises on the site. Strenuous efforts were made to save this fragment of mediæval London but to no purpose. This development seems the climax to the chequered career of the structure during the 450 years which have elapsed since its erection by Alderman Sir John Crosby. At first a town mansion, then a royal palace, a prison, an embassy, a Presbyterian chapel, a warehouse, a concert hall, and finally a restaurant. This historic monument is, however, to be re-erected in Chelsea, and doubtless will endure for yet another four centuries. There is something appropriate in the new use of the site as a bank. Such an enterprise would have appealed to the merchant prince who helped to build up the commercial greatness of London.

Sir John Crosby amassed a considerable fortune as a grocer and woolman; in addition he was a public man on the approved civic lines, for he attained the dignities of alderman and sheriff, and was warden of his company. On his death the house was purchased by the Duke of Gloucester, who there hatched many dark schemes prior to his accession to the throne as Richard III. Its connection with the business life of London was re-established later when it was tenanted by a succession of wealthy merchants.

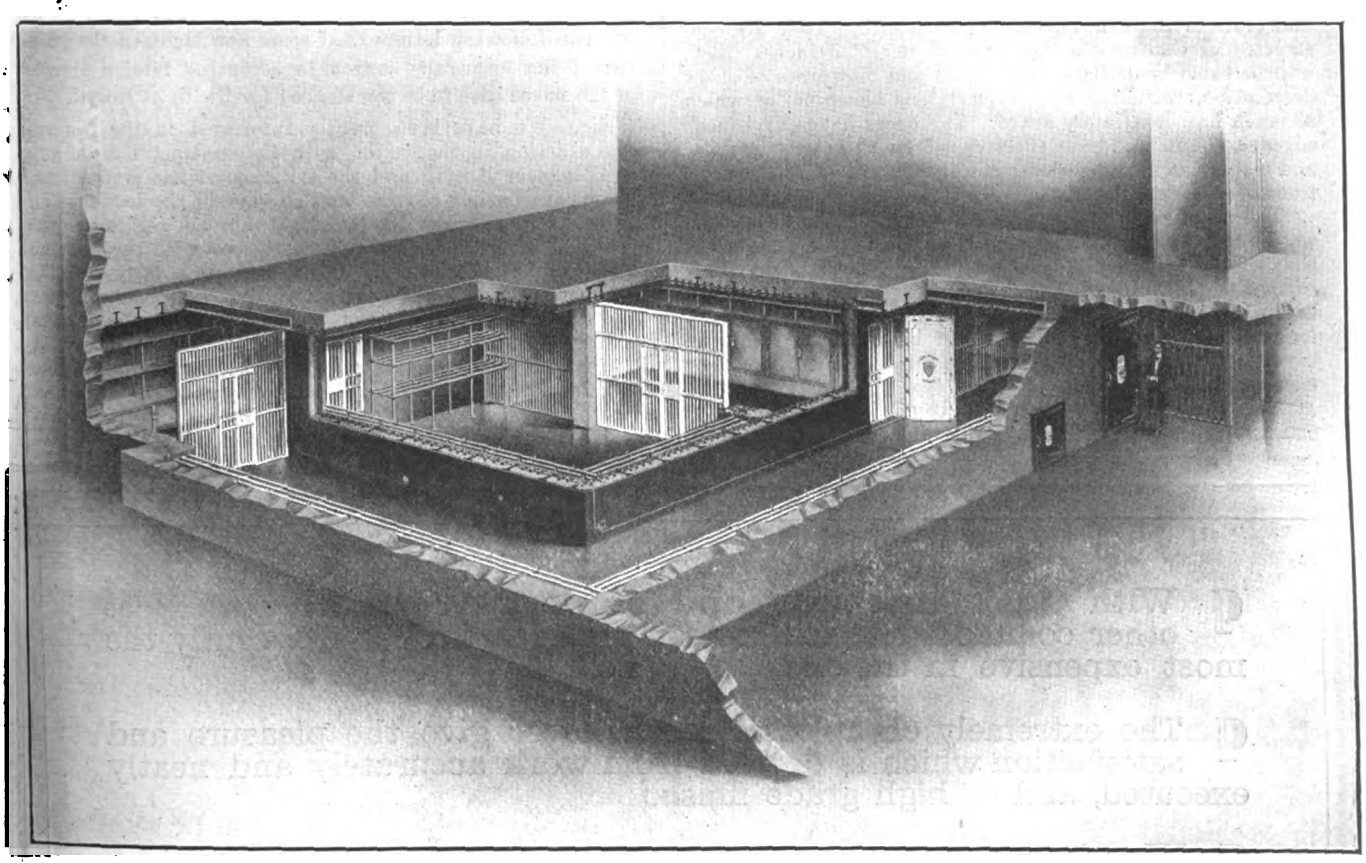
This long and distinguished connection with commercial London will be continued in its new use as a bank, having dealings with the East. The Orient has ever been the playground for imaginations that wish to run riot in pictures of limitless wealth of Indian nabob, Chinese mandarin, or Persian prince. All this comes within the range of the Chartered Bank, and in addition they tap the immense resources of Australia. The responsibility of safeguarding the treasure that comes to London from the East was vividly brought home to us by a recent visit to the underground portion of the Bank's new premises, where the strong room installation or stronghold is situated. The kernel, so to speak, of the stronghold, is a burglar-proof island strong room, a veritable "treasure island." The stronghold is situated in the sub-basement, and access to it is by the principal staircase, and by a lift direct from the banking room to its main entrance.

The general arrangement and construction are shown by the accompanying sectional perspective view, from which it will be seen that the burglar-proof steel strong room or "treasury" stands in the centre of a larger fireproof room.

The "treasury" is 32 feet 8 inches long by 25 feet 5 inches wide, and the outer or fireproof room is 55 feet long by 45 feet wide. The "treasury" is therefore surrounded on all sides by a fireproof corridor about 10 feet wide. The corridor is fitted with steel cupboards and shelving for books and documents, and the "treasury" with similar fittings for cash, securities, customers' boxes and other valuables.

Many obvious advantages result from this arrangement. The available space is most advantageously and economically utilised; control and supervision of the strong room and its contents are rendered easy and almost automatic, and the daily use of the surrounding corridor in the ordinary course of business ensures that the duration of any attack upon the "treasury" cannot exceed the time during which the bank is closed to the public. The structural advantages are still more important. The "treasury" (the steel roof of which extends over the corridor and engages with the outer walls) is in effect a central column of enormous strength capable of supporting the roof of the stronghold in the event of the collapse of the whole building in a fire. In these days of tall and heavy buildings, great structural strength has become the first essential in a bank stronghold, and this is effectively and ingeniously secured here.

After affording protection against fire, there comes the question of burglary. The burglar is limited as to the time at his command, and by the fact that he can only avail himself of portable appliances. A generation ago he was also restricted to the amount of power or energy which human muscles can develop. Now science has lent him her aid, and to-day he avails himself of stored energy in many forms, including the higher explosives (such as dynamite, nitroglycerine), acetylene, compressed oxygen, and the electric current. In the place of old-fashioned mechanical appliances, he has now an armoury of effective weapons furnished by the skill of the engineer, the chemist, and the electrician.



It is not however sufficient to provide against the methods in use to-day. Science makes constant progress, and in work of this permanent character it is needful to allow a sufficient factor of safety to ensure, as far as the limitations of human foresight permit, that it shall be adequate for future generations.

All these conditions are fully met in the stronghold of the Chartered Bank. Descent to the sub-basement can be made by the lift shown at the right-hand side of the illustration, which is close to the main entrance of the stronghold. This is guarded by one of Chatwood's patent strong room doors of massive construction, and by grille gates, the latter for use during the day.

This entrance opens into the fireproof corridor, fitted with shelving and cupboards for books and documents, and sub-

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divided by steel grilles and gates. The facilities for convenient arrangement and ready access to books and documents so essential to the rapid transaction of business are very striking, not less so the excellent lighting and ventilation.

Interest however centres itself on the "treasury." This is, it is hardly necessary to say, of great strength and massive construction. It is built throughout (walls, floor and roof) upon Chatwood's self-contained and "interlocking rail armour" principle. This consists essentially of two steel rooms, the one built within the other, and the two braced together by steel girders, thus forming a complete box girder. The interlocking rail armour is upon the outer surface of the inner wall. It consists of steel flange rails rivetted to the inner plates with double-headed steel rails keyed between them. The cavities and interstices are filled with specially prepared granite and cement concrete. The walls are 11 inches thick. A structure of great strength and rigidity is thus obtained, and both the mass of metal and its ingenious arrangement render it secure against all descriptions of cutting, burning, or forcing apparatus as well as against explosives.

The "treasury" has two entrances and is divided internally into two sections by a steel grille with gate. The entrances are so placed as to allow of through ventilation during the day. The doors are of special interest as well as of vital importance, and are a splendid example of the art and craft of the safe maker and locksmith. They are constructed of Chatwood's "intersected steel" 3 inches thick, unpenetrable by drills, cutting tools and blowpipes of every description, including the oxy-acetylene blowpipe, of which so much has been lately heard. The doors have curvilinear edges, a simple and most effective safeguard against wedges, and patent solid flange lockcases, which defeat all descriptions of screw and lever.

The main boltwork consists of an arrangement of Chatwood's claw bolts, which effectually dovetail the door into the body of the room. The bolt mechanism is secured by their composite multiple-point lock and changeable key lock, the keys of which can be changed without the intervention of a locksmith. The keyholes are closed by eccentric revolving key-hole plugs, which are in turn secured by their combination letter lock.

As the "treasury" with its extended roof, doors and fittings weighs some 400 tons, its erection in a sub-basement has been a difficult undertaking, but it has been carried out without a hitch or interference with the general progress of the building.

All the parts of this huge safe fit with an accuracy which a watchmaker might envy, and the finish of the whole is admirable. The ventilation is such that the staff can work in any part of the stronghold with the same comfort as in the banking room itself.

The work has been carried out by the Chatwood's Patent Safe and Lock Company, Ltd., from the designs of S. R. Chatwood, M.I.Mech.E., who has superintended its construction and erection. One expects much from Chatwood's, but in this case they appear to have done more than justice to their long-established reputation for sound design, strong construction, and fine workmanship. The results of their research and invention during fifty years seem to be brought to a focus in the design of the Chartered Bank stronghold, which affords a satisfactory solution of one of the most complex problems in engineering practice.

The Bank are to be congratulated upon the possession of a stronghold in every way well suited to the purposes of a large banking business.

THE ROSYTH CONTRACT.

THE two following letters shed some new light on the question of the Admiralty action in accepting foreign granite for the naval base to be commenced forthwith at Rosyth:—

Sir,—We have been greatly interested in the Government's action in connection with the contract for the new naval base at Rosyth and the criticism it has evoked from various responsible parties, and in view of the fact that an erroneous idea seems likely to get abroad regarding the ability of English quarry masters to cope with the work we are desirous that matters should be explained fully. In the first instance, when the contractors who were tendering for the work sent out schedules to various English and foreign producers, they were asked to quote alternative prices for British and foreign granites. It must be mentioned here that the substantial and primary reason why Norwegian granite can be produced cheaper than British granite is that the Norwegian quarries are more favourably situated for

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obtaining the stone. In most of the British quarries, notably Aberdeen and Cornwall, the stone is below the surface, and a great deal of labour and capital has to be expended before the quarry can be put into a position to obtain blocks of the sizes required for dock work, &c., whereas in Scandinavia all this cost is saved—the granite lying upon or very near the surface—and in many instances extending over a large area and lying adjacent to the deep waterways or fjords. Thus, at the outset, the Scandinavian firms have an advantage over the majority of the British quarries. Now, it has been stated that, apart from the difference between the cost of Norwegian and Aberdeen granites the reason for placing the order abroad is that the only English firm who could have taken over the work and completed it within the required time is full up for the next two or three years. We must enter our protest against this statement. There are, it is true, only two places in England where the work could have been taken over and executed successfully, one in Cornwall (which, as stated, has sufficient work for the near future), the other, our own quarry, situated at Shap, in Westmorland. A great deal has been made of the difference between the British and foreign prices, but we claim that we could undertake to supply the whole of the granite required well within the time limit at a price equal to, or within a reasonable margin of, the working price of the foregn granite. We can do this and guarantee to be paying the rate of wages recognised in the trade as the standard for the particular class of work for which that rate is paid, because we have a quarry more accessible for working than any other British quarry, one which can—as we can prove—produce larger blocks than any other quarry in the kingdom with greater ease—a quarry with a working face of granite half a mile long and 50 to 60 feet high, with an almost inexhaustible supply of material, and which is equipped with the most powerful cranes and the most modern labour-saving appliances known to the trade. You will doubtless think it strange that, with all these facilities, we did not submit our tender when requested to do so by the contractors, but the explanation is not far to seek. We are, unfortunately, situated in a position where our only outlet is by rail; we are controlled by the rates charged for carriage by the amalgamated railway companies of the country, and we are so hemmed in by the rates that it is impossible for us to compete successfully in contracts where foreign granites can so easily be procured and carried. The saving we should effect in the working is counterbalanced by the additional cost of transit, this latter proving an effectual bar to our successful competition against foreign granite. We wonder if your readers are aware what is being done in such circumstances for our Continental competitors. We suppose not. Take the attitude of the Continental Governments who, under such circumstances and such conditions, purchase the material at the quarries and make their own arrangements as to carriage, the latter charge being merely a nominal sum for a considerable distance, thus keeping their huge quarries and works employed and money circulating in their own country. The foreign Governments have recognised that if their people are to be fully employed and their commercial prestige advanced, they must help the many industries to compete successfully in other markets, and thus they are ousting home productions in nearly every trade. Now we come to our point. If the British Government would follow the example set by the foreign Governments and lend their aid to getting the granite conveyed from our quarries to Rosyth at, say, the same cost as it would take to bring the material from Scandinavia, there would be no need for the order to be placed abroad. The work could be done in England by skilled workmen, and provide a means of livelihood for many hundreds of people, as the entire population of Shap village (nearly 2,000), and many from neighbouring villages, are dependent solely upon the Shap granite quarries and works for their existence, apart from the fact that the work would be undertaken on competitive prices and the money paid and be circulated entirely in the country. We might mention that the granite for the Southampton Docks was supplied some years ago from our quarries, and amongst recent contracts which we have executed are the Heysham Docks for the Midland Railway Company, the large granite blocks required for various railway extensions in the North of England, while we are now shipping a large consignment of our granite to South America for dock and railway work there.

We trust you will pardon the length of this letter and its encroachment upon your space, but we think it only fair to the public (who will in the long run have to bear the cost) that they should be aware what are the conditions which

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prevent English quarry owners from entering into competition for work of this nature with any possibility of being successful.

We are, dear Sir, yours respectfully,

THE SHAP GRANITE CO., LTD.

Albert Square, Manchester: March 1, 1909.

Sir,—In view of the great interest which is being displayed and the controversy which is taking place both in the House of Commons and in the Press as to the use of Norwegian granite in this country, more particularly for the new contract at Rosyth, we feel it is incumbent upon us, being largely interested in two Scandinavian companies, and also being interested in several British granite quarries, to place the actual facts before the public from an unbiassed point of view, which we are in a position to do having interests on both sides.

Let it be understood, in the first place, that in this country the sources or districts from which granite is obtainable are limited, particularly so for large blocks. On the other hand Nature, which has favoured most countries in some respects, has provided Scandinavia with the finest deposit of granite in the world, of varying degrees of hardness and many different shades of colour, especially suitable for paving, architectural, monumental, and dock work, to such a degree as to place it beyond comparison with any other country in Europe, and probably in the world. These deposits of granite lie in level beds in varying thicknesses, and it is possible to obtain any size of block required and in any quantity—for instance, we could cut all the granite required in the Rosyth contract from a small portion of one of our quarries alone, as also could others, and we should like to emphasise the fact that this work would be undertaken by British workmen whom we sent out during the period of depression in the granite trade here, and who are so satisfied with their earnings and the conditions under which they labour that they have settled in Norway.

It has been stated in some papers that the wages earned by the dressers, or stone workers, in Norway only amount to a few "ore" (or pence) per day; others have termed it "sweated" or "convict" labour, but there is no truth whatever in these statements. The Norwegian and Swedish quarrymen are quite as well paid, if not better, than the English stone-dressers, their average wages being from 6*s.* to 8*s.* per day, and these rates are controlled by the respective trades unions.

It has also been stated that Scandinavian granite is not so good or so durable as British. This is incorrect, and the impression is no doubt conveyed by the only experience of Scandinavian granite being of one of the inferior classes. Let us here say that you can obtain in Scandinavia the hardest granite for setts and kerbing, the latter in lengths which it is absolutely impossible to quarry in any other country. Moreover, from the variety of the granites to be obtained Scandinavia is unequalled as a source of output for material for decorative, art, or building purposes.

It is merely a case of natural advantages, and quite apart from the question of labour, which does not enter into the matter at all, as in addition to the advantages enumerated above, the Scandinavian quarries lie alongside the fjords—which are deep waterways—where steamers can practically load at the quarry under the cranes without any cost of intermediate transit. Contrast these with the only two well-known competitive British districts, Cornwall and Aberdeen. In both these districts the blocks have, first of all, to be quarried at a depth of one or two hundred feet, hoisted to the top of the quarry, and placed in positions for the masons to work, and when ready for despatch have to be loaded into wagons, carted three miles or more to the quay, loaded from the wagons into the steamers, all of which tends to make the prime cost of Aberdeen or Cornish granite much in excess of that obtained from Scandinavia.

We trust that this explanation will enable the public to grasp the true position, and see that many of the statements already published are quite the reverse of the true facts, and very prejudicial to the well-being of many British subjects, as well as to an industry which has provided the means for the better paving of most of the important thoroughfares in this country.

We are, dear Sir, yours respectfully,

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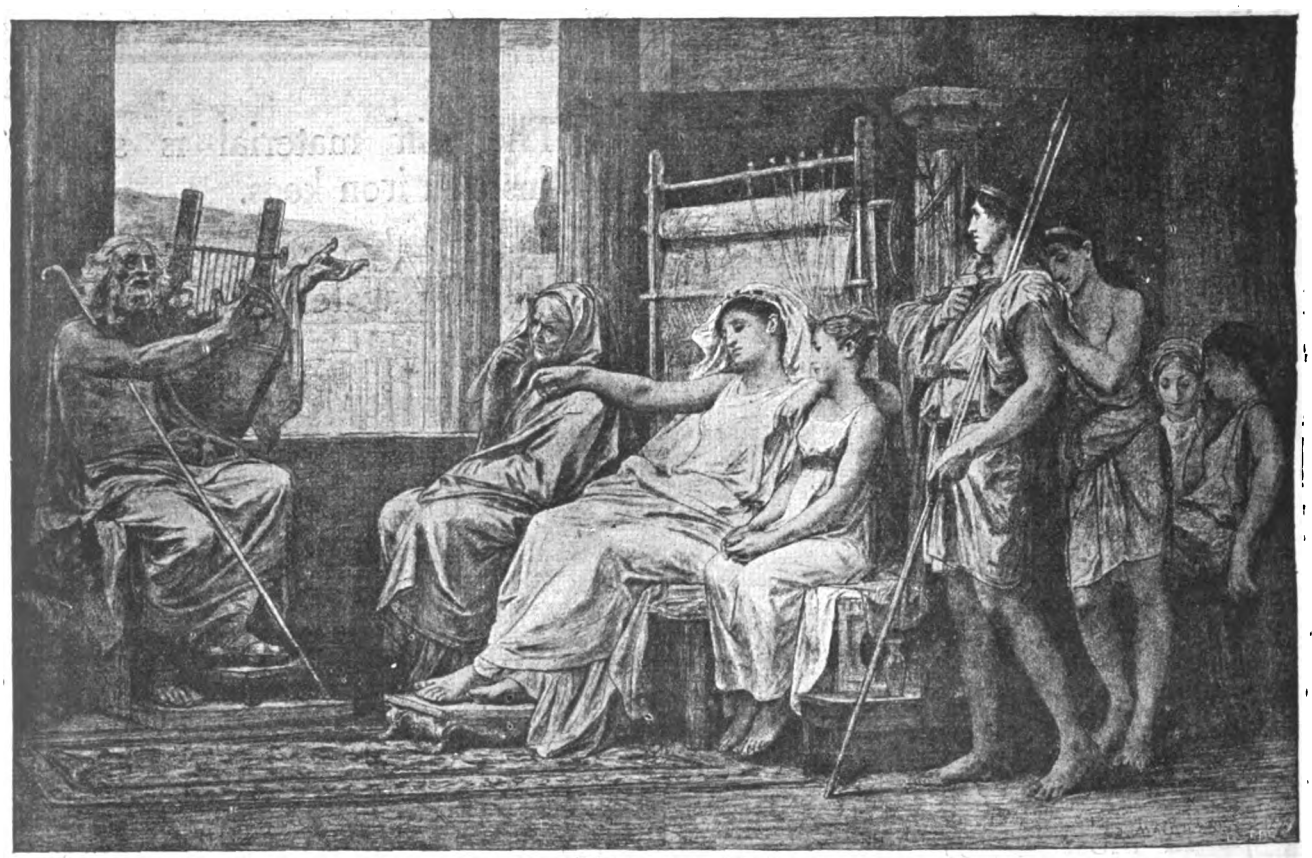
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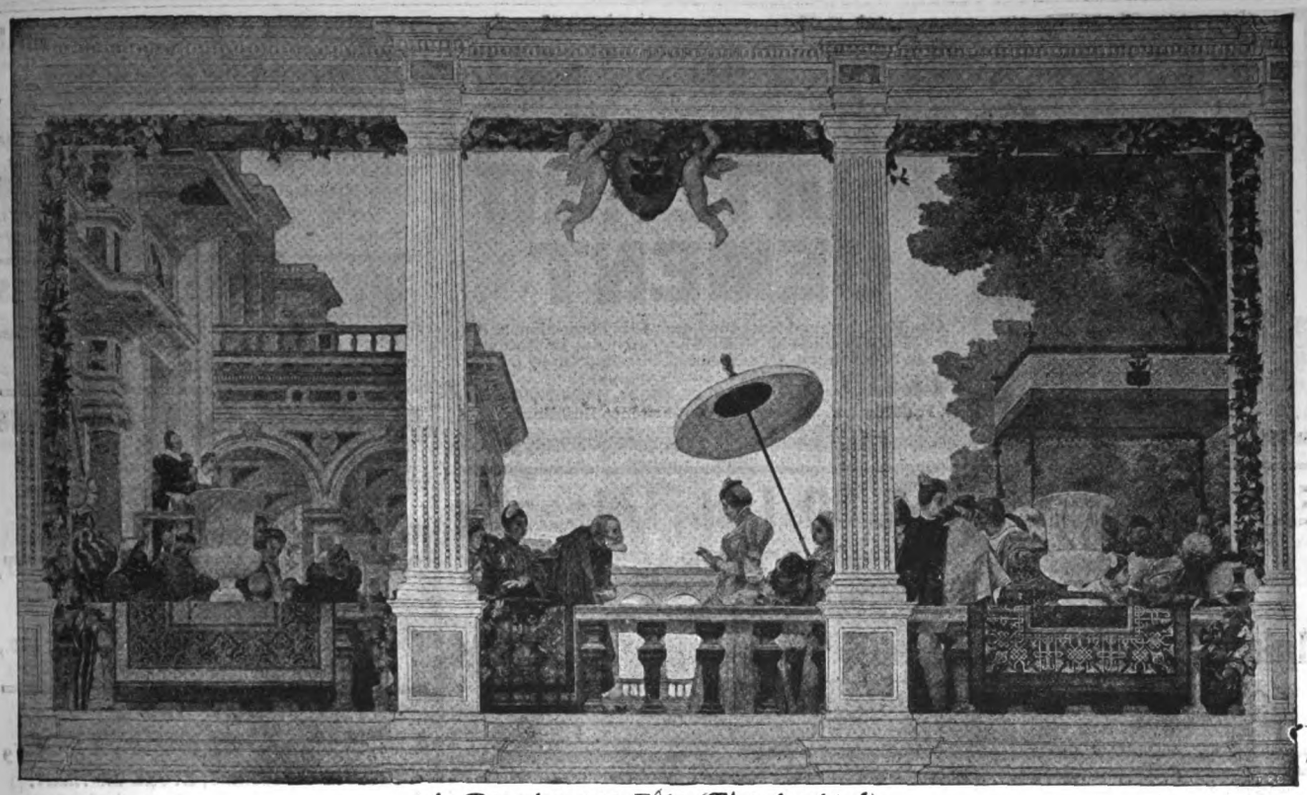
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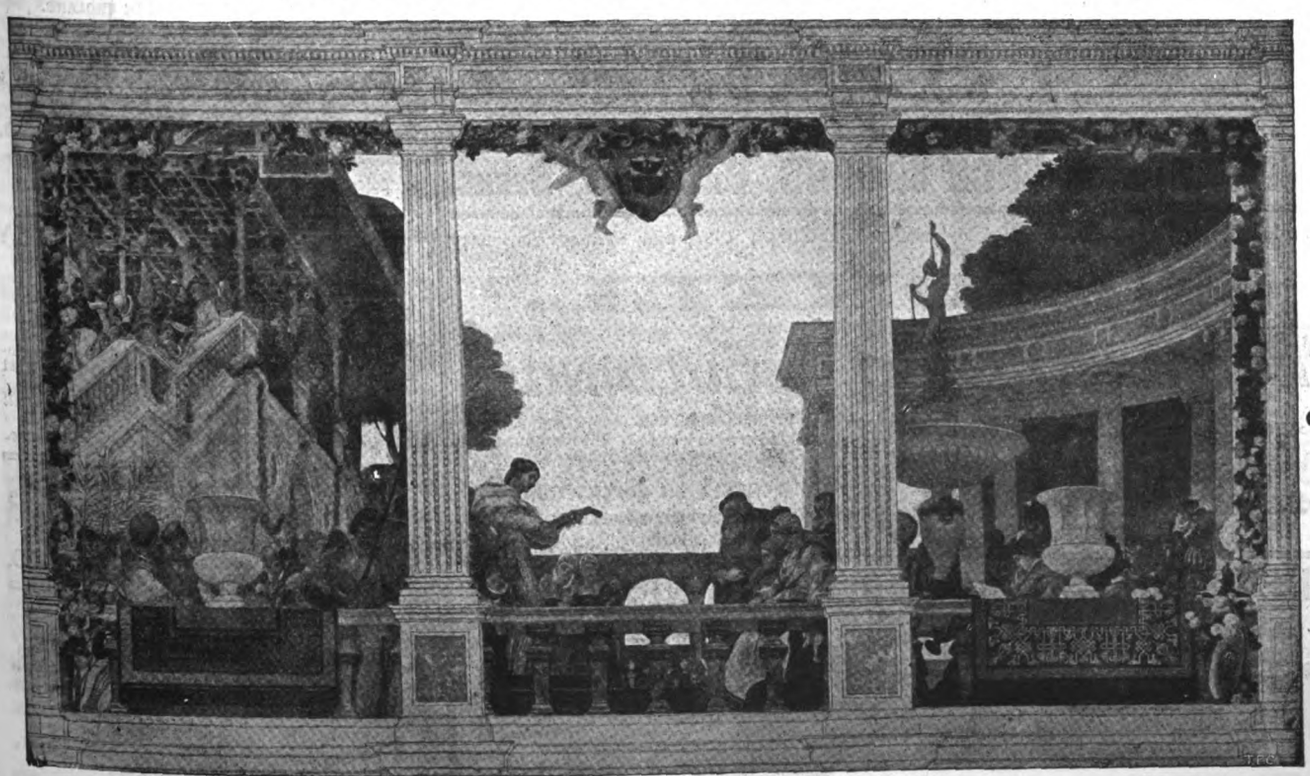
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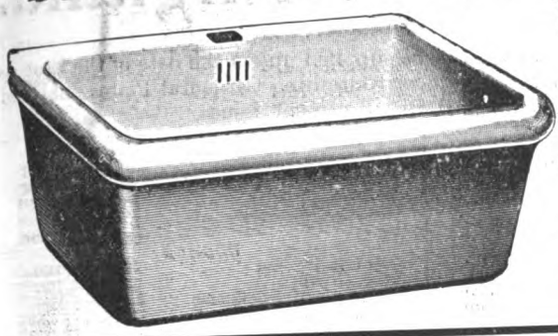
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ST. ALBANS.

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Cathedrals and Abbeys of England—continued.

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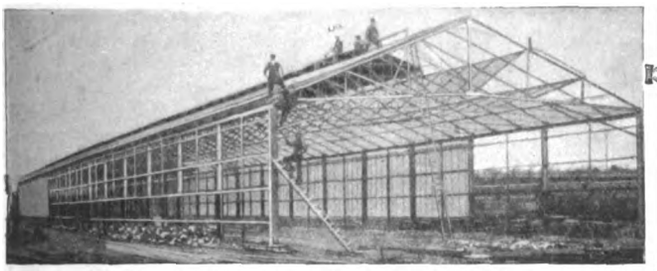
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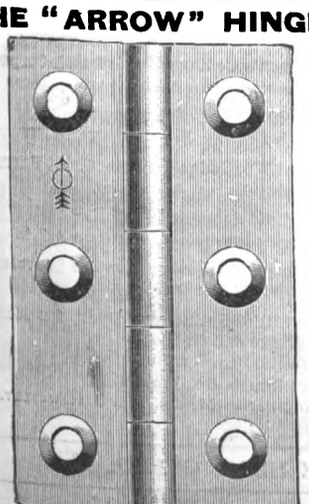
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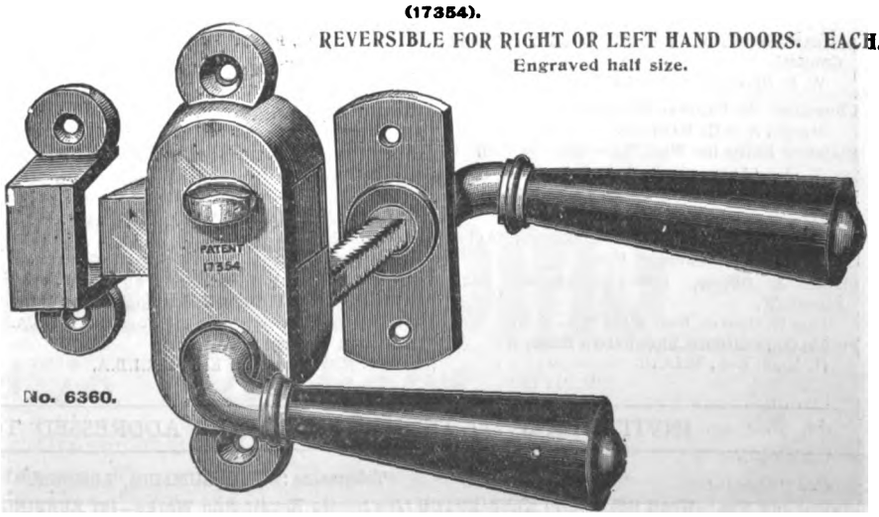
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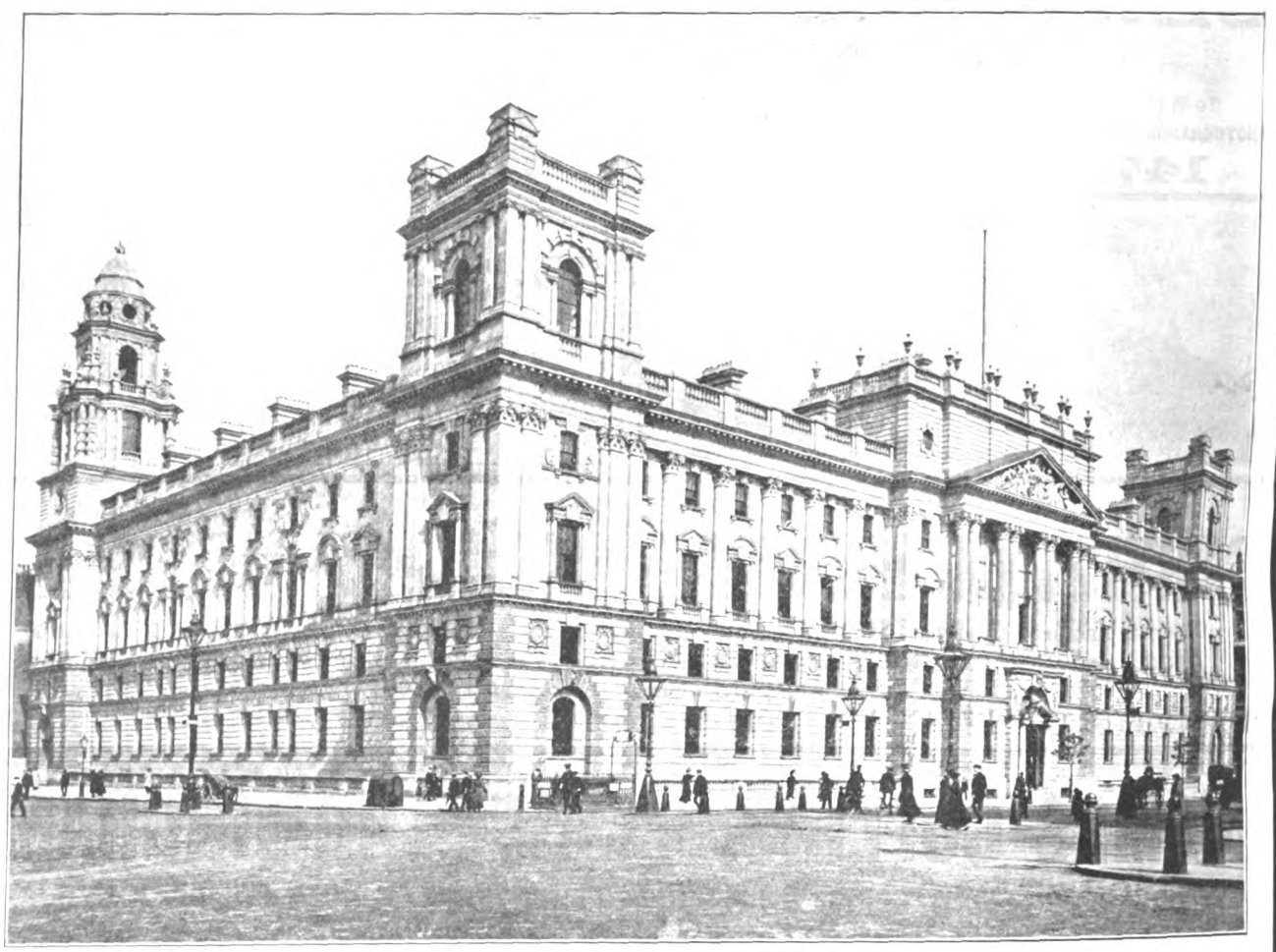
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EDITORIAL NOTICES

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

**** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

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BINGLEY.—March 29.—For erection of a training college at Bingley, Yorks. The West Riding Architect, County Hall, Wakefield. Deposit 1*l.* with the West Riding Treasurer, County Hall, Wakefield.

BLACKAWTON.—March 24.—For erection of a dwelling-house and post office. Mr. J. L. Life, Post Office, Blackawton, Devon.

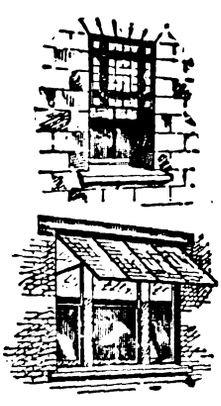
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Dewsbury.—April 6.—For the mason, joiner, plumber, slater, plasterer, painter, heating and electric lighting engineer's trades in Nurses' Home. Messrs. W. Hanstock & Son, architects, Branch Road, Batley.

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Edinburgh.—April 7.—For the equipment and complete fitting up of the new slaughter-houses at Gorgie. Deposit 5*l.* 5*s.* Mr. J. A. Williamson, A.R.I.B.A., Public Works Office, City Chambers, Edinburgh.

Elland.—March 26.—For the various works required in erection of three shops at Elland, Yorks. Mr. C. H. Petty, architect, 12 Waterhouse Street, Halifax.

Gloucester.—April 2.—For erection of county offices and alterations to the Shire Hall. Mr. Robert Phillips, consulting surveyor, Shire Hall, Gloucester.

Golborne.—March 27.—For alterations and additions at Parkside Mill School, Golborne, near Wigan. Deposit 2*l.* Mr. Henry Littler, county architect, 16 Ribblesdale Place, Preston.

Goole.—For erection of a building to contain sulphate of ammonia plant at the gas works. Mr. W. A. Burton, engineer and manager, Gas Works, Goole.

Hinckley.—April 6.—For erection of public baths at the rear of the Council Offices. Deposit 2*l.* 2*s.* Mr. E. H. Crump, A.M.I.C.E., engineer and surveyor, the Council Offices, Hinckley.

Hull.—March 24.—For the construction in reinforced concrete of a swimming pond 90 feet by 35 feet, together with sub-structure of main building 109 feet by 76 feet, including foundations, floors, gallery and main walls to gallery level. Deposit 1*l.*; charge for plans, 5*s.* Mr. A. E. White, M.I.C.E., city engineer, Town Hall, Hull.

Ireland.—March 22.—For erection of a station building, 60 feet by 11 feet, of timber, with slated roof, at Milford, about 2½ miles from Armagh, for the Castleblayney, Keady, and Armagh Railway Company. Mr. W. H. Mills, engineer-in-chief, G.N.R. (I.) Co. Amiens Street Terminus, Dublin; or, the District Engineer, Belfast.

Ireland.—March 22.—For erection of a building on the site of the Union Hall, High Street, Carrickfergus. Messrs. Samuel P. Close & Son, architects, 13 Donegall Square North, Belfast.

Ireland.—March 23.—For building additional offices in connection with the Armagh county courthouse, at a cost not exceeding 750*l.* Mr. Joseph Atkinson, county secretary, County Courthouse, Armagh.

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Ireland.—March 29.—For the construction of seventy-five habitations, at Glasthule, Kingstown. Bills of quantities (deposit 1*l.* each) for one unit, containing six habitations, have been prepared. The Surveyor's Office, Town Hall.

Ireland.—April 1.—For reconstruction of a coal store and building of a boundary wall at the Armagh gas works. Deposit 10*s.* Mr. James Whimster, engineer, Gas Works, Armagh.

Ireland.—April 1.—For alterations at the Town Hall, Ballsbridge. Mr. J. C. Manly, clerk, Town Hall, Ballsbridge, Pembroke, co. Dublin.

Ireland.—April 2.—For the erection of a sanatorium at Crooksling, Brittas, co. Dublin. Deposit 2*l.* Mr. G. T. Moore, architect, 1 & 2 Foster Place, Dublin.

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KEDINGTON.—April 2.—For works at Kedington workhouse, near Haverhill, as follows, for the Guardians of Risbridge Union, viz.:—Sinking a well, erecting a pump-house, supplying a pump, shafting, &c. Mr. G. E. Mitchell, Ashen Road, Clare, Suffolk.

LEEDS.—March 24.—For erection of shelters to bowling greens at various parks, and cricket pavilion at Roundhay Park; repairs and painting works to Cobble Hall; and supply of shoulder boards, &c., and of stone flags for cemeteries. Mr. W. T. Lancashire, Municipal Buildings, Leeds.

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LIGHTCLIFFE.—March 26.—For erection of a house at Lightcliffe, Yorks. Messrs. Joseph F. Walsh & Graham Nicholas, F.R.I.B.A., Museum Chambers, Halifax.

LONDON.—March 23.—For the extension of the existing stables and repairs to the roof thereof at the Islington Council's Depôt, Liverpool Road, N. Deposit 2*l*. 2*s*. Mr. J. Patten Barber, borough engineer, Town Hall, Upper Street, N.

LONDON.—March 25.—For erection of two house coal stores at the Eastern Fever Hospital, Homerton Grove, Homerton, E. Deposit 1*l*. Mr. W. T. Hatch, M.I.C.E., M.I.M.E., engineer-in-chief, Metropolitan Asylums Board, Embankment, E.C.

LONDON.—March 25.—For erection of new iron buildings and other works at Swaffield Road, Wandsworth, S.W. Deposit 1*l*. The Guardians' Offices, St. John's Hill, Wandsworth, near Clapham Junction railway station.

LONDON.—April 1.—For erection of an operating room at their infirmary, Dartmouth Park Hill, N., for the St. Pancras Board of Guardians. Mr. A. E. Pridmore, architect, 2 Broad Street Buildings, E.C.

LUTON.—March 25.—For works of renovation to the assembly room at the town hall. The Borough Engineer, Town Hall, Luton.

MANCHESTER.—March 22.—For the construction of about 560 super. yards of reinforced concrete flooring at the Harrison Street lodging-house, Ancoats. Deposit 1*l*. 1*s*. The City Architect, Town Hall, Manchester.

NEWCASTLE-UPON-TYNE.—March 29.—For alterations and additions to Westmorland Road Council school. Deposit 2*l*. 2*s*. Mr. A. C. Coffin, secretary, Education Offices, Northumberland Road, Newcastle-upon-Tyne.

NOTTINGHAM.—April 10.—For building a Bulwell stone boundary wall, also for certain structural alterations to cottages in Brewhouse Yard, and to buildings in yard adjoining the Castle Waterworks works, Castle Boulevard. Deposit 1*l*. 1*s*. Mr. F. W. Davies, water engineer, St. Peter's Church Side, Nottingham.

ROCHDALE.—March 24.—For erection of offices and cart-sheds forming a highway depôt at John Street, Castleton. Mr. S. S. Platt, borough surveyor.

SCOTLAND.—March 24.—For the mason, carpenter, slater, and plasterer's works of dwelling-house to be erected on the farm of North Belskavie, Drumoak. Mr. John Philip, Sawmill, Drumoak, or Messrs. Alex. Stronach, jun., & Son, advocates, 20 Belmont Street, Aberdeen.

SCOTLAND.—March 24.—For mason, joiner, plumber, slater, and plasterer's work in a villa on the glebe lands of Auchterderran. Mr. A. Scobie, architect, Douglas Street, Dunfermline.

SHOTLEY BRIDGE.—March 24.—For erection and completion of all the works necessary for Institute, Shotley Bridge. Mr. William Archer, Victoria Garesfield, Rowlands Gill.

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SLEAFORD.—March 22.—For alterations and additions to the Wesleyan church premises, Sleaford, Lincs. Deposit 1*l.* Mr. A. E. Lambert, architect, 22 Park Row, Nottingham.

SLOUGH.—April 3.—For internal alterations to Cedar House. Deposit 1*l.* 1*s.* The Surveyor to the Council, Mackenzie Street, Slough.

TERRINGTON ST. CLEMENT (NORFOLK).—March 23.—For carrying out improvements and repairs to the hall of the Manchester Unity of Oddfellows. Messrs. Walker & Walker, architects and surveyors, Wisbech and Terrington. Norfolk.

THORGANBY.—March 22.—For the renovation and new interior of the Wesleyan Chapel. Mr. Thomas Howden, blacksmith, Thorganby, near York.

WALES.—March 20.—For enlarging the Middle Rhymney mixed Council school, Monmouthshire. Deposit 2*l.* 2*s.* Mr. C. Dauncey, secretary, County Council Offices, Newport, Mon.

WALES.—March 22.—For erection of a school to accommodate 260 infants at Pontllanfraith, Mon. Deposit 2*l.* 2*s.* Mr. John Bain, architect, County Council Offices, Newport.

WALES.—March 23.—For building a residence at Govilon, near Abergavenny. Mr. John W. Rodger, architect, 14 High Street, Cardiff.

WALES.—March 24.—For erection of a police-station at Aber-Bargoed. Deposit 1*l.* 1*s.* Mr. William Tanner, F.S.I., county surveyor, Aber-Bargoed.

WALES.—March 24.—For erection of business premises at Brynmawr. Mr. Hy. Waters, architect and surveyor, Market Chambers, Ebbw Vale.

WALES.—March 26.—For erection and completion of a dwelling house, &c., at Aberthin. Mr. Robert Llewellyn Evans, architect and surveyor, Penllyn Court, Cowbridge.

WALES.—March 26.—For the foundations and drainage of a new county hall, in Cathays Park, Cardiff. Messrs. Harris & Moody, architects, 8 New Square, Lincoln's Inn, London W.C., and the County Council Offices, Westgate Street, Cardiff.

WALES.—March 29.—For erection of a house at the Woodlands, Talywain. Mr. A. Gordon Babbidge, architect and surveyor, Clarence Chambers, Pontypool.

WALES.—March 29.—For erection of twenty (or more) semi-detached houses at Cwmgwrach, near Glyn-Neath. Mr. J. Llewellin Smith, M.S.A., architect, Aberdare.

WALES.—March 29.—For erection of a detached house at Cwmgwrach, near Glyn-Neath. Mr. J. Llewellin Smith, M.S.A., architect, Aberdare.

WALES.—March 30.—For erection of ten houses in Llangyfelach Road, Pentre, to be built of concrete, or alternatively of brickwork with slated roof. Deposit 1*l.* 1*s.* The Borough Surveyor, 13 Somerset Place, Swansea.

WALES.—March 31.—For building a cookery kitchen, for the managers of Jones's Elementary School, Monmouth. Mr. George F. Grimwood, architect, Monmouth.

WALES.—April 2.—For erection of infants' school for 100 places, on land adjoining the existing school at Clydach, Breconshire. Deposit 2*l.* 2*s.* Mr. Charles W. Best, M.I.C.E., surveyor, County Hall, Brecon.

WHITEHAVEN.—March 27.—For erection of two semi-detached houses at Victoria Road (all trades except plumbing and glazing). Messrs. J. S. Moffat & Bentley, architects, 53 Church Street, Whitehaven.

WIDNES.—March 29.—For alterations to the Warrington Road Council school. Deposit 1*l.* 1*s.* The Education Department, Town Hall, Widnes.

WORTHING.—March 23.—For tiling, &c., at the Corporation Baths, Heene Road. The Borough Surveyor, Municipal Offices, Worthing.

WORSBROUGH DALE (YORKS).—March 24.—For the mason and bricklayer, plumber and glazier, slater, plasterer, and painter's work required in the erection of a house. Mr. A. Whitaker, architect, Saville House, Worsbrough Bridge, near Barnsley.

YORKS.—March 31.—The West Riding education committee invite whole or separate tenders for the following works:—Greasborough infants' provided school (alterations and erection of new conveniences); Silsden Aire View provided school (conversion of stable into caretaker's house); Liversedge, Norristhorpe provided school (asphalting playgrounds). Deposit 1*l.* in each case. The West Riding Architect, County Hall, Wakefield.

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TENDERS.

ABINGDON.

For additions to the Dog House Inn, near Abingdon. Mr. J. G. T. WEST, M.S.A., architect, Abingdon.

Buckle & Sons	£1,060	0	0
Wheeler	992	0	0
Cox	938	8	0
THATCHER & SONS (*accepted*)	885	0	0

ALSAGER.

For making-up Avenue Road, for the Urban District Council. Mr. H. V. LYNAM, surveyor, Alsager.

WILLIAMS, Stoke-on-Trent (*accepted*)	£286	2	6
Surveyor's estimate	326	2	3

ANDOVER.

For supply of 690 feet of 6-inch cast-iron water pipes, with necessary valves and fittings, for the Town Council.

Rogers & Co.	£105	14	4
Hole	104	19	9
Bell & Co.	102	17	3
Lynn & Sons	98	5	8
BEALE & SONS (*accepted*)	97	4	6

BOSTON (LINCS.).

For erection of about 185 yards of ornamental wrought-iron fencing, 6 feet high, and other works, at the cemetery. Mr. G. E. CLARK, A.M.I.C.E., borough surveyor.

Halliday	£264	10	0
Gratrix & Son	173	17	6
C. & C. Wright	168	8	3
Grattan	165	0	0
Thomas	150	11	9
Woodthorpe & Westmoreland	146	16	0
Emery	144	0	0
Hawley	143	1	3
White	142	14	10
Harwood & Son	140	15	0
LUCAS, Boston (*accepted*)	133	10	0

BROADSTAIRS.

For alterations, &c., at the Royal Albion Hotel. Mr. W. L. DOWTON, architect, London and Broadstairs.

Martin	£298	0	0
Kingsman	285	19	6
Sackett & Sons (*recommended*)	252	10	0

BUSHEY.

For private street improvements. Mr. E. R. RYDER, surveyor, Bushey.

Rosebery Road.

Bloomfield	£772	2	9
Bracey & Clarke	655	11	0
Champniss & Co.	645	9	2
Bailey & Sons	645	0	0
Mann	631	5	8
BLISS, Bushey (*accepted*)	610	12	0
Free & Sons	604	5	11
Jaggard	598	1	3
Brown	594	0	0
Adams	592	6	11

Merry Hill, Mount Road.

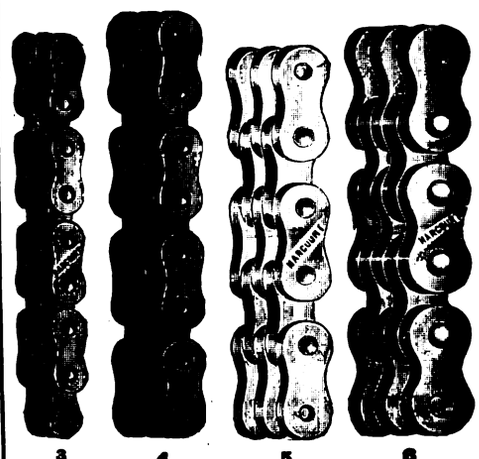
Bloomfield	£795	10	7
Bracey & Clarke	707	15	0
Champniss & Co.	690	6	0
Bailey & Sons	688	17	6
Mann	675	17	5
Free & Sons	650	17	0
Jaggard	641	7	7
Adams	634	19	4
Brown	634	7	0
BLISS, Bushey (*accepted*)	627	7	6

Victoria Road.

Bloomfield	£646	8	3
Bracey & Clarke	570	11	0
Bailey & Sons	559	9	6
Champniss & Co.	553	18	8
Mann	547	14	7
Free & Sons	524	1	8
Jaggard	516	16	4
Adams	511	11	11
BLISS, Bushey (*accepted*)	509	5	3
Brown	507	10	0

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The Holborn Viaduct Buildings, London.
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The Asylum, Letterkenny.

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For coal bays, &c., at Cricklewood and Kempton Park, for the Metropolitan Water Board.

Docwra & Son	£13,678 16 11
Mowlem & Co.	12,624 0 0
Wickstead & Beardsell	12,488 9 9
Hanson	11,839 0 0
Muirhead & Co.	11,680 16 0
Dick, Kerr & Co.	11,574 12 1
Moss & Son	11,291 0 0
Love	11,255 0 0
Jarvis & Sons	10,800 0 0
Renshaw	10,595 0 0
Perry & Co.	10,587 0 0
Leslie & Co.	10,333 0 0
Waring-White	10,278 0 0
Kirk & Randall (*recommended*)	10,183 0 0

DAVENTRY.

For sewerage works at Staverton.

Palmer & Co.	£1,398 0 0
Firth & Co.	1,233 10 0
Dixon	1,219 5 7
Bosworth & Wakeford	1,095 0 0
Martin	1,090 0 0
Wilmott	1,080 6 0
Watson	1,032 0 0
WEBSTER, Guilsborough (*accepted*)	935 0 0

DORKING.

For erection of an isolation hospital.

Brown	£3,211 0 0
Mitchell Bros.	2,800 0 0
Cropley & Sons	2,779 0 0
Higgs	2,637 0 0
Cæsar	2,614 0 0
Pink	2,603 0 0
Potter Bros.	2,600 0 0
Adams	2,587 0 0
Cummins & Sons	2,580 0 0
Ockenden & Son	2,578 0 0
Harrison	2,575 0 0
ROWLAND BROS., Horsham (*accepted*)	2,466 0 0

GLASGOW.

For the construction of rustic bridge over the Kelvin at the Botanic Gardens.

ORR, WATT & Co., Motherwell (*accepted*)	£930 0 0

For the works required in the construction of superstructure of machinery buildings, &c., at Shirehall.

FORREST (*accepted*)	£16,072 9 6

For office buildings in connection with above.

TRAIN & TAYLOR (*accepted*)	£2,258 4 6

GRANGE-OVER-SANDS.

For the following works:—(1) Erection and fitting of public conveniences near the Crown Hotel, in Main Street; (2) making-up of Charney Road. Mr. THOS. HUDDLESTON, engineer and surveyor.

Accepted tenders.

Contract No. 1.

Postlethwaite & Dawson, Grange	£190 0 0

Contract No. 2.

Nelson, Grange	480 0 0

HODDESDON (HERTS).

For erection of a school at Hoddesdon. Mr. W. A. SMITH, county surveyor, Hatfield.

Steed	£3,028 0 0
Barker	2,777 0 0
Negus & Son	2,709 0 0
Hunt	2,639 0 0
Sedcole	2,627 0 0
Hale & Co.	2,580 0 0
Fitch & Cox	2,530 0 0
Foster & Son	2,517 0 0
Clark & Son	2,450 0 0
Lawrence & Son	2,448 0 0
Hitch	2,425 0 0
Paul	2,378 0 0
Jennings & Grenfell	2,350 0 0
NORRIS & SON, Hertford (*accepted*)	2,283 15 0
Architect's estimate	2,335 3 7

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LONDON.

For the supply, delivery and erection at the Elephant and Castle sub-station of a 20-ton overhead travelling crane.

Higginbottom & Mannock	£480 0 0
Anderson & Co. (1905)	450 0 0
Chatteris Engineering Works Co.	396 0 0
Russell & Sons	385 0 0
Chambers, Scott & Co.	370 0 0
Carrick & Ritchie	368 0 0
Ditto (alternative tender)	375 0 0
Heywood & Co.	363 0 0
Applebys	333 0 0
Johnson & Son	330 0 0
Henderson & Co.	317 10 0
North British Lifting and Moving Appliance Co.	315 0 0
Carrick & Sons	315 0 0
Morley Electrical Engineering Co.	315 0 0
Pickerings	295 10 0
Smith (Keighley)	295 0 0
Spencer & Co.	290 0 0
Jack & Co.	268 0 0
Holt & Willett (*recommended*)	265 0 0
Estimate of the chief officer of tramways	350 0 0

LONDON—*continued.*

For the supply and erection of high and low tension switchgear at the Elephant and Castle sub-station.

Electric and Ordnance Accessories Co.	£5,982 13 0
Electric Construction Co.	3,057 3 6
British Westinghouse Electric and Manufacturing Co.	2,786 1 4
Ferranti	2,746 0 6
Whipp & Bourne	2,731 12 4
Switchgear Co.	2,670 0 0
Johnson & Phillips	2,495 1 3
Spagnoletti (*recommended*)	2,458 3 0
Estimate of the chief officer of tramways	2,450 0 0

For the supply of six static transformers required for use at the Elephant and Castle sub-station, for the L.C.C.

Burnand & Co.	£2,727 10 0
British Thomson-Houston Co.	2,716 0 0
Electric Construction Co.	2,427 0 0
General Electric Co.	2,284 0 0
facturing Co.	2,112 0 0
Dick, Kerr & Co.	2,092 0 0
British Westinghouse Electric and Manu-	
British Electric Transformer Co. (*recommended*)	1,879 0 0
Estimate of the chief officer of tramways	2,000 0 0

For supply of (1) 2,000 tons of cement delivered at the various tramway depots on the south side of the Thames; (2) 1,250 tons of cement delivered at the various tramway depots on the north side of the Thames.

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	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Trechman, Weekes & Co.	—	18 10	18 10	18 10	21 0	21 0
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Burtt & Sons	20 5	18 4	18 2	18 4	19 6	19 6
Martin, Earle & Co.	20 5	19 1	18 10	19 1	20 4	19 1
West Kent Portland Cement Co., Rochester (*accepted*)	19 8	18 0	—	18 0	—	—
Do., alternative tender	20 9	—	17 11	—	19 6	19 6
Associated Portland Cement Co., Lloyd's Avenue (*accepted*)	19 4 / 19 10	18 4	18 3	18 5	19 5	19 5

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LONDON—*continued.*

For the supply of a forging and annealing furnace required for use at the central car-repair depôt.

Meldrum Bros.	£250	0	0
Horsfall Destructor Co.	172	0	0
Alldays & Onions	134	2	6
Mountain & Gibson (*recommended*)	128	0	0
Estimate of the chief officer of tramways	110	0	0

For the supply of two 1,500-kw. rotary converters, &c., required for use at the Elephant and Castle sub-station, for the L.C.C.

Bruce, Peebles & Co.	£9,416	0	0
British Westinghouse Electric and Manufacturing Co.	5,601	0	0
General Electric Co.	4,636	10	0
British Thomson-Houston Co.	4,490	0	0
Electric Construction Co.	4,319	0	0
Dick, Kerr & Co. (*recommended*)	4,274	10	0
Ditto (alternative tender)	4,652	0	0
Estimate of the chief officer of tramways	4,500	0	0

For the wiring and fitting for electric lighting of the Norwood tramways car-shed.

Lund Bros. & Co.	£920	4	8
Weston & Sons	809	7	0
Pullan	797	0	3
Sheldrick & Co.	783	1	4
Comyn Ching & Co.	778	10	0
Pinching & Walton	758	0	9
Whitehead	739	17	9
Taylor & Co.	720	2	3
Tredegar & Co. (*recommended*)	706	7	8
Estimate of the chief officer of tramways	900	0	0

For forming and paving works in Kinveachy Gardens, for the Greenwich Borough Council.

Martin	£653	0	0
Wheeler & Co.	634	0	0
Fry Bros.	632	0	0
A. L. Etheridge	600	7	6
Woodham & Sons	587	0	0
Mowlem & Co.	568	0	0
J. E. Etheridge (*recommended*)	555	17	6

MAIDSTONE.

For sewer work at 152 to 166 Upper Fant Road. Mr. T. F. Bunting, surveyor.

Cox Bros.	£139	0	0
Elmore & Son	137	17	6
Wallis & Sons	133	0	0
Barden & Head	129	10	0
Corben & Co.	123	0	0
Burrows	119	6	6
Ansett & Son	116	1	2
Clarke & Epps (*accepted*)	114	0	0

For new booster.

Stevens	£118	0	0
General Electric Co.	112	10	0
Electromotors, Ltd.	111	10	0
Peebles	102	10	0
British Westinghouse Co.	99	0	0
Veritys, Ltd.	88	0	0

For sewer work at 18 to 24 Hartnup Street.

Cox Bros. (*accepted*)	£48	0	0

SOLIHULL.

For erecting an isolation hospital. Mr. W. H. Ward, architect, Birmingham.

Gregory, Olton (*accepted*)	£8,240	0	0

STRATFORD-ON-AVON.

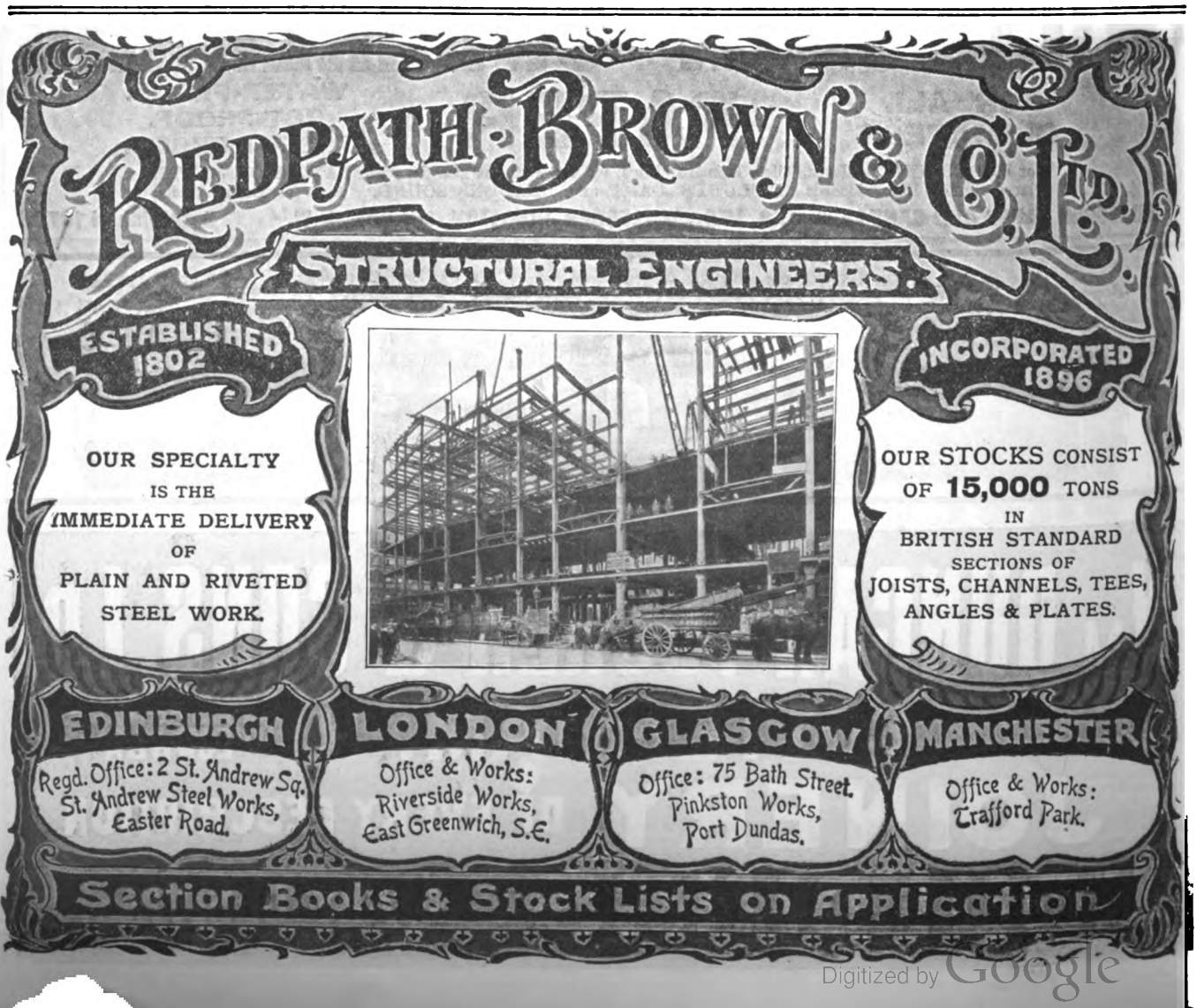
For alterations and additions to No. 13 John Street. Mr. Albert H. Callaway, architect, Stratford-on-Avon.

Fincher & Co.	£915	0	0
Cox	875	0	0
Kennard	836	0	0
Whateley & Sons	820	0	0
Harris & Sons, Stratford-on-Avon (*accepted*)	788	0	0

SCOTLAND.

For widening and repairing the west wharf and dredging a portion of the harbour, Stranraer. Messrs. Crouch & Hogg, engineers, Glasgow.

Bannatyne, Irvine (*accepted*)	£4,981	0	1



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ILLUSTRATIONS.

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ST. MICHAEL AND ALL ANGELS CHURCH, BECKTON, LONDON, E.—EAST ELEVATION—THE CHOIR.

CAMDEN CHURCH, PECKHAM.—THE CHOIR, AS RESTORED AFTER FIRE.

TORQUAY.

For the renovation of the exterior of the Bath saloons.

IRELAND (*accepted*)	£441 13 0

TUCKENHAY.

For erecting eight cottages. Mr. W. F. TOLLIT, architect, Totnes.

Pethick Bros.	£1,774 0 0
Selwood	1,769 11 6
Reeves & Son	1,577 0 0
Badcock	1,545 0 0
Brooks	1,500 0 0
Tozer	1,500 0 0
Leaman	1,444 15 0
LEWIS, Harbertonford (*accepted*)	1,250 0 0
Horsman	1,150 0 0

WALES.

For making and forming a new road, being a diversion of the Newport and Bedwas main road at Church Road, in lieu of Volland Hill. Mr. WILLIAM TANNER, F.S.I., county surveyor.

Reeves	£1,678 16 10
Jenkins	1,528 10 0
Dix	1,527 2 0
Rossiter	1,500 0 0
Shaddock	1,463 8 5
Truman	1,449 0 0
Pomeroy & Co.	1,425 4 8
Barnes, Chaplin & Co.	1,365 6 3
Meredith	1,354 8 6
Reed	1,350 0 0
Parfit	1,290 0 0
Smith	1,241 0 0
OSMOND & SONS, Cardiff (*accepted*)	1,227 1 1

WALES—*continued.*

For sewerage works at Abersoch, for Lleyn Rural District Council. Mr. HARRY ROBERTS, sanitary surveyor, Ynys, Churlol, R.S.O.

Riley	£543 0 0
J. T. Jones	396 0 0
Summers	385 0 0
Hunter	376 0 0
W. & R. Jones	335 0 0
ROBERTS, Pwllheli (*accepted*)	292 0 0

For erection of shop front, &c., at 10 Pool Street, Carnarvon. Mr. E. R. TILLING, architect, Carnarvon.

Griffiths	£236 0 0
Williams & Roberts	220 0 0
Jones Bros.	213 0 0
Parry	213 0 0
Jones & Son	189 0 0
ROBERTS, Carnarvon (*accepted*)	168 0 0

For erecting new schoolroom, library, vestry, &c., at Amlwch. Mr. Jos. OWEN, F.R.I.B.A., architect and surveyor, Menai Bridge.

W. & R. Jones	£1,200 0 0
Prytherch	1,198 0 0
Thomas & Son	1,030 0 0
PRITCHARD, Amlwch (*accepted*)	900 0 0

WALTHAMSTOW.

For erection of St. Oswald's Mission. Messrs. OLLEY & HAWARD, architects.

Thomerson & Son	£2,860 0 0
Barton	2,697 0 0
Patman & Fotheringham	2,543 0 0
Gladding & Co.	2,397 0 0
Jerram & Co.	2,278 0 0
Hosking	2,243 0 0
Spencer, Santo & Co.	2,239 0 0
Coxhead	2,195 0 0
Price	2,157 0 0
Sheffield Bros.	2,075 0 0
Shurmur & Sons	2,070 0 0



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WELLINGBOROUGH.

For the construction of a cattle-shed at the sewage farm, Irthlingborough Road. Mr. E. Y. HARRISON, A.M.I.C.E., surveyor.

Sharp	£167 18 0
Smith & Bunning	140 0 0
Francis	139 0 0
Goodman & Murkett	133 0 0
Stevens	132 0 0
Ball	131 10 0
BERRILL & GREEN (*accepted*)	129 0 0

WESTCLIFF-ON-SEA.

For alterations to the Westward Ho! Hotel. Mr. W. A. LEWIS, architect.

Shurmur & Sons	£3,564 0 0
Holliday & Greenwood	3,500 0 0

WOLDINGHAM.

For the erection of a private residence in Lunghurst Road, Woldingham, Surrey. Mr. A. M. CAWTHORNE, architect, 120 Victoria Street, S.W.

Maides & Harper	£2,296 0 0
Smith & Sons	2,293 0 0
North Downs Building Co.	2,147 0 0
Syme & Duncan	2,005 0 0

WREXHAM.

For providing and fixing unclimbable iron fencing at Gresford, for the Wrexham Rural District Council. Mr. J. PRICE EVANS, engineer, Wrexham.

Randles	£404 13 0
Heyward & Sons	341 2 6
Rubery & Co.	322 18 10
Gratrix & Sons	321 19 7
Hughes	316 9 6
Sandford	313 10 8
MILLER & SONS, Wolverhampton (*accepted*)	296 2 7

MR. G. CHRISTIE, engineer and manager of the Brighton Corporation electricity works, estimates the probable capital expenditure to meet the requirements of the undertaking during the next five years to be 34,620*l*.

TRADE NOTES.

THE Underfeed Stoker Company, Ltd., Coventry House, Finsbury, E.C., have received the order to supply mechanical stokers at the municipal electricity works, Walsall, at a cost of over 2,000*l*.

WE have been requested to announce that owing to the growth of the business the proprietors of *Page's Weekly* have been compelled to move to more commodious premises at Lennox House, Norfolk Street, Strand, London, W.C.

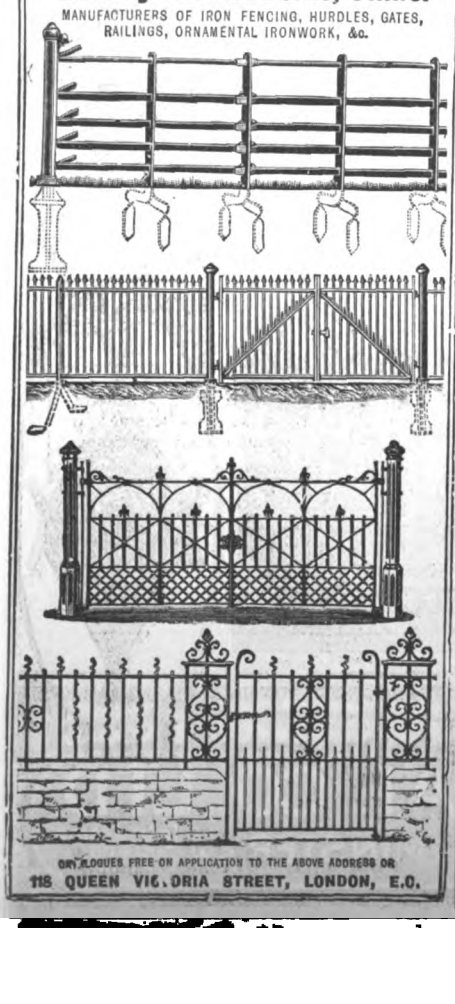
MACKAY'S patent direct-acting ventilators, supplied by Messrs. Cousland & Mackay, Glasgow, the sole makers, have been used in the ventilation of the Central Senior School, Gourock, now being erected from the plans of Mr. Alex. Cullen, F.R.I.B.A., Hamilton.

MESSRS. PATMAN & FOTHERINGHAM, builders and contractors, Theobald's Road, W.C., have been successful in obtaining the contract for some extensive alterations at Shaftesbury Theatre, Shaftesbury Avenue, W., under Mr. Frank A. Tugwell, architect, of Scarborough. The theatre was originally built by them.

MESSRS. WM. POTTS & SONS, LTD., clock manufacturers, Leeds and Newcastle-on-Tyne, have received an order for a new illuminated hour-striking clock for Lancashire, and one not to strike for Cheshire, and to fix new large illuminated dials to a four-dialled striking clock, and restore the clock near Bradford, also to clean and restore a clock erected by them about sixty years ago, and clean and restore another one made by some other firm.

THE Chapel-en-le-Frith Rural District Council on Monday decided to carry out a water scheme for Wormhill, at a cost of 2,225*l*. The only supply at present is from a well and fountain erected to the memory of James Brindley, the great canal engineer.

AN "Everything for the Home" Exhibition is to be held in the Bingley Hall, Birmingham, October 6 to 23. It is being organised by the International Trade Exhibitions, Ltd., who were responsible for the recent Midland Counties Building Trades Exhibition, and many others. The chief divisions will be construction, sanitation, decoration, ventilating and heating, lighting and furnishing.

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I have had many years' experience with Ranges, this being the fourth house I have built for my own occupation.
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VARIETIES.

MR. J. RYECROFT, late chief architectural assistant under the Corporations of Lancaster and Bradford, has been appointed quantity surveyor and general assistant in the Sheffield City Architect's department, at 180*l.* per annum.

THE Sheffield Master Plumbers' Association recently wrote asking that two of their representatives be placed on the town-planning committee of the Corporation. This matter was referred to the special town-planning committee.

THE Local Government Board have sanctioned a loan of 25,000*l.* for the cost of carrying out schemes of sewerage and water supply for the district of Aspley Guise, Aspley Heath, and Woburn Sands.

MONTROSE Town Council have resolved to erect an additional storage reservoir and filtration plant for the burgh water supply. The work agreed upon is part of the scheme, involving an expenditure of over 10,000*l.*, propounded by Mr. Bennett, C.E., Edinburgh.

THE sewerage committee of the Aberdeen Town Council who have had the question of completing the Girdleness outfall scheme under consideration, have agreed to recommend the Council to proceed with it as soon as possible. The work will entail an outlay of between 50,000*l.* and 60,000*l.*

THE Dudley Guardians have instructed Mr. Stanley Eagles to further report upon a modified system of workhouse drainage, having regard to immediate requirements, with provision for extensions if necessary. The report was adopted.

THE plans and works committee of Edinburgh Town Council recommend the provision of a mechanical fire escape and water tower for the fire brigade at a cost of 750*l.* The ladder, which will extend to about 90 feet, can be raised at any angle up to 60 degrees in 30 seconds.

THE Harpenden Urban District Council are applying to the Local Government Board for a loan of 31,500*l.* for the purpose of inaugurating a sewerage scheme for the urban district, and for a provisional order for the compulsory purchase from Mr. Basil Loder of a portion of his estate. An inquiry into the matter has been held at Harpenden by Mr. M. K. North.

THE Water of Leith Purification Commissioners have decided to proceed with new works at a total estimated cost of 4,400*l.* These include the laying of surface water drains at Juniper Green at an estimated cost of 1,500*l.*, at Colinton at an estimated cost of 750*l.*, and at Corstorphine at an estimated cost of 1,550*l.*

MR. J. A. CROWTHER, borough engineer, Southampton, has been granted three days' leave of absence in addition to his ordinary Easter holidays for the purpose of enabling him to take part in the visit that is being arranged to the Continental cities that illustrate town-planning. Mr. Crowther will pay his own expenses.

THE Crowstone Yacht Club, Westcliff-on-Sea, have had plans prepared for a club-house, comprising a saloon capable of seating 250, a smoking lounge, a ladies' room, &c. The building will cost upwards of 1,000*l.* It will be erected on piles driven into the foreshore, and will be approached from the leas by a jetty.

IT has been decided to proceed with the erection of a new church for the district of Bramhall, Lancs. The scheme is to be divided into two parts, and the first portion will cost about 4,000*l.* The sum of 3,400*l.* has been raised, and it is expected that the building will be opened free from debt. The sum of 7,500*l.* is put down as the cost of the scheme.

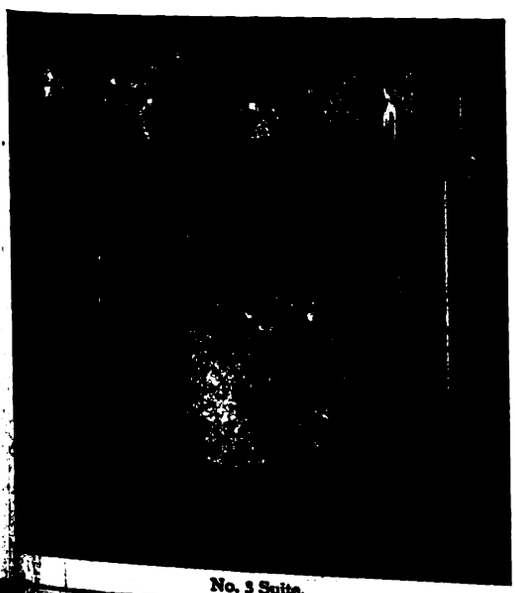
A COMMITTEE of Dundee Town Council recommend the Town Council to experiment with a trackless tramcar line at an estimated cost of 5,000*l.* The proposal is that the cars should run from the centre of the city along the Esplanade and join with the existing system at a point two miles further west. The cars will only be run during the summer months, and in good weather.

THE Local Government committee of the London County Council report that up to December 31 last particulars of 30,358 estates had been obtained and defined on the ground plan of London. Particulars had also been obtained in regard to 942 estates which had not been recorded on the Ordnance sheets. Negotiations are proceeding in regard to about 2,000 estates. The total area dealt with is 112 square miles 357 acres, leaving about three square miles to complete the plan. The total cost of the plan up to the end of last year was 14,477*l.*

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The "BURKONE" Fire is above the floor level. *It can easily be fixed in the place of old stoves*, by any builder, without elaborate plans or alterations to the hearth, &c.
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AN extensive Government contract has been secured by the Consolidated Pneumatic Tool Company, Ltd., Fraserburgh. The order is to supply 300 electric drills, at an average cost of 50*l.* each, the total contract thus amounting to 15,000*l.* This is the largest Government order ever placed in Fraserburgh. The tool works at present employ 150 hands, but provision is being made for additional mechanics.

A LOCAL Government Board inquiry was held last week at Bury into an application by the Town Council for sanction to borrow 43,000*l.* for the purpose of relaying about a dozen streets with granite setts. The borough engineer said the streets were main lines of traffic, and it was necessary, owing to the heavy motor vehicle traffic, that the foundations of the roads should be strengthened and that stronger surface setts should be used.

THE City of London Corporation have arranged to send a deputation of members of the streets committee to visit certain cities on the Continent, to observe and report upon the various systems of gas and electric lighting in operation there, with a view to the comparison of the methods in use in the City of London. Among the places visited will be Paris, Berlin, Vienna, Brussels, Cologne, Dresden, Hamburg, and Düsseldorf. The deputation left on March 18, and will be away a fortnight.

THE plans for the Bunyan memorial window in Westminster Abbey have been finally approved by the executive committee, and the work will be undertaken forthwith. Mr. J. N. Comper, the artist, has accepted the suggestions made by the committee at its last meeting, and has made some slight changes in his design for one of the scenes. The window in the north aisle selected for the memorial is the first to the right of the usual entrance.

A REMARKABLE undertaking for the development of electric power is reported from Halifax, Nova Scotia. An application has been made to Parliament for a charter authorising the damming of the head of the Cumberland Basin, the Basin of Minas, and several other streams emptying into the Bay of Fundy, with the object of utilising the tidal flow to develop electric power for sale in New Brunswick and Nova Scotia. There is a tidal flow of about 40 feet in the Bay of Fundy, from which it is believed that an immense amount of power can be developed.

A CONFERENCE of representatives of local authorities was held in connection with the Smoke Abatement Exhibition, in Sheffield. Representatives attended from most of the principal cities and towns throughout the kingdom, including London, Birmingham, Manchester, Bradford, Darlington, Middlesbrough, and Kendal. A committee of representatives of local authorities, manufacturers, and voluntary associations was appointed to consider the question and take steps to put the movement on a permanent national footing.

AT a meeting of Inverness Town Council last week considerable discussion took place as to whether new police buildings on a new site should be erected, or whether the Council should acquire property at the back of the present police station, and bring the old buildings up to modern requirements. It was ultimately resolved to purchase the property behind the present building, and to invite architects in Inverness to send in competitive plans for the alteration of the buildings.

FOR certain work urgently required in connection with the Gibraltar Dockyard extension, the Admiralty accepted a tender over 600*l.* higher than the lowest submitted, the accepted contract providing for delivery three months earlier than the lower tender. As, however, delivery was not made until after the date promised in the rejected tender, the Comptroller and Auditor-General inquired whether the question of a penalty for the late delivery had been considered, and in reply he was informed that the contract did not embrace any clause covering late delivery.

THE Yarmouth borough surveyor having submitted his report on 159 advertising signs overhanging from the front of buildings in the Market Place, Regent Street, King Street, and Regent Road, the Town Council resolved that no advertising signs be allowed to be erected over the public highways of the borough without the consent of the Corporation. That all advertising signs over the public highways under 8 feet in height from the street level be prohibited. The borough surveyor is to prepare and submit to a future meeting a list of all advertising signs exceeding 3 feet by 2 feet now erected over the principal highways of the borough. No flags, posts, or ropes are to be erected or placed over the public highways, except on occasion of public festivals, and then only for ornamental purposes.

CHANCE BROTHERS & CO., LTD.,
Glass Works, near BIRMINGHAM.

Manufacturers of
WINDOW GLASS
of all descriptions.

Sheet, Patent Plate, Plain Rolled and Rough Cast Plate, Figured Rolled, Rolled, Double Rolled and Sheet Cathedral, Muffled, "Flemish" and Coloured Glass, Old English Crown Glass and Genuine Crown Bullions, Optical, Microscopical, &c., &c.

Also of
VENTURENE WALL TILES
The new Opal Tiles of lustrous surface with clean cut edges.

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OUR attention has been called to a recent development of the confidence trick. Professors of that craft, taking a hint from the usual practice of public authorities in inviting open tenders by public advertisement, have sent out circular letters to respectable firms stating that tenders are required for certain work, somewhat, but not too indefinitely described. Applications are to be sent to an individual of an assumed name, by post, and accompanied with a 5*l.* note, in return for which are promised, after an interval, plans specifications, and quantities. Those who are honoured with an invitation to tender from persons unknown to them should make inquiries before parting with the 5*l.* note.

THE housing committee of the Liverpool Corporation have received a statement of the approximate balance of debt and present net charge in connection with demolition and housing in Liverpool. On December 31 last the balance of debt on demolition was 206,916*l.* 6*s.* 2*d.*, and on housing 469,269*l.* 3*s.* 1*d.*, a total of 676,185*l.* 9*s.* 3*d.*, interest and sinking fund amounting on the former to 12,686*l.* 4*s.* 4*d.*, and on the latter to 26,430*l.* 16*s.* 5*d.*, a total of 39,117*l.* 0*s.* 9*d.* From this has to be deducted 9,537*l.* 19*s.* 3*d.* for net rents, leaving the present net charge at 29,479*l.* 1*s.* 6*d.* The approximate total cost of housing and demolition, after allowing for sums realised by the sales of surplus land, to December 31 last was:—Housing, 545,942*l.* 10*s.* 11*d.*; and demolition, 357,479*l.* 16*s.* 7*d.*; total, 903,422*l.* 7*s.* 6d. By the deduction of 146,337*l.* 5*s.* 2*d.*, the cost of unrestricted buildings in Victoria Square, Juvenal Street, and Arley Street, the housing account was reduced to 399,605*l.* 5*s.* 9*d.*, on which the sinking fund and interest for 1908 amounted to 19,867*l.* 6*s.* 8*d.*

MR. ELLIS DAVIES, M.P., asked the Home Secretary in the House of Commons whether, in view of the opinion of the departmental committee on industrial diseases that fibroid phthisis exists amongst workmen in slate quarries, any effort had been made to protect the workers in that trade from the effects of dust inhalation by special rules or otherwise, as had been done in the Potteries and in the mines of Cornwall and Devon. Mr. Gladstone, in reply, stated that the committee on industrial diseases reported that the incidence of fibroid phthisis in slate quarries had been established in some instances, though there is no evidence that the disease prevails to a serious extent. The question, however, of extending the precautions adopted in the Cornish mines to all cases in which dust of an injurious character may be produced by rock-drilling has not been lost sight of, and the working of the existing rules is being carefully watched. The Royal Commission on Mines are shortly to reach that part of their inquiry which has to do with conditions of health and safety in metalliferous mines and quarries, and he thought it would be desirable that the matter should be considered by them.

THE Society of Engineers, 17 Victoria Street, S.W., will award a status prize each year for the next five years, ending 1913 (if papers of sufficient merit are received), for the best paper written by any person on the subject of "How to Improve the Status of Engineers and Engineering, with special reference to Consulting Engineers." The prize will be three guineas' worth of books and/or instruments to be chosen by the successful author. The essay shall not be more than 6,000 words in length and shall be typed on one side of foolscap paper, the distance between the lines being $\frac{5}{16}$ inch or more. The papers for the present year shall be sent in on or before June 30 next, addressed to the Secretary of the Society of Engineers, 17 Victoria Street, Westminster. The successful paper shall be read and discussed at a meeting of the Society, the reading, if possible, being done by the author. The paper shall be published in the usual manner in the Transactions of the Society. The Society of Engineers, the Civil and Mechanical Engineers' Society and/or the donor of the prize shall have the right to publish any paper sent in for the competition.

THERE are so many kinds of directories that the feeling of wonder which on first acquaintance they arouse becomes somewhat blunted, and a purchaser quickly loses any power of marvelling at the amount of minute labour embodied in the pages. But there is one directory that is still able to inspire us with astonishment by its contents, and that is "The Mercantile Year-book and Directory of Exporters," published by Lindley Jones & Bro., 21 St. Helen's Place, E.C., which has attained its twenty-third year of publication. It opens with eleven itineraries, giving the names and exact addresses (including the floors) of London merchants in strict order, the goods shipped and the ports. This has

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Cabinet, Builders', Furnishing, & Naval Brass Foundry,

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MACHINE-MADE BRASS SOCKET BOLTS.

4601 Brass with Iron Shoot.

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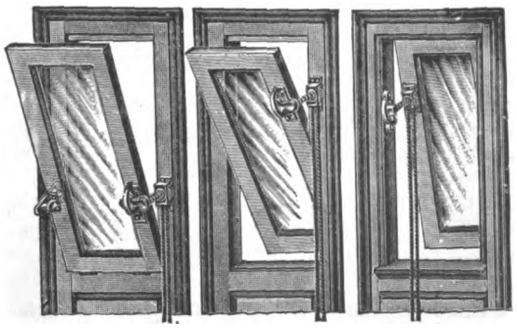
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13	6	12/-
15	0	13/-
16	6	14/-
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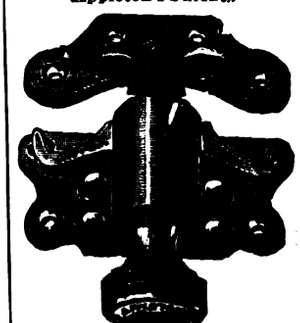
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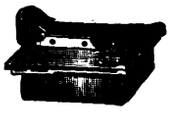
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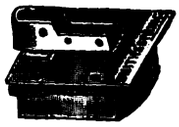


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its own alphabetical index to the streets. Part II. gives the importers in British colonies and foreign countries, with their representatives and buying agencies in Europe. Part III. gives the principal classes of goods shipped from London, with the names of the shippers. Part IV. consists of the merchant exporters of London, with their addresses, telegraphic addresses and telephone numbers, and the markets with which they trade. Part V. deals with the exporters of Manchester, Liverpool, Birmingham, Glasgow, Bristol, Bradford, Leeds, Nottingham, Huddersfield. Part VI. gives the same information about the exporters of Paris, Hamburg, Berlin, Bremen, Amsterdam, Rotterdam, Antwerp. The compilation of such a directory may truly be called prodigious.

THE American Consul at Turin calls attention to the extensive supplies which will be needed for rebuilding the Italian cities destroyed or damaged by the earthquake. The reconstruction of the cities of Messina, Reggio, Palmi, Bagnara, &c., having been decided upon, the Italian Government will, as soon as the debris left by the earthquake has been cleared away, direct the engineer corps of the civil state, or a special commission composed of members of that corps, to proceed to divide the areas selected for reconstruction into building lots. These lots will be bid for by Italian and foreign contractors who may wish to undertake the construction of new buildings thereon. The Public Works Co-operative Society of Lombardy announces that it will hold a public competition to demonstrate the relative merits of various materials and methods of work and construction adapted for use in the devastated regions. The competition will deal especially with types and systems of construction for urban, rural, and industrial edifices least likely to be affected by seismic disturbance, and the Italian Government will probably hold a special competition for the solution of purely technical problems. This competition will, however, only take place after the Government shall have solved the grave financial and administrative problems that now demand its attention. It seems likely that steel and reinforced concrete will be widely used in the work of reconstruction, and that the height of buildings will be limited to 32.81 feet. It is probable that only the very lightest materials will be used for floors, ceilings and roofs.

BUILDING AND BUILDERS.

MESSRS. H. & J. MARTIN, contractors, Dublin, are carrying out extensive alterations to the Phœnix Park residence of the Hon. Walter Guinness.

THE Estimates 1909-10 vote 15,000*l.* for the new recruiting station at Great Scotland Yard, and 19,000*l.* for the extension of the National Gallery over part of the present barrack site. For the additional law court in the Strand 16,000*l.* is taken, and among other votes are 300*l.* to improve the lighting of Big Ben and 300*l.* for a children's playground in Kensington Gardens.

THE Brighton Corporation are about to give official notice to architects and builders that the conversion of a building into more than one flat or dwelling-house constitutes a new building within the meaning of the regulations, of which due notice must be given, and plans submitted to the authorities.

THE Eastbourne Board of Guardians are going to seek the advice of the Local Government Board as to proceeding further with the new workhouse scheme in view of the report of the Poor Law Commission. Under imperative directions from the Whitehall authority, the guardians have had plans prepared, and completed other preliminaries to a scheme involving an expenditure of between 20,000*l.* or 30,000*l.*

IN his report on the health of Bacup during the past year, Dr. Brown, the medical officer of health, states that a much felt want in the town is about to be supplied, the Esther Estate, adjoining the cricket field, having been taken on which to build over 200 houses suitable for an artisan population. Each house is to have three bedrooms, &c., bathroom, hot and cold water, and front garden. He adds that there is every prospect that the houses will be let or bought as soon as they are ready for occupation.

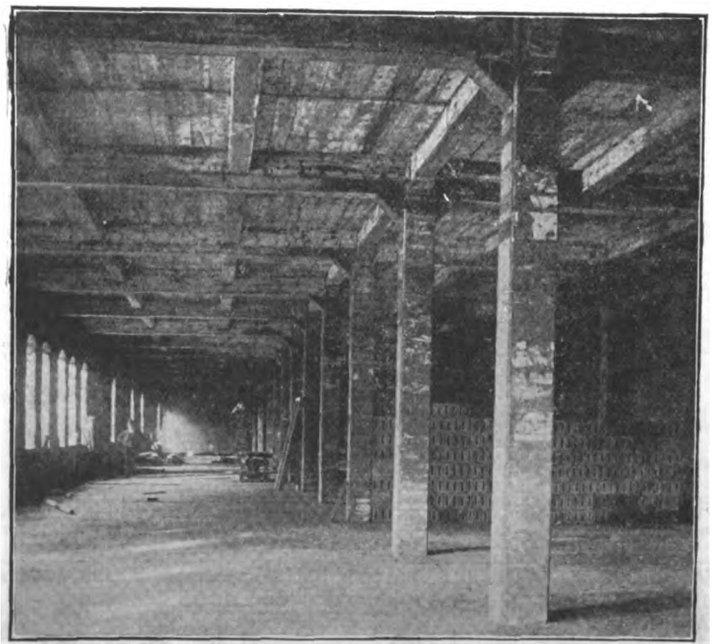
THE committee of the Torquay Town Council to whom was referred the question of considering the new town hall and pavilion projects met last week, when the members were practically unanimous in regard to carrying out the two proposals simultaneously as a combined scheme. The suggested figures are 25,000*l.* for the town hall, and 20,000*l.* for the pavilion. The meeting was adjourned until March 30, a general desire being shown to take steps to carry out the combined scheme with all reasonable progress.

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Two new and important works will probably be established in the Sutton district of St. Helens, Lancs., at an early date. Messrs. Morris & Bastert, of Loughborough), are negotiating for a site for an engineering works on a part of the Sherdley Estate, and it is said the works may eventually employ a very large number of workmen. The Junction Glassworks Company have sold their works which have been in operation for the past three years. The stock of rolled plate glass has been purchased by Messrs. Pilkington Brothers. The extensive buildings on the site are to be used as works for the development of a new method of making steel which was recently patented.

WE have just received an advance copy of the *Pall Mall Magazine* for April. It is an interesting number, well printed on good paper. There is something to suit each class of reader. A most interesting article is that on Sir Douglas Straight, the retiring editor of the *Pall Mall Gazette*, and one of the leading journalists of the day.

AT the annual dinner of the Gainsborough employés of the firm of Messrs. Newsum, Sons & Co., on Friday last, it was stated that the firm had recently accomplished a smart piece of work. On February 24 they took in hand a large order for Messina—to supply 1,000 windows, 500 doors and 625,000 feet of mouldings. This work had been completed in contract time, and on March 10 the consignment left Gainsborough in a special train of thirty-one waggons.

MR. WATT, M.P., asked in the House of Commons on Monday what firm had been engaged to do the measuring work at Rosyth, and where was their place of business? He also asked why measurers with their places of business in Scotland were not given the opportunity of this work, and would the authorities in future see that Scottish measurers got some share of the Admiralty's work in Scotland, seeing that they were more conversant with the methods of the various tradesmen there? The First Lord of the Admiralty in reply stated that Messrs. George Corderoy & Co., 21 Queen Anne's Gate, Westminster, had been engaged. It was considered the above firm had the largest experience of great engineering works. Scottish surveyors have been employed for building works in Scotland, and will be so employed in future.

HIGH PRESSURE OR LOW PRESSURE.

A CASE under the London Building Act was decided at the Mansion House police court on the 5th inst.

Mr. Frank Lee, a steam and hot water engineer carrying on business at 62 Chiswell Street, E.C., was summoned on the information of Mr. C. W. Surrey, district surveyor for the Western Division of the City, for making default in complying with a notice of an irregularity served on February 8.

The notice set out particulars of work done in contravention of the Act, and to be amended as follows:—"A pipe for conveying steam had been fixed nearer than 6 inches to combustible materials in contravention of sec. 66, sub-sec. 4 of the London Building Act, 1874."

Counsel raised a preliminary objection that the notice was bad inasmuch as no offence was shown, and contended that under sub-sec. 4 the words "not being a pipe for conveying steam at low pressure" should have been added.

Sir John Bell said he would take the evidence first as to whether the pipe was for high pressure or low pressure.

The Surveyor then gave evidence and stated that the pipe was a $\frac{3}{4}$ inch pipe leading from the basement, up the lift shaft into the kitchen, under the hot plate-rack, and returning to where the girls wash their dishes. If all the valves were open there was no doubt it was a low pressure pipe, but he was not prepared to say whether the pipe would be a high pressure one with the valves closed.

Sir John Bell, without calling upon the defence, decided that the summons must fail on the objections raised, and moreover expressed his opinion that the steam pipe was of low pressure, as it could only be used with the valves open, and that the proceedings were frivolous on the part of the surveyor.

AN intimation has been received by the town clerk of Brierley Hill (Mr. W. Waldron) that the Local Government Board have sanctioned a loan for the town's deep sewerage system. The amount involved is nearly 20,000*l*. By arrangement with the Kingswinford Rural Council the sewage is to be treated on the rural council's farm at Kinver, the price to be paid by Brierley Hill for this privilege being 750*l*. per year, for a period of thirty years from January next.

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MUNICIPAL TRADING IN LIVERPOOL.

THE following correspondence has taken place between the Liverpool Master Builders' Association (a large majority of whose 450 members are Liverpool ratepayers), and the finance committee of the Corporation:—

Duchy Chambers, 24 Sir Thomas Street, Liverpool:
February 9, 1909.

Dear Sir,—The Council of this Association have had under consideration the question of the large amount of work that is executed by the Corporation through their own Works Department, and cannot help feeling that while in a large city like Liverpool the Corporation must of necessity employ a considerable number of workmen direct, at the same time a very large amount of work now done in that way might, with distinct advantage to the best interests of the ratepayers, be put out to competition.

A statement was made at the last meeting of the City Council to the effect that some work that had been done by the Works Department had cost from thirty to forty per cent. more than if it had been executed by a private contractor, after having been submitted to competition, and though my Council are not at present in a position to verify these figures in their entirety, they are convinced that they are substantially correct, and feel strongly, especially as far as work in the building trade is concerned, that a considerable amount of money might be saved every year in this way, and thereby tend towards preventing continual increase in the rates.

I shall feel obliged if you will kindly submit this letter to the consideration of your committee and look forward to hearing from you as to the result at your convenience. Thanking you in anticipation, yours faithfully,

BERTRAM B. MOSS,
Secretary of the Liverpool Master Builders' Association.

Mr. J. S. Harmood Banner, C.C., M.P., Chairman of the Finance Committee, Municipal Offices, Liverpool.

Town Clerk's Office, Municipal Buildings, Liverpool:
February 20, 1909.

Dear Sir.—I duly submitted to the meeting of the finance committee yesterday your letter of the 9th inst., with reference to placing out to competition work now done by the Works Department.

The committee did not, however, pass any resolution thereon.—Yours truly,

EDWARD R. PICKMERE, Town Clerk.

The Secretary, the Liverpool Master Builders' Association,
24 Sir Thomas Street, Liverpool.

Duchy Chambers, 24 Sir Thomas Street, Liverpool:
March 6, 1909.

Dear Sir,—Referring further to my letter of the 9th ulto. addressed to the Chairman of the finance committee, and your reply thereto of the 20th ulto., I am requested to write and inform you that my Council are very dissatisfied indeed with the way the finance committee have treated this Association's important suggestion.

My Council in writing to the finance committee thought that they were approaching the committee which could, if the suggestion met with its approval, bring influence to bear upon the spending committees, coupled with the suggestion of preventing as far as possible municipal trading being carried on to an excessive extent to the disadvantage of the ratepayers in general and the members of this Association in particular.

My Council cannot help feeling that the finance committee have practically ignored the communication from this Association containing a suggestion which, if acted upon, would save the ratepayers of Liverpool many thousands of pounds per annum.

My Council have instructed me to forward a copy of this correspondence to the chairmen of all the "spending committees," and anticipate that they will give the matter more serious consideration than the finance committee has seen its way to do.

I am also instructed to forward a copy of the correspondence to the local papers, which I am doing.—Yours faithfully,

BERTRAM B. MOSS, Secretary,

Mr. Edward R. Pickmere, Town Clerk,
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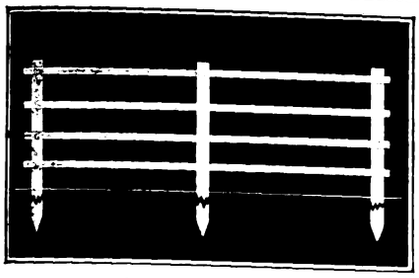
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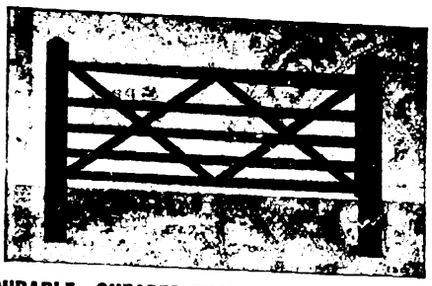
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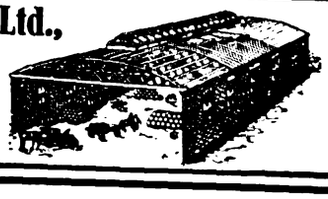
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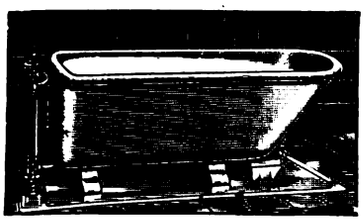
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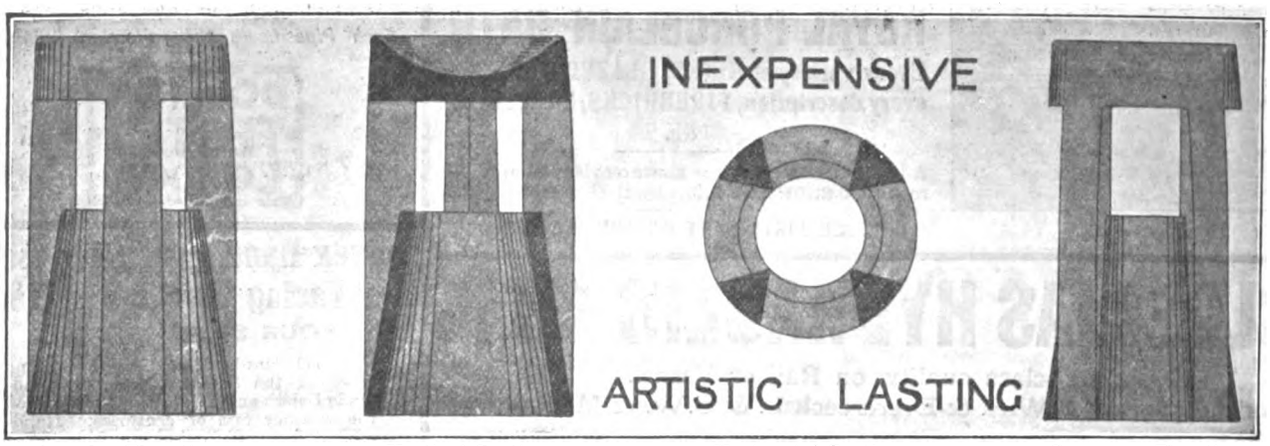
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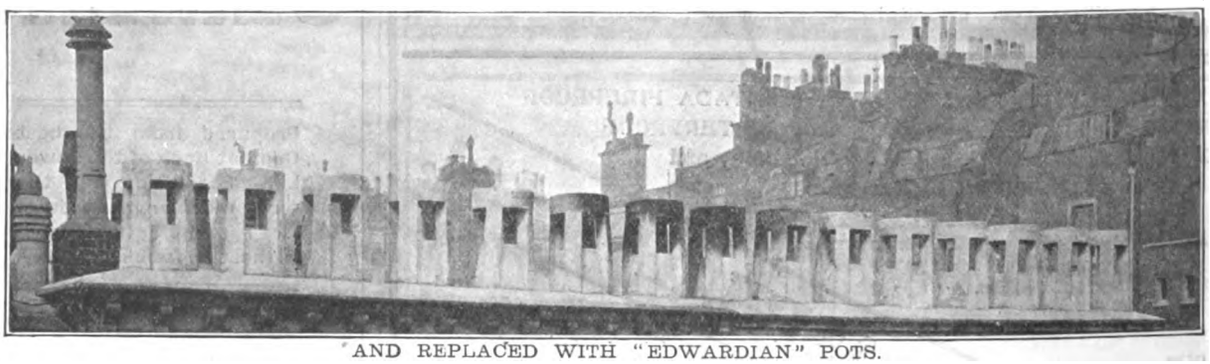
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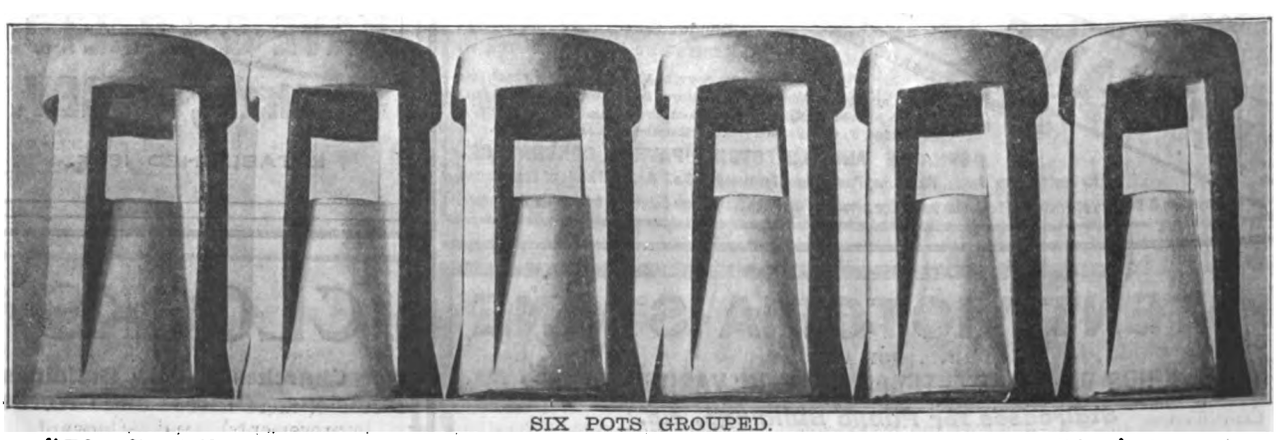
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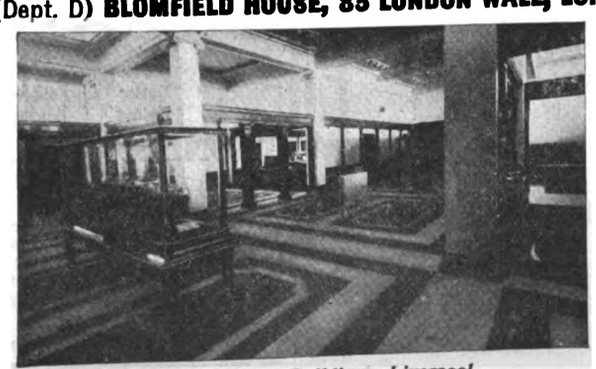
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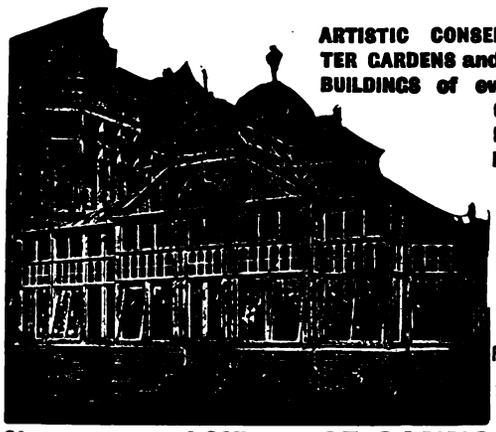
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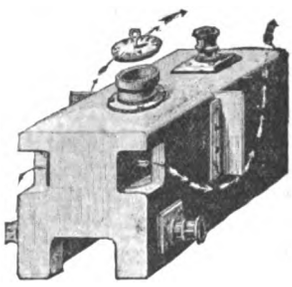
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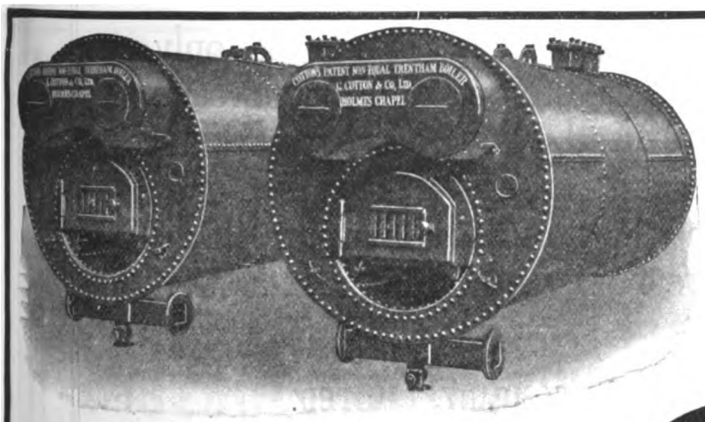
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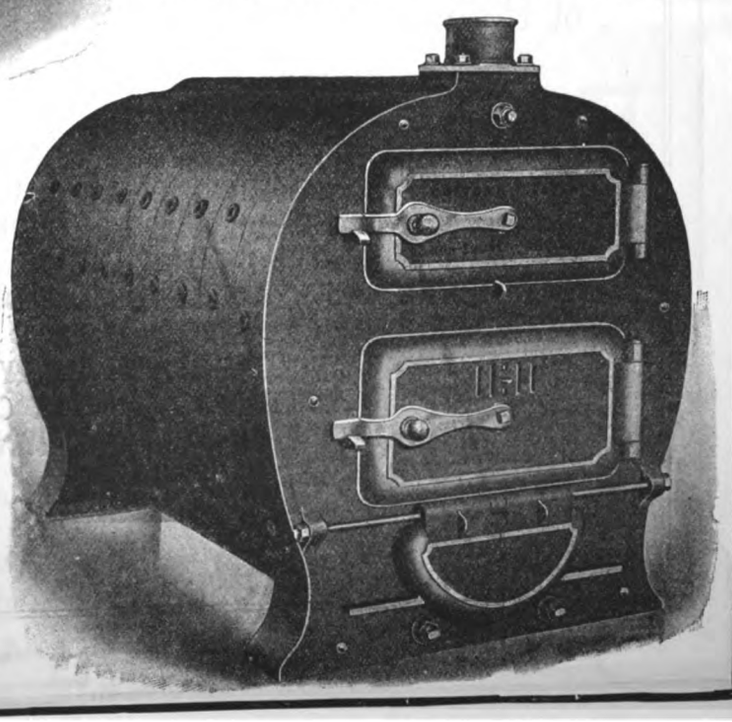


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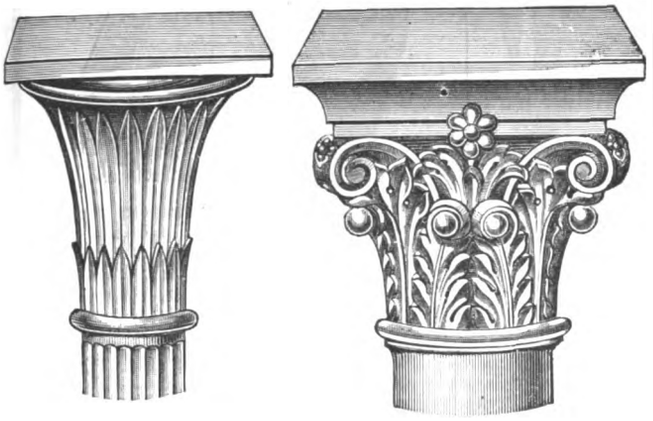
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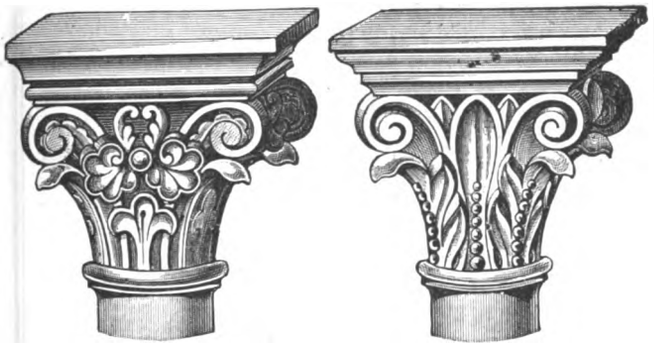
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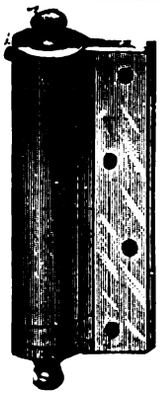
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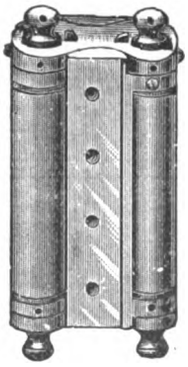
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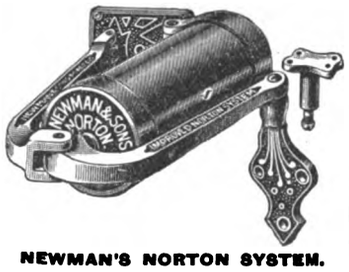
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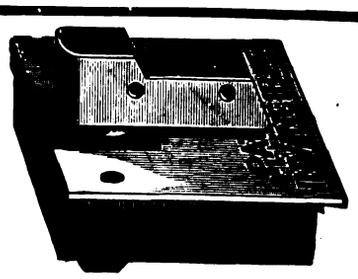
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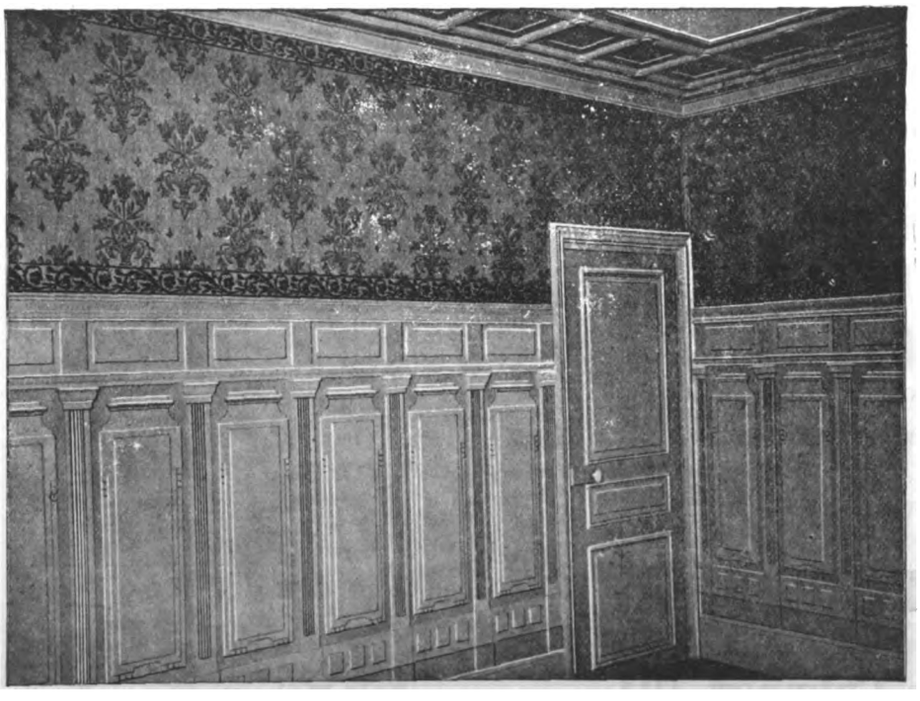
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EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

**** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITIONS OPEN.

EGREMONT.—The Wallasey Urban District Council invite designs from architects practising in Lancashire and Cheshire for Carnegie public library, Earlston Road, Liscard, Cheshire. Particulars on deposit of 2*l.*, to be refunded on receipt of designs or return of papers within seven days, from Mr. W. H. Travers, A.M.I.C.E., Public Offices, Egremont, Cheshire.

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BIRKDALE (LANCS.).—April 5.—For new aisles and vestries, St. John's Church, whole or separate trades. Messrs. Austin & Paley, architects, Lancaster.

BRIDLINGTON.—March 30.—For erection and completion (heating excepted) of a school and class-rooms. Mr. J. Earnshaw, architect, Wellington Road, Bridlington.

BRIGHAM (CUMBERLAND).—April 5.—For the joiner's work, plumbing, glazing and painting for two houses at Brigham. Messrs. W. G. Scott & Co., architects and surveyors, Workington.

BRIGHOUSE.—March 30.—For the works required in the erection of the Brighouse secondary school for girls. Apply to Messrs. Sutcliffe & Sutcliffe, architects, New Road, Hebden Bridge.

CHEADLE.—March 31.—For erection of public conveniences adjoining the Hundred Bridge at Gatley. Mr. E. Sykes, surveyor, Council Offices, Cheadle, near Manchester.

CLITHEROE (LANCS.).—March 29.—For the following work:—Contract No. 1, taking down and re-erecting retort house, chimney and coal store; contract No. 2, taking down old iron roof, the supply and erection of two new steel roofs. Mr. Robert Barrett, gas manager, Gas Works, Clitheroe.

CHARTHAM DOWNS.—April 29.—For the erection of recreation-rooms and other works at the Kent County Lunatic Asylum. Deposit 5*l*. Mr. W. J. Jennings, architect, 4 St. Margaret's Street, Canterbury.

DEWSBURY.—April 6.—For the mason, joiner, plumber, slater, plasterer, painter, heating and electric lighting engineer's trades in Nurses' Home. Messrs. W. Hanstock & Son, architects, Branch Road, Batley.

EDINBURGH.—April 7.—For the equipment and complete fitting up of the new slaughter-houses at Gorgie. Deposit 5*l*. 5*s*. Mr. J. A. Williamson, A.R.I.B.A., Public Works Office, City Chambers, Edinburgh.

FERRYHILL.—March 27.—For building eight six-roomed houses, with bathroom, &c., at Ferryhill, Durham. Apply to Messrs. Stephen Wilkinson & Crowley, A.R.I.B.A., 30 Mosley Street, Newcastle-on-Tyne.

FOREST ROW.—March 31.—For erection of a public elementary school at Ashurst Wood. Apply to Mr. F. J. Wood, county surveyor, County Hall, Lewes.

GLOUCESTER.—April 2.—For erection of county offices and alterations to the Shire Hall. Mr. Robert Phillips, consulting surveyor, Shire Hall, Gloucester.

GOLBORNE.—March 27.—For alterations and additions at Parkside Mill School, Golborne, near Wigan. Deposit 2*l*. Mr. Henry Littler, county architect, 16 Ribblesdale Place, Preston.

GRIMSBY.—March 31.—For three pairs of cottages in Station Road, Habrough. Messrs. Holmes & Richardson, architects and surveyors, 2 St. Mary's Gate, Grimsby.

HARRINGTON.—April 5.—For the slating, plumbing, plastering, glazing and painting of a house at Harrington, Cumberland. Messrs. W. G. Scott & Co., architects and surveyors, Workington.

HINCKLEY.—April 6.—For erection of public baths at the rear of the Council Offices. Deposit 2*l*. 2*s*. Mr. E. H. Crump, A.M.I.C.E., engineer and surveyor, the Council Offices, Hinckley.

HIGH LITTLETON, NEAR BRISTOL.—March 31.—For erection of a stone-built chapel at High Littleton, two miles from Hallatrow (G.W.R. Station). Deposit 1*l*. 1*s*. Apply to Mr. Geo. H. Gibson, building surveyor, Victoria Square, Radstock, near Bath.

IRELAND.—March 27.—For remodelling the premises of Messrs. J. P. O'Connor, Swineford, co. Mayo. Mr. Joseph S. Cairns, C.E., Ballina.

IRELAND.—March 29.—For the construction of seventy-five habitations, at Glasthule, Kingstown. Bills of quantities (deposit 1*l*. each) for one unit, containing six habitations, have been prepared. The Surveyor's Office, Town Hall.

IRELAND.—April 1.—For reconstruction of a coal store and building of a boundary wall at the Armagh gas works. Deposit 10*s*. Mr. James Whimster, engineer, Gas Works, Armagh.

IRELAND.—April 1.—For alterations at the Town Hall, Ballsbridge. Mr. J. C. Manly, clerk, Town Hall, Ballsbridge, Pembroke, co. Dublin.

IRELAND.—April 2.—For the erection of a sanatorium at Crooksling, Brittas, co. Dublin. Deposit 2*l*. Mr. G. T. Moore, architect, 1 & 2 Foster Place, Dublin.



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IRELAND.—April 3.—For building eighteen single labourers' cottages, two double cottages, and for fencing sixteen plots. Deposit 5*s*. Mr. R. Goodbody, clerk to the Cloneygowan Rural District Council, Mountmellick.

IRELAND.—April 10.—For alteration and extension of Dungiven Presbyterian Church. Mr. Samuel Macartney, architect, Dungiven, Ireland.

KEDINGTON.—April 2.—For works at Kedington workhouse, near Haverhill, as follows, for the Guardians of Risbridge Union, viz.:—Sinking a well, erecting a pump-house, supplying a pump, shafting, &c. Mr. G. E. Mitchell, Ashen Road, Clare, Suffolk.

KIRTON IN HOLLAND (LINCS.).—April 19.—For alterations and enlargement to the Kirton Holme Council school. Deposit 2*l*. Apply by March 29 to Mr. Jas. Nowell, architect, Church Lane, Boston.

LEYTON.—March 30.—For the supply and erection of partitions with Havelock's patent plaster slabs, and the supply and erection of stoves, shelving, and other fittings for the Leyton Urban District Council. Deposit 1*l*. 1*s*. Mr. F. Harman Lewis, electrical engineer to the Council, Electric Light and Power Works, Cathall Road, Leytonstone.

LOCKERLEY.—April 3.—For erection of two small brick bridges at Lockerley, near Romsey. Deposit 2*l*. 2*s*. Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

LONDON.—April 15.—For erection of municipal buildings in Cambridge Road, Bethnal Green, N.E. Deposit 2*l*. 2*s*. Mr. E. E. Finch, borough engineer and surveyor, Town Hall, Bethnal Green, N.E.

LONDON.—March 29.—For erecting new stables, workshops, offices, &c., at the depôt site in Grove Road, N.W. Mr. J. Paget Waddington, M.I.C.E., borough surveyor, Town Hall, Marylebone Lane, Oxford Street, W.

LONDON.—April 1.—For erection of an operating room at their infirmary, Dartmouth Park Hill, N., for the St. Pancras Board of Guardians. Mr. A. E. Pridmore, architect, 2 Broad Street Buildings, E.C.

MANCHESTER.—April 3.—For supply, delivery and erection of a steel roof over the "B" retort house at the Rochdale Road gasworks. Deposit 1*l*. 1*s*. Mr. C. Nickson, superintendent, Gas Department, Town Hall, Manchester.

NEWCASTLE-UPON-TYNE.—March 29.—For alterations and additions to Westmorland Road Council school. Deposit 2*l*. 2*s*. Mr. A. C. Coffin, secretary, Education Offices, Northumberland Road, Newcastle-upon-Tyne.

NOTTINGHAM.—March 29.—For alterations to the stable buildings, Bulwell Hall. Deposit 1*l*. 1*s*. Mr. F. B. Lewis, city architect, Guildhall, Nottingham.

NOTTINGHAM.—April 10.—For building a Bulwell stone boundary wall, also for certain structural alterations to cottages in Brewhouse Yard, and to buildings in yard adjoining the Castle Waterworks works, Castle Boulevard. Deposit 1*l*. 1*s*. Mr. F. W. Davies, water engineer, St. Peter's Church Side, Nottingham.

NUNEATON.—March 30.—For erection of public slaughter houses in St. Mary's Road. Deposit 1*l*. 1*s*. Mr. F. C. Cook, borough surveyor, Council Offices, Nuneaton.

OXENHOPE.—For the various works required in erection of additions to works at Oxenhope, Yorks. Messrs. John Haggas & Sons, architects, North Street, Keighley.

PEASEDOWN ST. JOHN.—March 31.—For erection of two stone-built cottages at Peasedown St. John, near Radstock. Mr. G. H. Gibson, building surveyor, Victoria Square, Radstock.

SCOTLAND.—March 29.—For mason, carpenter and slater's work in rebuilding farm-steading at Newton of Murcar. Messrs. Brown & Watt, architects, 17 Union Terrace, Aberdeen.

SCOTLAND.—April 2.—For the mason, carpenter, slater, plaster, plumber, painter and glazier, and iron works of drill hall to be erected at Forres. Messrs. Charles C. Doig & Son, architects, Forres.

SCOTLAND.—April 2.—For the mason, carpenter, slater, plaster, plumber, painter and glazier works of cookery room to be erected at Rafford Public School, Forres. Messrs. Charles C. Doig & Son, architects, Forres.

SKIPTON.—March 30.—For extensions of retort-house at the gas works, consisting of regenerative settings with retort stack, and ironwork complete with furnace fittings, coal and coke plant extensions and steel work for stage floors, also hydraulic and foul mains and tar-tower. Mr. J. H. Woodward, gas manager, Skipton.

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SLOUGH.—April 3.—For internal alterations to Cedar House. Deposit 1*l.* 1*s.* The Surveyor to the Council, Mackenzie Street, Slough.

SMALLTHORNE.—March 27.—For alterations and improvements at the Leek Road School, Smallthorne, Staffs. Deposit 10*s.* 6*d.* Apply to Mr. Graham Balfour, director of education, County Education Offices, Stafford.

STANFORD-LE-HOPE.—March 29.—For boys' and girls' schools to accommodate 528 children at Stanford-le-Hope, Essex. Apply to Mr. Christopher M. Shiner, A.R.I.B.A., architect, 10 John Street, Adelphi, W.C.

STANHOPE.—April 3.—For the several works required in erection of house for Wesleyan minister, at Stanhope, Durham. Mr. T. Batty, Ivy House, Wolsingham.

TRIMDON (DURHAM).—March 29.—For erection of an extension to the branch premises of the Station Town Co-operative Society. Deposit 1*l.* Mr. J. Wilson Hays, architect, The Homestead, Wingate.

WALES.—March 29.—For erection of twenty (or more) semi-detached houses at Cwmgwrach, near Glyn-Neath. Mr. J. Llewellin Smith, M.S.A., architect, Aberdare.

WALES.—March 29.—For erection of a detached house at Cwmgwrach, near Glyn-Neath. Mr. J. Llewellin Smith, M.S.A., architect, Aberdare.

WALES.—March 29.—For erection of a coach-house and stable at Dale, Haverfordwest. Mr. Hugh J. P. Thomas, architect and surveyor, 9 Victoria Place, Haverfordwest.

WALES.—March 29.—For erection of a house at the Woodlands, Talywain. Mr. A. Gordon Babbidge, architect and surveyor, Clarence Chambers, Pontypool.

WALES.—March 30.—For erection of ten houses in Llangyfelach Road, Pentre, to be built of concrete, or alternatively of brickwork with slated roof. Deposit 1*l.* 1*s.* The Borough Surveyor, 13 Somerset Place, Swansea.

WALES.—March 31.—For building a cookery kitchen, for the managers of Jones's Elementary School, Monmouth. Mr. George F. Grimwood, architect, Monmouth.

WALES.—April 2.—For erection of infants' school for 100 places, on land adjoining the existing school at Clydach, Breconshire. Deposit 2*l.* 2*s.* Mr. Charles W. Best, M.I.C.E., surveyor, County Hall, Brecon.

WALES.—April 3.—For rebuilding the "Railway Tavern," Water Street, Aberavon. Mr. J. Cook Rees, architect, The Parade, Neath.

WALES.—April 5.—For erection of a Miners' Rescue Brigade Station at Crumlin, Mon. Deposit 1*l.* 1*s.* Mr. A. F. Webb, architect, High Street, Blackwood, Mon.

WALES.—April 6.—For erection of fifty or more cottages at Ebbw Vale, Mon. Mr. Wm. Harris, architect and surveyor, Bank Chambers, Bargoed.

WALES.—April 6.—For erection of farm buildings at Tyr-Rhos, Llwydcoed, Aberdare. Deposit 1*l.* 1*s.* Mr. J. Llewellin Smith, M.S.A., architect, Aberdare.

WHITEHAVEN.—March 27.—For erection of two semi-detached houses at Victoria Road (all trades except plumbing and glazing). Messrs. J. S. Moffat & Bentley, architects, 53 Church Street, Whitehaven.

WHITTINGTON MOOR.—April 3.—For Council schools at Whittington Moor, near Chesterfield, to accommodate 432 infants. Deposit 1*l.* 1*s.* Mr. George H. Widdows, A.R.I.B.A., architect to the committee, St. Mary's Gate, Derby.

WINDERMERE.—April 1.—For the various trades and works required in erection of premises in Crescent Road. Messrs. Walker, Carter & Walker, architects, Windermere.

WIDNES.—March 29.—For alterations to the Warrington Road Council school. Deposit 1*l.* 1*s.* The Education Department, Town Hall, Widnes.

YORKS.—March 31.—The West Riding education committee invite whole or separate tenders for the following works:—Greasborough infants' provided school (alterations and erection of new conveniences); Silsden Aire View provided school (conversion of stable into caretaker's house); Liversedge, Norristhorpe provided school (asphalting playgrounds). Deposit 1*l.* in each case. The West Riding Architect, County Hall, Wakefield.

YORKS.—April 13.—For the following works for the education committee of the East Riding of York, viz.: (1) Erection of a Council school to accommodate eighty-nine children at Wawne. Deposit 1*l.* 1*s.* (2) Erection of a cloak room, &c., at the Council school at Burstwick. (3) Alterations and additions to the Council schools at Ryhill-cum-Camerton. The building surveyor, County Hall, Beverley.

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For erection of an elementary school at Bitton, near Bristol. Mr. R. S. PHILLIPS, architect, Gloucester.

Dimery & Sons, Berkeley (*provisionally accepted*)	£2,242 10 0

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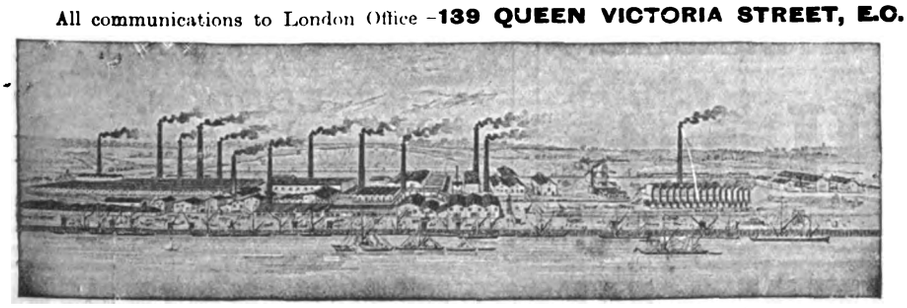
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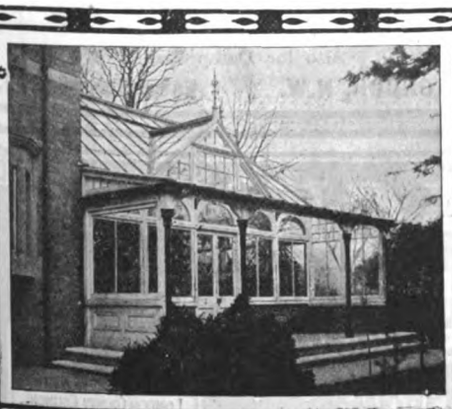
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Simon, Johnson & Sons	19,143 0 0
Graham & Sons	18,789 0 0
Pike & Sons	18,045 0 0
Hodkenson	17,796 0 0
Cottle	17,635 0 0
Saxon Bros.	17,354 0 0
Nowell	16,335 0 0
Redgard	16,274 0 0
Shuttleworth Bros.	16,020 0 0
Marshall	15,322 0 0
Bell & Sons	14,741 0 0
Freeman & Sons	14,649 0 0
STORRS & SONS, Stalybridge (*accepted*)	14,610 0 0
Cunliffe	13,119 0 0

BURY ST. EDMUNDS.

For converting the large room at the town hall into public offices and certain other work. Mr. W. D. HARDING, A.M.I.C.E., borough surveyor.

Contract No. 1.

Frost	£130 0 0

Contract No. 2.—*Reinforced concrete roof, Kahn system.*

Ellis & Sons	201 0 0

Contract No. 3.—*Erection of Offices, &c.*

Frost	1,330 0 0
Grimwood & Sons	1,193 0 0
Fisk & Co.	1,139 0 0
Huniels & Son	1,117 12 6
Roper	1,111 0 0
Mason & Son	1,110 0 0
Bennett & Snare	1,085 0 0
Plummer	1,072 10 0
LINZELL, Newmarket (*accepted*)	1,066 0 0

Contract No. 4.—*Heating.*

Andrews & Plumpton	143 5 0

CHAPEL-EN-LE-FRITH.

For carrying out a water scheme at Wormhill.

BOWER BROS., Halifax (*accepted*)	£2,225 0 0

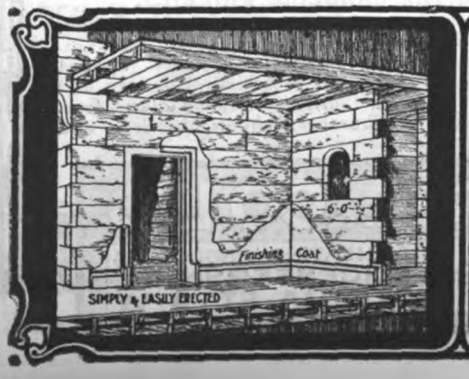
ENFIELD.

For the erection of a block of schools at Lavender Road. Mr. G. E. T. LAWRENCE, architect, 22 Buckingham Street, Adelphi, W.C.

		Addition if glazed brick facing for interior walls adopted.
Ballard & Co.	£20,420 0 0	£1,603 0 0
L. & W. H. Patman	19,785 0 0	2,160 0 0
Myall & Upson	19,600 0 0	2,084 0 0
Pattinson & Sons	18,787 0 0	1,638 0 0
Coles	18,562 0 0	2,076 0 0
Kirk & Randall	18,546 0 0	1,872 0 0
F. & G. Foster	18,444 0 0	1,998 0 0
Jerram	18,269 0 0	1,450 0 0
Appleby & Sons	18,260 0 0	1,740 0 0
Hickman	17,995 0 0	1,520 0 0
Lowe & Co.	17,982 0 0	1,211 0 0
Moss & Sons	17,937 0 0	1,435 0 0
F. & C. Davey	17,785 0 0	1,319 0 0
Fairhead & Son	17,667 0 0	1,365 0 0
B. & G. Nightingale	17,636 0 0	1,466 0 0
Monk	17,475 0 0	1,420 0 0
Fryer	17,450 0 0	1,425 0 0
Hammond & Son	17,387 0 0	1,230 0 0
Brand, Pettit & Co.	17,380 0 0	1,550 0 0
Clark & Sons	17,325 0 0	1,150 0 0
Fitch & Cox	16,920 0 0	1,920 0 0
Lawrence & Son	16,840 0 0	1,330 0 0
Hawkins & Co.	16,824 0 0	1,391 0 0
Maddison	16,723 0 0	1,364 0 0
KNIGHT & SON, Tottenham, N. (*accepted*)	16,527 0 0	1,234 0 0

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GALSTON (SCOTLAND).

For waterworks.

For supply of 8-inch cast-iron pipes and specials.

Stewart & Co.	£1,230	0	0
Maclaren & Co.	1,192	0	0
Cochrane & Co.	1,155	0	0
Stanton Ironworks Co.	1,114	0	0
MACFARLANE, STRANG & Co., Glasgow (*accepted*)	1,107	0	0

For laying 8-inch pipes.

Steel	735	0	0
Kings & Co.	549	0	0
Brown & Kincaid	545	0	0
Meikle	540	0	0
Allen	489	0	0
Pollock	482	0	0
Flett	450	0	0
Picken	382	0	0
Timothy	356	0	0
Mitchell & Young	380	0	0
CULLINANE, Kilwinning, Ayrshire (*accepted*)	348	0	0

IRELAND.

For the warming and ventilating of the Council Chamber, City Hall, Dublin, on the "Plenum" system.

CURTIS & SONS, Dublin (*accepted*)	£320	0	0
Brightside Foundry Co.	287	0	0
McGarvey & Son	283	0	0
Westminster Ventilating Co.	273	0	0
Maguire & Gatchell	248	15	0
Musgrove & Co.	227	10	0
Buffalo Forge Co.	225	0	0

LONDON.

For the construction of section 5 of the northern low-level sewer No. 2 between Grosvenor Crescent and Warwick Road, Kensington.

Westminster Construction Co. (*recommended*)	£172,630	12	6

N.B.—See page 21.

LONDON—*continued.*

For the supply and erection of seven vertical gas engines, two air-compressors, four air-receivers, &c., at the Abbey Mills pumping station.

Crossley Bros.	£28,505	0	0
British Westinghouse Manufacturing Co.	27,000	0	0
Newton Bros.	26,000	0	0
Campbell Gas Engine Co.	25,510	0	0
Premier Gas Engine Co.	22,420	0	0

Amended tenders.

British Westinghouse Manufacturing Co.	27,476	0	0
Campbell Gas Engine Co.	26,560	0	0
Premier Gas Engine Co. (*recommended*)	23,558	5	0

For mission hall at Mallard Street, Hackney Wick, N.E. Messrs. J. D. & S J. MOULD, architects.

Holloway Bros.	£813	0	0
Messenger	710	0	0
Brand, Pettitt & Co.	638	0	0
Shurmur & Sons	621	0	0
Maddison	609	0	0

For the erection on the Tredegar Road site (Bow and Bromley) of divisional offices for the Poplar district of the L.C.C.

Holloway Bros. (London)	£5,080	0	0
F. & H. F. Higgs	4,826	0	0
Lawrance & Sons	4,696	0	0
Leslie & Co.	4,648	0	0
Johnson & Co.	4,634	0	0
F. & T. Thorne	4,588	0	0
Holloway	4,533	0	0
Wall (*recommended*)	4,371	0	0

MAIDSTONE.

For the erection of a Council school.

Pearce & Sons	£15,930	0	0
Corben & Co.	14,813	0	0
Cox Bros.	14,499	0	0
Barden & Head	14,386	6	6
Elmore & Son	13,750	0	0
Clarke & Epps	13,400	0	0
Wallis & Co.	13,343	0	0
BURROWS (*accepted*)	13,339	0	0

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MIDDLEWICH.

For Chester Road sewerage works. Mr. F. W. STOCKS, F.S.I., engineer, Middlewich.

Birchall Bros.	£440	0	0
HUTTON & Co., Northwich (*accepted*)	354	8	0

MILFORD HAVEN.

For erecting a house in North Road. Mr. C. LAUNCELOT-BLETHYN, architect, Milford Haven.

Phelps & Owens	£700	0	0
Lloyd & Co.	689	0	0
Heatherley & Co.	655	0	0
Cole & Sons	650	0	0
Scott	602	0	0
Adams	565	10	0
POWELL, Milford Haven (*accepted*)	546	10	0

NOTTINGHAM.

For the erection of a school in Stanley Road, Haydn Road.

CRANE (*accepted*)	£8,587	0	0

PETERBOROUGH.

For work at the property belonging to the Charity Trustees at Orton Waterville.

Cracknell	£284	0	0
Brown	283	4	6
Lucas	279	0	0
Ireson	269	15	0
Gutteridge & Son	267	0	0
Nichols	260	7	0
Measures	257	0	0
Crane	249	10	0
Bailey	249	7	0
Hawkins	235	0	0
GANDERTON, Orton (*accepted*)	228	15	6

PORTSMOUTH.

For painting A and B blocks at the workhouse infirmary.

SMITH & Co. (*accepted*)	£124	0	0

SCOTLAND.

For the repair of the old portion of Wallacetown School, Dundee.

Accepted tenders.

Clarke & Son, joiner	£170	0	0
Kirkaldy & Gibson, mason	161	0	0
Dewar, plumber	97	0	0
Macbeth & Son, plasterer	28	9	0
Costello, slater	3	13	8

For the construction of a reinforced concrete slipway and other works at Ackergill, near Wick, Caithness, N.B., for the Royal National Lifeboat Institution. Mr. W. T. DOUGLASS, M.I.C.E., 15 Victoria Street, Westminster.

Thorburn & Son	£2,790	0	0
Davidson & Miller	2,552	5	0
Nott	2,207	1	7
McAdie	1,835	13	0
Exors. of J. Arundel	1,645	0	0
Tait	1,571	14	9
Lewis Construction Co.	1,382	9	2
Handman & Co.	1,323	0	0
LESTER, Plymouth (*accepted*)	1,147	0	0

SHEERNESS.

For erection of the Higher Elementary school. Mr. WILFRID H. ROBINSON, M.S.A., architect to the Kent education committee.

Stephens, Bastow & Co.	£7,345	0	0
Ballard & Co.	7,300	0	0
Parren & Sons	7,297	10	0
Crossley & Son	7,140	0	0
Moss	7,000	0	0
Gates & Sons	6,989	0	0
W. Wallis	6,919	0	0
Browning	6,797	0	0
Podger & Sons	6,714	0	0
Seager	6,696	0	0
West Bros.	6,685	0	0
Knight	6,670	0	0
Amos & Ford	6,595	0	0
G. E. Wallis & Sons	6,484	0	0
Amos & Foad	6,595	0	0
Skinner, Chatham (*recommended*)	6,393	0	0

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For Index of Advertisers, see page X.

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SNEATON.

For alterations in the chancel, for reseating and other works at the parish church of Sneaton, near Whitby. Mr. EDWARD H. SMALES, A.R.I.B.A., architect, Whitby.

White	£615 10 6
Boulton & Sons	593 19 6
Lander & Co.	564 6 2
Allinsons	511 14 2
Lawson	508 12 0
Robinson	496 11 6
Dale & Jinnison	470 1 7
Wortley	467 0 0
Kidd & Fletcher	459 3 6
Brain & Sons	368 9 0
LEONARD & SONS, Whitby (*accepted*)	327 3 6

TONBRIDGE.

For additions at Pembury workhouse. Mr. S. PHILPOT, architect and surveyor, Tunbridge Wells.

Elliott	£627 0 0
Sykes & Sons	498 15 0
Roberts & Co.	490 0 0
Soper & Jones	461 0 0
G. & F. Penn	453 0 0
Stanbridge & Sons	452 12 0
Goodwin Bros.	447 0 0
Crates	444 0 0
Smith	435 0 0
Burr	428 0 0
Jarvis	410 0 0
PUNNETT & SONS, Tonbridge (*accepted*)	413 0 0

WALES.

For erecting a Council school at Trefdraeth, Anglesey. Mr. J. OWEN, F.R.I.B.A., county architect, Menai Bridge.

Roberts & Son	£2,222 0 0
Pritchard	1,996 0 0
W. & R. Jones	1,935 0 0
R. Jones	1,759 0 0
Roberts & Williams	1,754 0 0
Hughes	1,724 0 0
H. & J. Williams	1,561 0 0
Prytherch	1,485 0 0
O. W. & T. ROWLANDS, Rhosneigr (*accepted*)	1,375 0 0

WALES—*continued.*

For the construction of roads and paths, laying drains, building retaining walls, erecting entrance gates and railings, and other work in the extension of the burial ground at Ebbw Vale. Mr. T. J. THOMAS, town engineer and surveyor.

Jones	£3,661 13 0
Macnale	3,228 16 6
Ebbw Vale Building Co.	3,119 18 3
Davies	2,998 10 0
Brown	2,890 18 0
Mills	2,843 9 8
Morgan	2,792 0 0
Barnes & Chaplin	2,630 1 4
EVANS & MURRAY, Mountain Ash (*accepted*)	2,560 0 0

For Glyntaff cemetery extension, for the Pontypridd Burial Board. Messrs. A. O. EVANS, WILLIAMS & EVANS, architects, Pontypridd.

Davis	£3,720 0 0
Murray	3,620 0 0
Williams	3,499 0 0
Evans & Murray	3,490 3 4
R. Jones	3,456 10 0
Sutherland	3,380 0 0
E. Jones	3,367 0 0
Knox & Wells	3,350 0 0
Barnes Chaplin Co.	3,342 15 6
Collins & Co.	3,341 7 7
Morgan	3,029 19 0
Smith, Jones & Sons	2,991 13 9
WEBB, Abercynon (*accepted*)	2,818 13 6

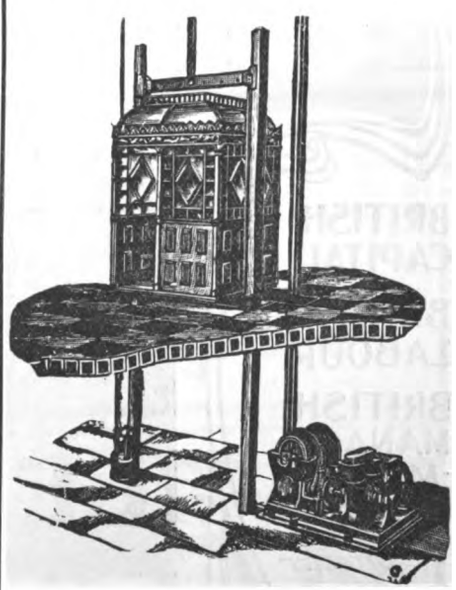
For the erection of a Carnegie library in Mostyn Street, Llandudno.

Thorpe	£5,378 0 0
Roberts	4,413 0 0
Hughes	4,129 10 0
Jones	4,128 7 10
OWEN (*accepted*)	3,904 0 0

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WALES—*continued.*

For widening, diverting, &c., the district road between Llantrisant and Llantwit Fardre. Mr. GOMER S. MORGAN, surveyor, Pontyclun.

Pomeroy	£885 16 7
Collins & Co.	823 5 4
Rutter	800 17 6
Thomas & Sons	770 8 1
Murray	761 12 8
Evans & Morris	755 0 0
Well	752 7 5
Barnes, Chaplin & Co.	734 2 9
Sutherland	733 6 3
Morgan	706 5 6
John & West	669 0 0
Davies	668 19 10
John	648 18 0
WILLIAMS, Pontyclun (*accepted*)	645 13 3

For erecting twenty houses or more at Pwllgwaun, for Llwynmadoc Building Club. Mr. E. REES, architect and surveyor, Pontypridd.

	Per House.
Davies	£229 0 0
E. Jones	219 10 0
Jones Bros.	218 10 0
R. JONES, Pontypridd (*accepted*)	217 0 0
Tucker	212 8 0

TRADE NOTES.

MESSRS. PATMAN & FOTHERINGHAM, LTD., have been successful in obtaining the contract for the extension and alterations at the Union Jack Club, Waterloo Road, S.E., under Mr. H. B. Measures, the architect.

THE new schools, Peterborough, are being ventilated by means of Shorland's patent exhaust roof and special inlet ventilators, the same being supplied by Messrs. E. H. Shorland & Brother, of Manchester.

THE Sussex Portland Cement Company, Ltd., Newhaven, have issued a second edition of their elegant calendars, giving the remaining nine months of the year. The sketch is of Calstock Viaduct, Cornwall, on which their Newhaven brand was exclusively used.

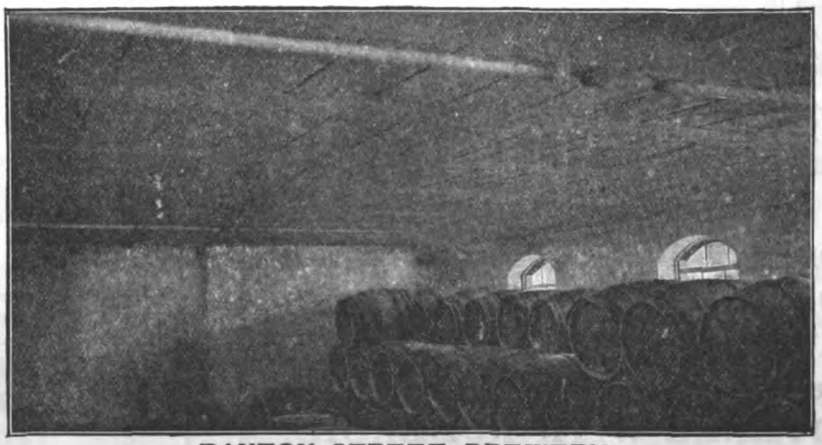
MESSRS. GEORGE MILLS & CO., LTD., fire engineers, Radcliffe, near Manchester, have just placed on the market a new chemical fire-extinguisher which has several features to recommend it. The acid is held in a porcelain jar, which makes it impossible that there should be any corrosion; there are no parts to be broken, and nothing is wanted for recharging but a supply of the ingredients. This machine is made in heavy rolled copper lined with tin, is highly polished and has brass rims top and bottom. Bearing in mind that all fires start from small beginnings, it is very desirable that all public buildings and institutions should be protected by an equipment of extinguishers.

MR. L. B. BARCLAY, engineer to the Water of Leith Purification Commission, in his annual report says he has been considering whether a less costly ventilating system could be introduced. "This, I think, could be brought about by using the lately discovered chemical known as thalassol (hermite solution), and which, I believe, can be manufactured at a trifling cost at either of the electric power stations in Edinburgh by payment of royalties. This chemical is spoken of as a most powerful deodorant, and I am of opinion that, if it were to get a fair trial by applying it to our existing apparatus, the cost of maintaining the present system could be reduced by 100*l.* per annum, if not more. On the other hand, I am of opinion that if something was done to keep down the temperature of hot liquids at present being discharged into the sewers from the different factories throughout the city, the generation of sewer gas in the sewers would be reduced to a minimum, and probably the Commissioners would be able to dispense with the present ventilating system to a considerable extent. This is a matter which might very well form the subject of a joint report by the burgh engineer and myself. I am satisfied that a large expenditure could be avoided if all hot liquids discharged into the city sewers were reduced to a temperature of 90 degrees. I would respectfully ask the Commissioners to consider the matter, and I shall be glad if I may be permitted to try an experiment with the use of thalassol." The report was adopted.

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ILLUSTRATIONS.

DINING-ROOM, WEST HALL, BYFLEET.

THE EDINBURGH LIFE ASSURANCE COMPANY'S NEW OFFICES, GEORGE STREET, EDINBURGH.—BOARD ROOM—PUBLIC OFFICE.

THE RETREAT, LLANDAFF.

THE BLACK LION INN, TRENT VALE, STOKE-UPON-TRENT.

RESIDENCES, CASTELLO AVENUE, PUTNEY.

THE UNITED COUNTIES BANK, BRISTOL.

VARIETIES.

THE annual exhibition of students' work at the Borough Polytechnic Institute will take place to-morrow (Saturday). There are fourteen departments.

THE Essex education committee on Tuesday approved plans for a girls' school at Bishop Stortford, a high school to cost 13,000*l.* at Romford, and a new school at Earl's Colne.

THE Dumfries County Council have under consideration a considerable extension of the county buildings, so as to provide satisfactory accommodation for the sheriff and his staff, and also the county council and their staff of officials.

THE Yarmouth Board of Guardians have been informed that the Local Government Board will authorise the expenditure of 12,716*l.* for the extension of the infirmary. The work is to be proceeded with as soon as possible.

THE Concrete Institute have published the first number of their "Transactions and Notes." The notes chronicle the various activities of the Institute, and the papers read at the two first general meetings have been reprinted in full together with the verbatim discussion.

To meet the requirements of those employés of the London and South-Western Railway who, when the works at Nine Elms are removed to Eastleigh, will be unable to find accommodation at that centre, Messrs. Wilson, contractors, London, are immediately erecting 150 houses at Hampton Park, with bath-rooms and other modern accessories. They are prepared to go on building so long as such houses are required.

AT the last Partick Dean of Guild Court lining was granted to the trustees of Partick Congregational Church to erect a church at the corner of M'Lean Street and Stewartville Street. Sitting accommodation is to be provided for 550 persons, and about 180 in the hall. The estimated cost is 4,000*l.*

AN international competition has been arranged by the Lombard Co-operative Society of Public Works to determine types and methods of building to be adopted in those parts of Italy which are subject to earthquakes. Plans, reports, photographs and models will be received by March 31, and awards of 120*l.*, 80*l.*, and 40*l.* are offered for the best proposals. The secretary's address is 8 Via Lupetta, Milan.

THE Rotherham Rural District Council on Monday considered plans relating to a model village at Maltby, where mining and railway developments are proceeding. Besides providing for the erection of a number of houses, the scheme embraces football ground, cricket ground, tennis court, &c., in the form of a park. It was decided to endeavour to arrange for the straightening and widening of the road, which would no doubt be very much more used in the near future.

THE London County Council on Tuesday agreed:—"That application be made in the session of Parliament of 1909 for authority to enable the Council, notwithstanding the provisions of Section 27 of the Metropolitan Board of Works Loans Act, 1869, to defray, out of any surplus arising from the sale or transfer of property acquired for the purposes of the Works Department out of money raised by loan after paying off the amount of debt outstanding thereon, any deficit arising from the sale of plant, materials and other items, the purchase of which was defrayed out of advances from the general county account."

THE Dublin Corporation are to hold a special meeting to consider a letter from Mr. P. J. Kinlen, Greystones, contractor for the new reservoir, in course of construction, at Roundwood, asking the Corporation to sanction the transfer of the work to Messrs. M'Kee & M'Nally, contractors, of Dungannon. The work was commenced early last year. Mr. Kinlen asks that the necessary arrangements should be sanctioned as speedily as possible. Messrs. M'Kee & M'Nally are well-known Irish contractors, and are at present engaged in carrying out important water-supply works for the North

GREEK MARBLE.

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and South Dublin Unions. The amount of the original contract for the reservoir at Roundwood was 87,000*l.*, and Mr. Kinlen has spent already 18,000*l.* upon the works.

MR. G. H. RILEY, surveyor to the Wellington Urban District Council, last week presented estimates of the cost of three different schemes for public baths. No. 1 provides for a covered swimming bath, 75 feet by 20 feet, with a depth ranging from 6 feet to 3 feet, together with five men's and five ladies' slipper baths, a shower bath, public wash-house, caretaker's house, &c., at a total cost of 3,000*l.* No. 2 scheme provides for a swimming bath (uncovered) on similar lines to the first, but without the public wash-house, &c., at an estimated cost of 1,450*l.*; and No. 3 scheme provides for an open swimming bath only, at a cost of 850*l.* The sanitary committee have been instructed to consider No. 1 scheme in detail.

THE Bath Historical Pageant to be held at Victoria Park, Bath, from July 19 till July 24 will comprise eight episodes with 3,000 performers. The covered auditorium will accommodate nearly 4,000 spectators. The episodes will be as follows:—(1) Roman market scene and dedication of the temple, about A.D. 160; (2) Sack of the Romano-British city of Bath by the West Saxons, A.D. 577; (3) Coronation of King Edgar, A.D. 973; (4) Visit of King Henry VII., and dream of Bishop Oliver King, A.D. 1499; (5) Visit of Queen Elizabeth and confirmation of the city's charter, A.D. 1590; (6) Battle of Lansdown and fall of Sir Bevil Grenville, A.D. 1643; (7) The glorious times of Beau Nash and Ralph Allen, 1752; (8) Reception of Queen Charlotte, 1817.

THE electricity and street lighting committee of Plymouth Corporation have declined to accept the challenge of the local Gas Company to a demonstration of the respective merits of the rival illuminants. The committee some months ago instructed their engineer to report what means could be advantageously adopted to demonstrate the effectiveness of electric light as an illuminant, and also to consider the suggestion that special arc lamps should be placed at a few prominent points in the centre of the town. The Gas Company thereupon suggested that arrangements should be made to demonstrate the efficiency and economy of gas as well as of electricity for street-lighting purposes. After two months' consideration the committee have decided to reply thanking the Gas Company for their letter, but inviting them to submit any suggestions they may have to make with regard to any improvement of the existing system of gas lighting.

MR. A. A. G. MALET, M.I.C.E., held an inquiry at Walsall last week, on behalf of the Local Government Board, as to a proposal by the Town Council to borrow 62,734*l.* for sewage disposal works. A scheme estimated to cost 78,550*l.* was prepared by the late borough surveyor, but Mr. Taylor, the present surveyor, amended it so as to cost 62,734*l.*, and that scheme had been submitted to the Local Government Board and approved. Since then, however, a further report had been issued by the Royal Commission on the matter, and, acting on what was laid down there, the scheme was amended so that it would cost only 50,000*l.* and would keep all the works within the borough instead of going partly into West Bromwich and Wednesbury. The loan asked for was therefore 50,000*l.*

A BUILDING workman who recently emigrated to America has sent an account of his experiences. In the course of it he says:—"I stayed fifteen months in Montreal, but left on account of a strike, and have been in Chicago since last June. I was on a large skyscraper, twenty-two storeys high, right from start to finish, but it only lasted fifteen weeks. The buildings simply grow up like mushrooms here. You can guess the size when I tell you there are 110 bathrooms in it. It is a sort of large boarding house for business people. We work on cable scaffolding, suspended from the steel frame work. The scaffolds are wound up by levers; there is never any reaching up. It was rather a weird feeling at first swinging up in the air about 250 feet high, and the style of work is so different. There are eighteen skyscrapers going up here this season, and trade will be good all over the States. Last year's buildings in Chicago, if placed side by side, would take up fifty-five miles of frontage. That is paper estimates and no Yankee yarn. There is only one bricklayers' hall in Chicago, and there were 9,000 brickies on the books last season, but that was because other parts were slack. There are 5,000 resident brickies, and that is a good number. We are now getting 65 cents an hour, eight hours a day, 8 A.M. to 5 P.M., 1*l.* 1*s.* 8*d.* a day, and it has to be zero before they stop bricklayers. We work with salamanders and canvas round scaffold."

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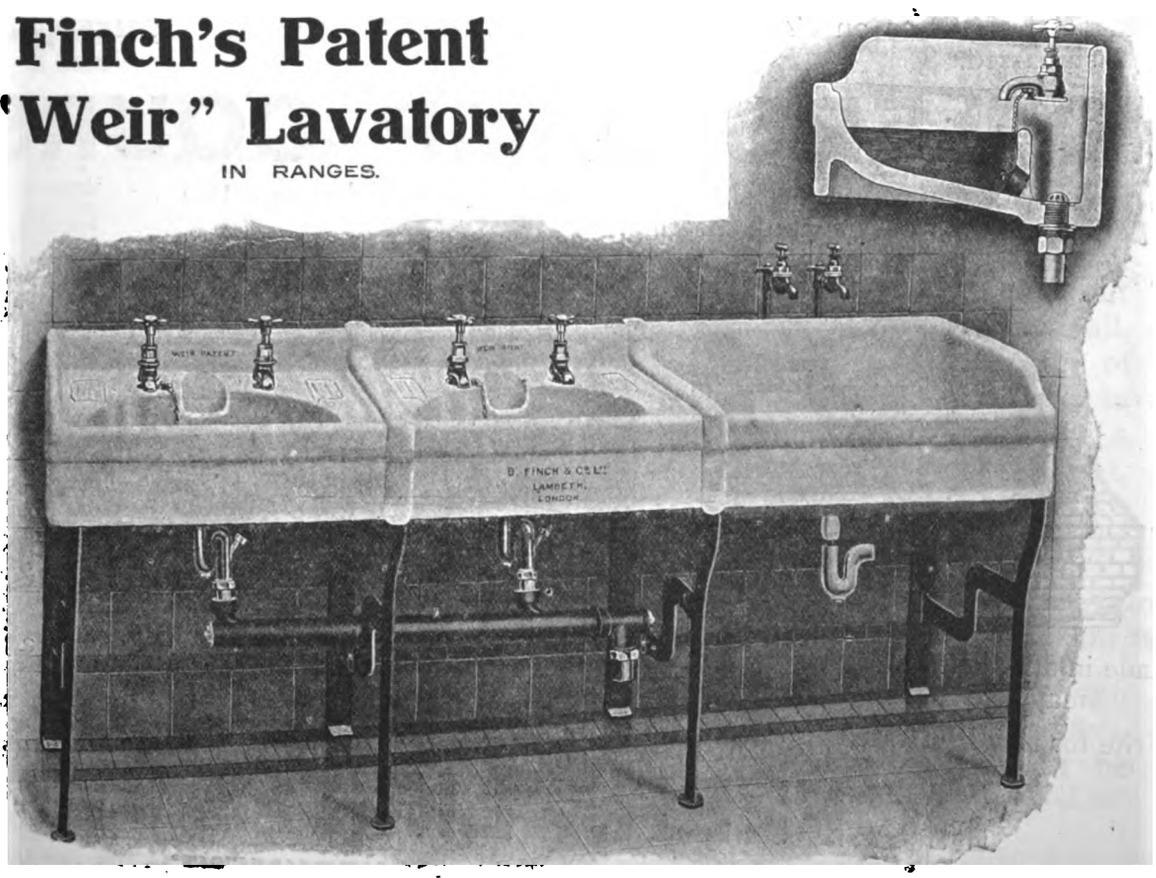
ACCORDING to an estimate submitted to the management committee of the Glasgow Corporation Markets Department by Messrs. Alex. Knox & Robb, measurers, the probable cost of the proposed extension of the lairages and slaughter-house accommodation fronting Hill Street and Duke Street, as shown on the plan attached to the report by the joint deputation of the Corporation and the Glasgow United Fleshers' Society as to the inspection of markets and slaughter-houses on the Continent and in London, will be 65,000*l*. The committee approved of the proposed extension being proceeded with, except as regards that part which involves the demolition of the tenements fronting Duke Street and Hill Street, which is estimated to make the total cost 5,000*l*. less. The committee instructed the city engineer to proceed with the preparation of detailed working drawings, and, in conjunction with the measurers, of specifications, schedules of quantities, and forms of tender for the proposed extension, the town clerk to advertise for tenders for the work so soon as the Corporation have approved of the minutes.

IN the Official Referee's Court on Tuesday judgment was given by Mr. Muir Mackenzie in the action brought by Mr. Daniel T. Jackson, contractor, of Barking, against the Romford Rural Council, in respect of the contract for the construction of the Dagenham sewer and outfall works. The hearing lasted thirty-four days. The plaintiff's claim was for 10,750*l*. for work done; alternatively he claimed the same amount for the alleged exceptional and unreasonable manner in which he was compelled to execute certain works; as a further alternative, he claimed the same amount for damages for alleged false representations in the plans and drawings incorporated in the contract and in quantities, on all of which the plaintiff contracted, and by which the plaintiff said he was compelled to execute more costly work than was represented to be required. The Rural Council denied the claim, and counter-claimed for damages because the work was not executed in a certain time. The learned Official Referee found that the plaintiff did complete the work in accordance with the specifications and sections as varied by the defendants' orders, and therefore the defence of non-completion failed. He granted judgment for the plaintiff for 3,432*l*. 15*s*. 8½*d*. damages, and said that the plaintiff had succeeded on one issue, but failed on two, and a set-off of costs was inconvenient; he should allow him three-quarters of the costs. The counter-claim was dismissed.

FOR visiting Holland and Germany during the Easter holidays the Great Eastern Railway Company's British Royal Mail Hook of Holland route offers exceptional facilities. Passengers leaving London in the evening and the Northern and Midland Counties in the afternoon arrive at the chief Dutch cities the following morning. A corridor train with dining and breakfast cars is run on the Hook of Holland service between London and Harwich. From the Hook of Holland through carriages and restaurant cars run in the North and South German express trains to Cologne, Bale and Berlin, reaching Cologne at noon, Bale and Berlin in the evening. Special tickets at reduced fares have been arranged by the Harwich-Antwerp route for passengers wishing to visit Brussels for the Field of Waterloo. For the convenience of passengers, tickets dated in advance can be obtained at the Liverpool Street Station Continental inquiry or booking offices.

BEAM compasses of a novel pattern have been introduced by Mr. W. H. Harling, mathematical drawing and surveying instrument manufacturer, of 47 Finsbury Pavement, E.C. The beam is wedge-shaped, so greatly assists the firm attachment of the compasses. The slider is ready clamped in any position without the use of a screw, which is liable to wear out, and it is adjusted by thumb pressure. Each set includes two beams, one of 10 inches and the other 30 inches. The compasses with the shorter of the two will be found in practice to be an excellent substitute for a pair of 6-inch compasses, as it is perfectly rigid and the points are always perpendicular to the paper. Extra lengths of beam may be obtained at a small cost from the manufacturer, or they can be made by any carpenter. When the compasses are required for use in different offices, the beams can be supplied in short lengths, which can be joined by means of a double clamp. The points are fastened by clamping screws instead of the usual set screws. The new idea is called Philpot's Patent Beam Compasses.

Finch's Patent
"Weir" Lavatory
IN RANGES.

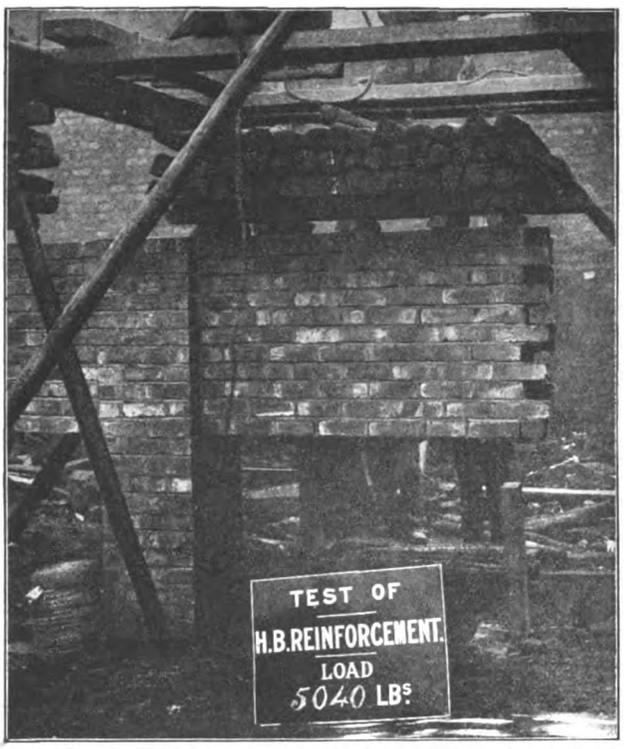


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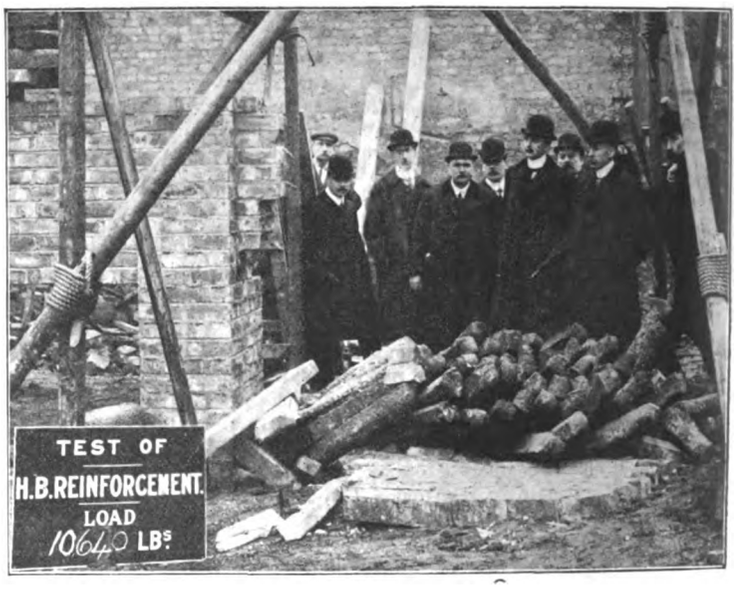
REINFORCED BRICKWORK TEST.

WE recently gave a brief general description of "Monolithic Brickwork"—*i.e.* brickwork with a reinforcement of steel wire mesh 2 inches or 2½ inches in width with four tensional wires running its extreme length. The tests here illustrated were carried out on a piece of brick wall 3 feet high forming



a 5 feet cantilever built as follows:—A 4½-inch outer wall, a cavity 1½ inch, and an inner 3-inch wall. The joints were reinforced in every course on the H B system, this reinforcement being carried throughout the entire length of the walls and piers. There were no ties between the inner and outer walls. The distributed load of pig iron left on the span after the first day's test was 5,040 lb. Next day it was increased to 8,260 lb. without any indication of deflection, and finally to 10,640 lb., when it broke suddenly without showing any tendency to crack or deflect.

An examination of the fracture showed that the bricks, where built into the pier, had sheared across, and the others had broken away at the joint. The wire reinforcement thus bore the tension strain of the load of 10,640 lb. Finally, the bricks of the cantilever wall gave way under excessive shearing force, the wire reinforcement being likewise cut across.

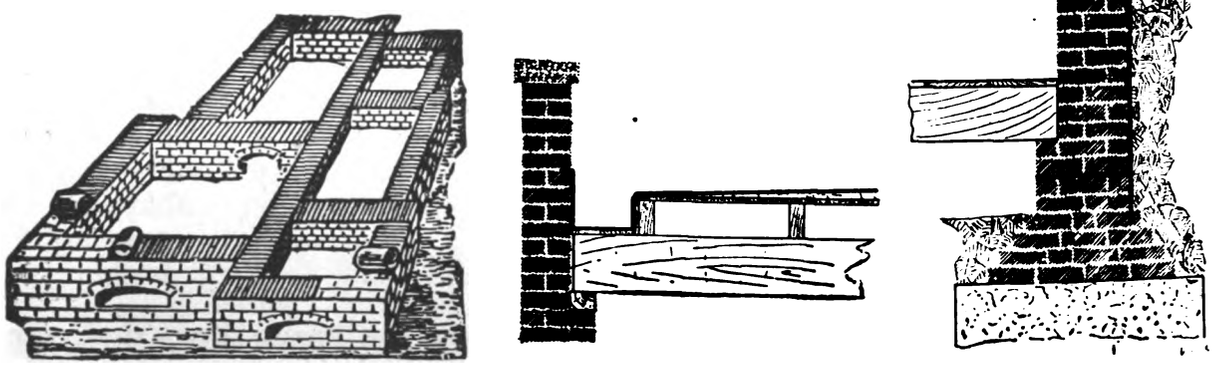


This remarkable result shows that the method of reinforcement is valuable and will permit of openings in brick walls being constructed of wide spans without the use of girders or arches to support the brickwork. This method of

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construction is new in England, but similar ones have been known in Germany for several years, and the system of Messrs. Rd. Johnson, Clapham & Morris is quite equal to the best German one that we have seen.

AN L.C.C. MAIN DRAINAGE CONTRACT.

THE London County Council on December 15, 1908, referred to the main drainage committee the undermentioned tenders for the construction of section 5 of the northern low-level sewer No. 2 between Grosvenor Crescent and Warwick Road, Kensington:—

A. N. Coles, Westbourne Park	£164,810 1 0
John Cochrane & Sons, Westminster	187,937 4 2
S. Pearson & Son, Ltd., Westminster	188,580 16 0
J. Mowlem & Co., Ltd., Westminster	189,712 0 0
G. Shellabear & Son, Plymouth	189,954 4 5
Kelletts, Ltd., Holborn	191,413 9 5

On December 22 the committee reported that it would be to the Council's advantage to obtain fresh tenders for the work. The Council, however, did not accept this recommendation and passed the following resolution:—"That the recommendation be referred back to the committee, with instructions to accept, on behalf of the Council, during the ensuing recess, the lowest of the tenders received for the construction of section 5 of the northern low-level sewer No. 2, on condition that the tenderer agrees to give preference in employment on casual or unskilled labour required for the work to men bona fide resident in the county of London, and that particulars of such tender and of the remaining tenders be subsequently reported to the Council."

In accordance with the foregoing instruction the main drainage committee accepted, on January 7, 1909, the tender submitted by Mr. A. N. Coles, subject to the conditions referred to in the Council's resolution. Mr. Coles at first refused to give the undertaking which the Council required with reference to the employment of London labour, but, as a result of further correspondence, he agreed to meet the Council's wishes in this respect on condition that he was allowed to make certain alterations in the schedule of prices contained in his tender. This course was not permitted, and on February 9, 1909, the Council decided to invite fresh tenders for the work.

The new tenders, which contained a clause providing that preference in employment on casual or unskilled labour required for the work should be given to men bona fide resident in the county of London, were as follows:—

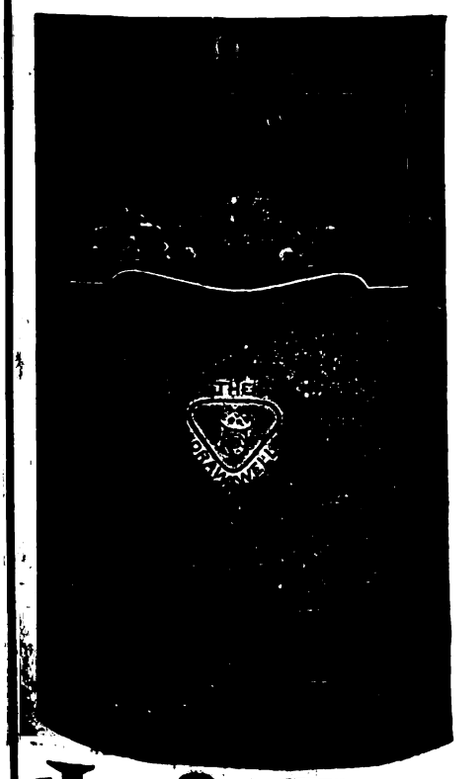
The Westminster Construction Company, Ltd., Westminster	£172,630 12 6
W. Muirhead & Co., Westminster	174,998 11 2
H. M. Nowell, Stockton-on-Tees	175,852 2 6
J. Mowlem & Co., Ltd., Westminster	177,782 0 0
John Cochrane & Sons, Westminster	182,698 6 2
S. Pearson & Son, Ltd., Westminster	183,147 18 6
G. Shellabear & Son, Plymouth	185,433 13 5
H. Kellett, Ealing	186,070 18 5
E. Bentley & Son, Leicester	187,453 12 3
Johnson & Langley, Leicester	198,667 11 6
Walter Scott & Middleton, Ltd., Westminster	205,437 0 0
Price & Reeves	207,036 16 11

The chief engineer's estimate comparable with the tenders is 172,750*l.*

The main drainage committee recommend that the tender of the Westminster Construction Company, Ltd., should be accepted. Also that an expenditure on capital account not exceeding 4,500*l.* be sanctioned for general incidental expenses, including the employment of resident and assistant engineers, clerks of works and inspectors required in connection with the supervision of the work referred to in the foregoing resolution.

THE Local Government Board has sanctioned a loan of 8,500*l.* for the erection of a new kursaal and pump-room at Matlock Bath. The total cost of the scheme will be over 30,000*l.* Building is to be commenced at once. The kursaal will occupy the best site in the town, and include a restaurant to seat 1,000, a roller-skating floor, a ballroom, a concert or theatre hall. Mr. F. W. Ackland Hodge, of 101 Gower Street, London, and Mr. Jno. Nuttall, of Matlock, are the joint architects for the scheme.

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This Grate can only be supplied through Builders' Merchants, Ironmongers, &c., but Drawings and Particulars can be obtained from

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London Showrooms, Saracen's Head Buildings, Snow Hill, City, where the "Drawwell" can be seen in action.
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THE "AERO" FIRE ALARM.

ANYONE about to instal a fire alarm in any premises and who is studying the various systems available should not omit to investigate the claims of the "Aero" alarm. This can best be done in the case of a London architect or engineer by a visit to 92 Queen Victoria Street, E.C., the central office of the Aero Fire Alarm, Ltd. Installations are also in use in some of the chief provincial cities as well as in various country mansions.

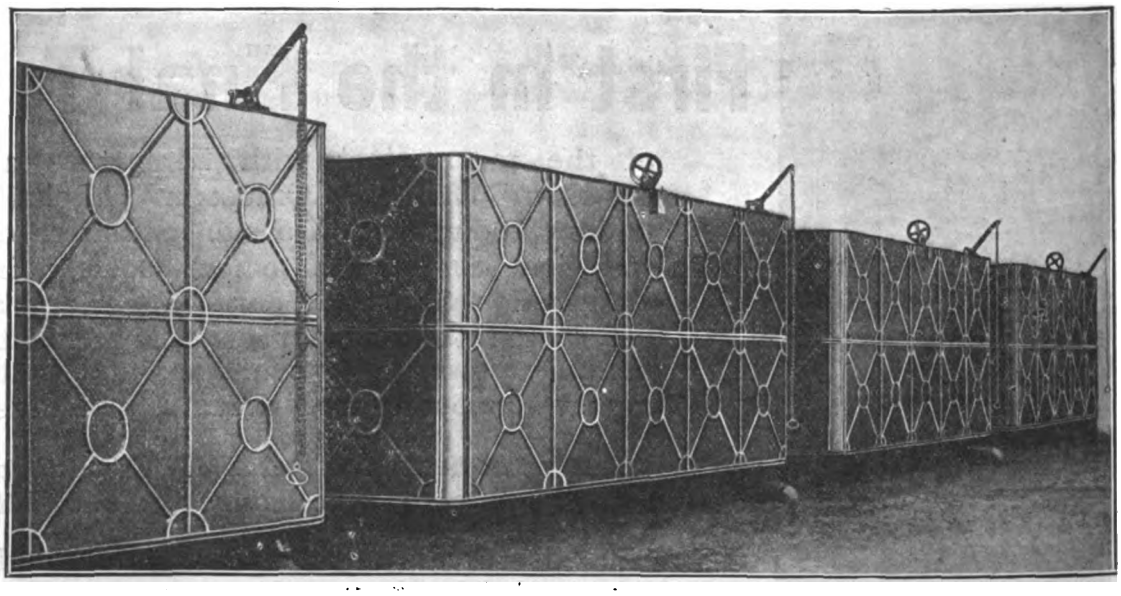
The alarm is remarkable for its simplicity. It consists of a wire-covered copper tube, one-tenth of an inch in outside diameter, which is run round the ceiling of the rooms of a building, and may be concealed from sight. It is carried through walls, or from floor to floor like an electric wire. Both ends of the tube go to an indicator board, where one is joined to the flat circular detector-chamber. One side of this chamber is made of a thin flexible disc, above which are two contacts, so that if the air pressure in the tube causes the disc to bulge, these contacts are brought together and close an electrical circuit. Near the detector-chamber is a "leak," connecting the tube with the outer air. This is closed more or less tightly, according to requirements, by a porous washer and an adjusting screw. The other end of the tube is joined to a testing pump with a push button and hand-wheel. The "leak" allows the air pressure inside the copper tube to fluctuate with the external atmosphere. When the temperature of a room is raised for working purposes by stoves, radiators, pipes or other means the increase is gradual and slow, and consequently the gradually expanding air inside the tube makes its escape through the "leak" and does not affect the flexible disc. In the event of an outbreak of fire, however, the increase is so rapid that the air has not time to escape before affecting the disc, which expands, an electrical circuit is made, and the alarm immediately sounds.

In the case of an independent installation such as would be put up in a country house, the alarm could be simultaneously raised on various parts of the building, in the stables, in the lodge, and in any other place where help would be forthcoming. In certain provincial towns there is a direct connection from the premises so protected to the fire station. The London County Council will not allow such a connection, so that a central office has been established at 92 Queen Victoria Street, which is in automatic communication with the various installations throughout London. If, for instance, a fire was to break out in the new Selfridge's Stores (one of the large buildings equipped with the "Aero" system), the alarm would be raised simultaneously at those premises and at Queen Victoria Street, where the signal would be transmitted to the fire brigade. Elaborate precautions are taken against any chance breakdown in the signal, and it would seem as if no failure were possible.

One striking feature of the alarm is its adaptability to different requirements, thanks to the "leak" with its adjusting screw, and to the variable distance between the disc and the two contacts. By these means an increased or a decreased susceptibility may be arranged as desired. Another feature is the simplicity and thoroughness of the tests which are made merely by operating the air-pump of the testing chamber; this creates a sudden momentary increase of air-pressure in the tube, similar to what happens on an outbreak of fire, and the alarm therefore is sounded in the same way. A third recommendation is its invisibility. The small tubing can be hidden in the cornice, or even carried under the plaster out of sight. This advantage must commend itself to those who are anxious not to spoil architectural effect by unsightly wires or thermostats. Finally, the system is approved by the fire offices committee, and insurance companies allow the maximum rebate where it is installed.

THE plans for the new slaughter-houses of the Edinburgh Corporation at Gorgie were passed by the Edinburgh Dean of Guild Court last week. The buildings are to be constructed chiefly of brick, with ferro-concrete roofs, with the exception of the lairages, which are intended to be of corrugated iron. The interior walls are to be tiled, with the exception of the refreshment rooms, while an overhead tracking for the conveyance of carcases is to be erected. Estimates have been accepted involving an outlay of 30,000*l*. The work has been begun, the contracts having been let to Messrs. James Kinnear, Sons & Co. It is expected they will complete their part of the work early next year. The plans were prepared by Mr. J. A. Williamson, city architect.

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DAM CONSTRUCTION IN NEW SOUTH WALES.

AT the ordinary meeting of the Institution of Civil Engineers on March 9, Mr. James C. Inglis, president, in the chair, a paper was read on "Concrete and Masonry Dam Construction in New South Wales" by Mr. L. A. B. Wade, M.Inst.C.E. The following is an abstract:—

In thirteen cases concrete walls curved in plan have been built for the storage of town water-supplies, the resistance of the material in the wall and the sides of the valley being relied upon for stability, and complex questions of stresses being disregarded. The formula used for determining the thickness of a wall at any level below the highest water-surface was

$$T = \frac{RP}{S},$$

in which T denotes the thickness at any level in feet; R, the radius in feet; P, the water-pressure in tons per square foot; S, the stress in tons per square foot. These vary as under for different materials, where D is the depth of water in feet:—$T = RD \times 0.0014$ when S is equal to 20 tons; $T = RD \times 0.0018$ when S is equal to 15 tons; $T = RD \times 0.0023$ when S is equal to 12 tons; $T = RD \times 0.0027$ when S is equal to 10 tons.

The cross-section would be a triangle, but in practice it is advisable to make the top not less than 3 feet 6 inches wide, increased according to the depth of water and the timber passing over in flood-time. The climatic conditions are against the formation of heavy ice.

Nine of the thirteen walls are curved for the whole of their length; of the rest, the Cootamandra has two tangents of gravity cross-section, and the Tamworth, Parkes and Woolongong walls each have one tangent of gravity cross-section. In all cases they abut against the rock sides of the gorges to their top levels. The gravity tangent at Parkes is constructed on a flat bench of rock at a level about 13 feet below the top of the wall, the thrust of the arched length being taken by the gravity length, assisted by an anchorage of steel rails placed vertically and connecting the wall to the rock foundation.

The horns of the curve are more or less fixed by local conditions, and a radius giving a versed sine of about one-third forms the most economical location between those points. When this rule will not apply, the radius may be advantageously altered to suit the configuration of the valley.

In two cases pressures of 24 and 25 tons per square foot have been allowed on hard granite, but later these limits have been reduced to 20 tons. Hard slate, sandstones, conglomerates and ironstones are limited to 15 or 12 tons per square foot, according to quality, and softer sandstones to 10 tons. These limiting pressures apply to the walls rather than the abutments, as the end of the wall can be splayed, thus reducing the pressure per unit area in the abutments. The walls in all cases are of Portland-cement concrete, with plums of greater resistance than the concrete, which is therefore the measure of the crushing resistance of the wall. The proportions of the concrete in all cases are 11½ cubic feet of sand, 10 cubic feet of shivers from ¾-inch to ⅛-inch gauge, and 13 cubic feet of metal of 1½-inch gauge. The results of tests of concrete gave a mean crushing resistance of 50 tons per square foot when mixed with soft sandstone and 100 tons with sound igneous rocks. It has been assumed that concrete in bulk offers a crushing resistance 1½ times greater than that of unsupported 6-inch cubes. The maximum pressures allowed on different materials give a factor of safety of 5 on results from unsupported 6-inch cubes, which, if the assumption of increased strength be correct, will be 7½ for concrete in bulk.

The section of a wall of 500 feet radius to resist 20 tons per square foot and of a wall of 270 feet radius to resist 10 tons per square foot closely approximates to that of a gravity wall for a similar depth of water. The author is of opinion that gravity walls should be made straight, a curve having no advantage as regards strength or adaptability to meet contraction sufficient to justify the increased quantities. The economical limit justifying substitution of curved for gravity walls is with radii somewhat less than the foregoing, bearing in mind the greater length of a curved as compared with a straight wall; thus the use of curved walls is restricted to comparatively narrow valleys and gorges.

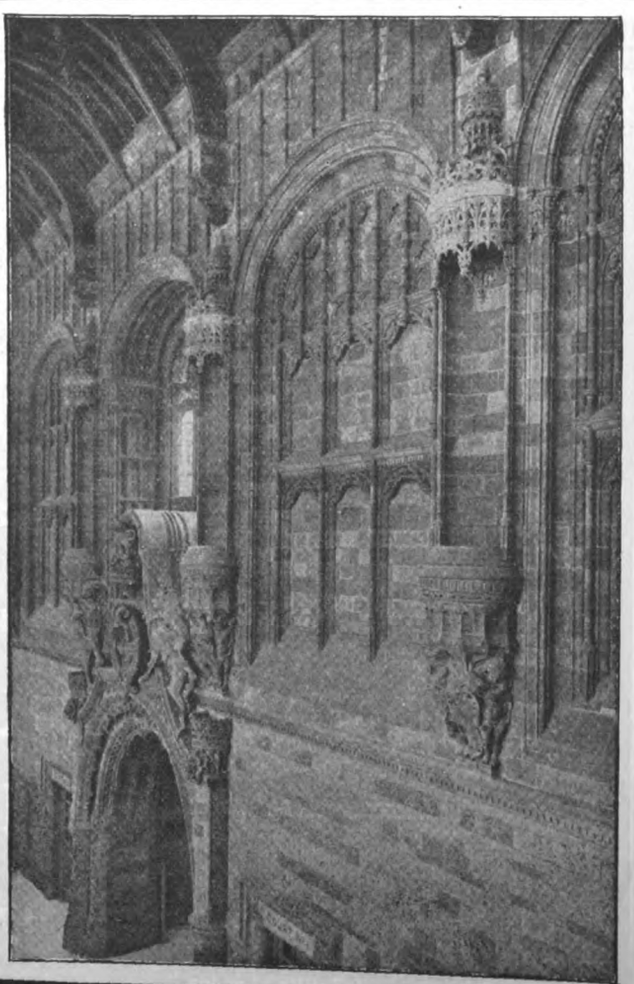
Igneous rocks as foundations proved the most impervious media against leakage. In the case of granite, all soft seams were followed up. In sandstones and conglomerates, the

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weaknesses were found along horizontal beds, and in cases leakage occurred under the flanks of walls, water entering some distance up-stream, the exit being some distance down-stream. In two instances short drives were carried under the flank of a wall to cut out weak places, being filled again with concrete and grouted through drill-holes under pressure. The worst leakages have been experienced in shale and slate.

The proportions of material used in concrete are sufficient for the required resistance at a minimum cost, but are not sufficiently impervious for a thin wall. In earlier walls a 6-inch facing of special concrete was placed on the up-stream side for watertightness. Subsequently it was found that by working the sloppy concrete in situ against the mould boards a skin was formed on the surface and a practically impervious wall was obtained. When, however, surplus water dried out, vertical cracks developed. Further experience showed that longitudinal contraction was less in a wall of concrete placed in situ fairly dry and well rammed, and that cracks either do not occur or occur only to a much less extent; but a skin could not be obtained and thin walls leaked excessively. It was found that two coats of neat cement applied as the timber was stripped gave good results and did not scale, owing to the absence of frosts.

Cracks have appeared more or less in the Parkes, Cootamundra, Tamworth, Wellington and Mudgee dams, but no failures have resulted. No cracks have appeared in any of the other dams.

The cracks in the Mudgee dam are more open than are those in dams constructed of dry concrete. Vertical cracks in all cases twist in their course, inwardly as well as vertically, and open and close with change of temperature; they almost disappear with high temperature and low water-level and cold temperature and high water-level, and open most with cold temperature and low water-level. They occur as a rule at quick changes of foundation level.

The author is of opinion that such vertical cracks, as they occur naturally, do not endanger the stability of the walls; but as they are likely to develop, it is better to provide parting joints to allow of the cracks forming on radial lines, spaced at intervals, than to allow them to occur naturally. Iron built horizontally into the top levels of walls has been suggested to prevent vertical cracks, but the author thinks this would lead to horizontal cracks. Iron might be built in if the parting joints were provided and if it did not cross the joints.

In the opinion of the author the experience gained of these structures since the first was completed in 1895 shows that curved walls relying for their stability on their resistance to crushing form a safe and economical means of storing large bodies of water.

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The highest estimated flood-level is 4 feet 6 inches over the spillway weir.

The material of which the dam is constructed is local Hawkesbury sandstone, and its maximum crushing-stress was limited to 8½ tons per square foot. A system of 6-inch rectangular conduits filled with broken stone, parallel to and about 6 feet back from up-stream face, was constructed to drain the interior of the wall, and these conduits were again drawn into 6-inch earthenware pipes laid at right angles to the wall, with exits on the down-stream face.

The sandstone, from experiments, gave a crushing strength of 276.3 tons per square foot on 12-inch cubes, unsupported.

Tests on concrete at ninety days gave an average of 113.5 tons, and mortar, for hearting, about 102 tons per square foot.

The remainder of the paper dealt with the construction of this dam.

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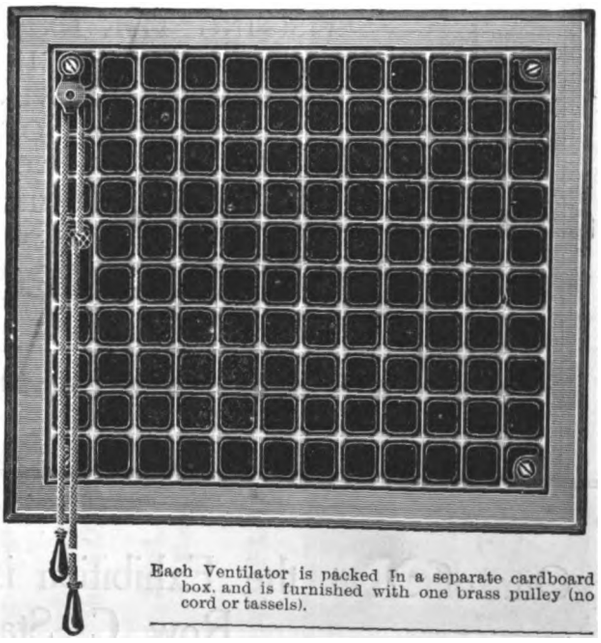
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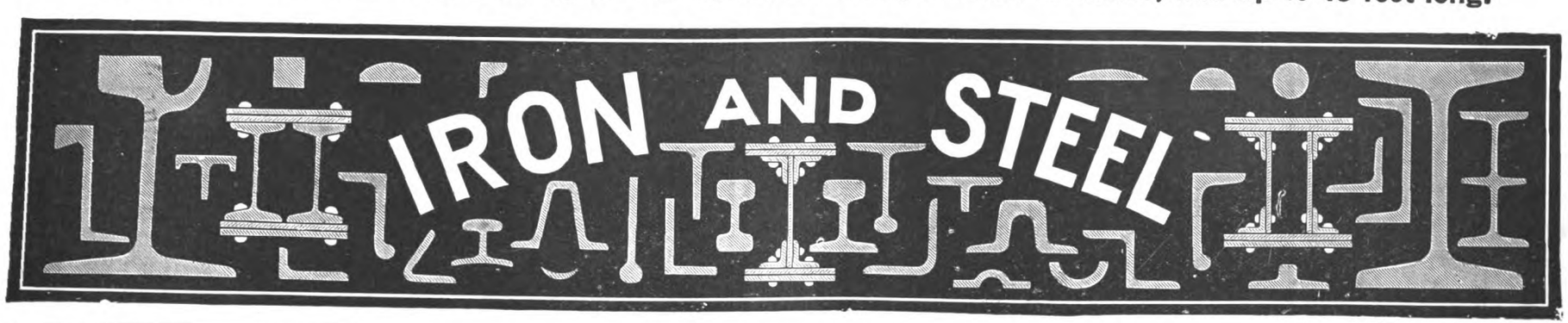
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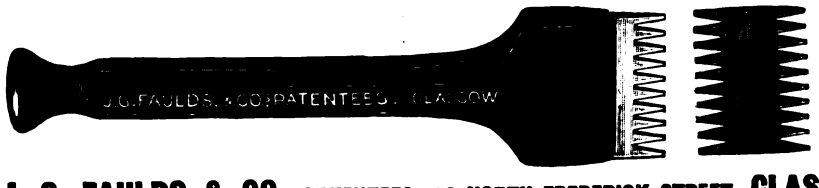
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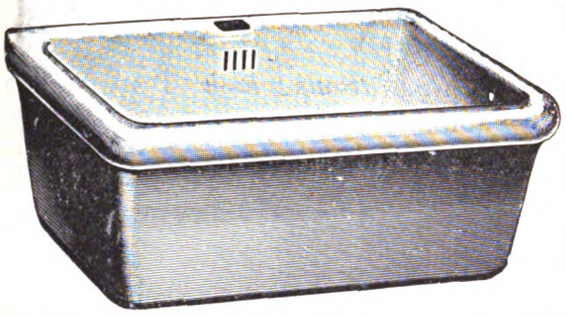
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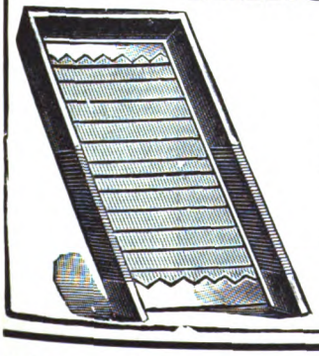
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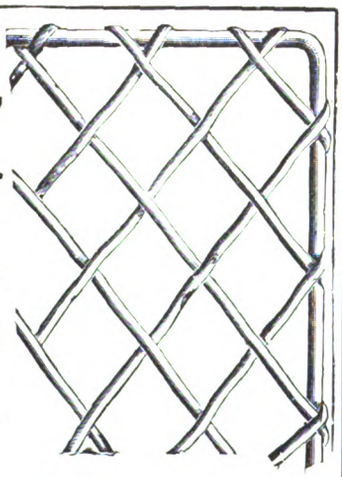
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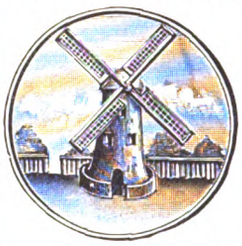
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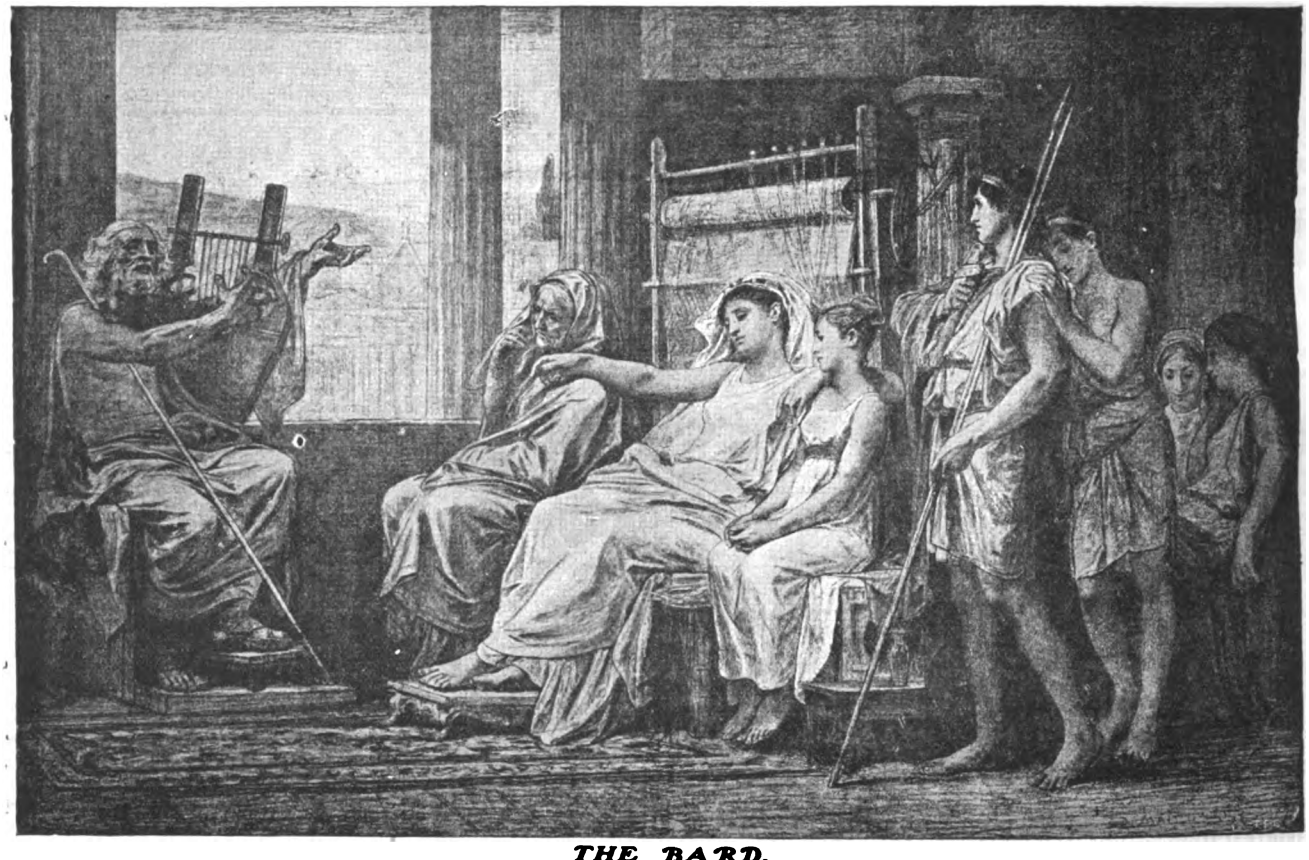
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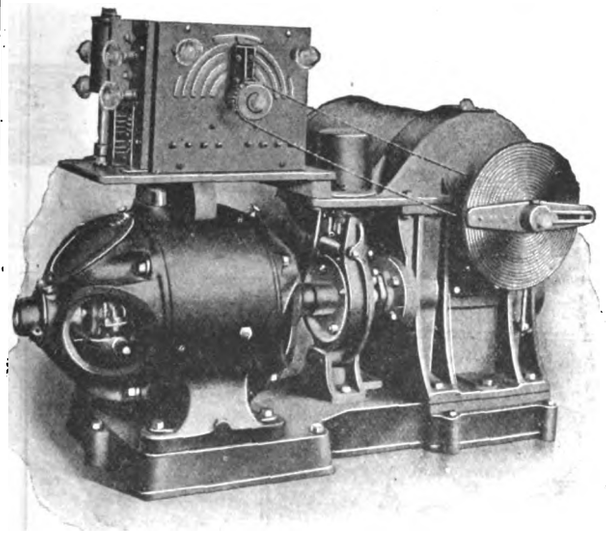
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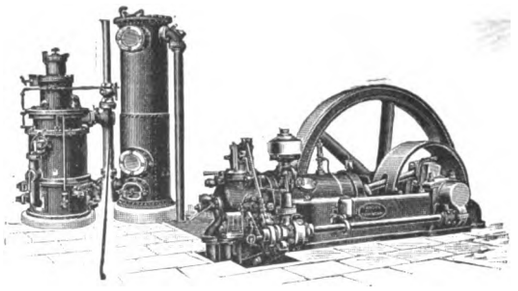
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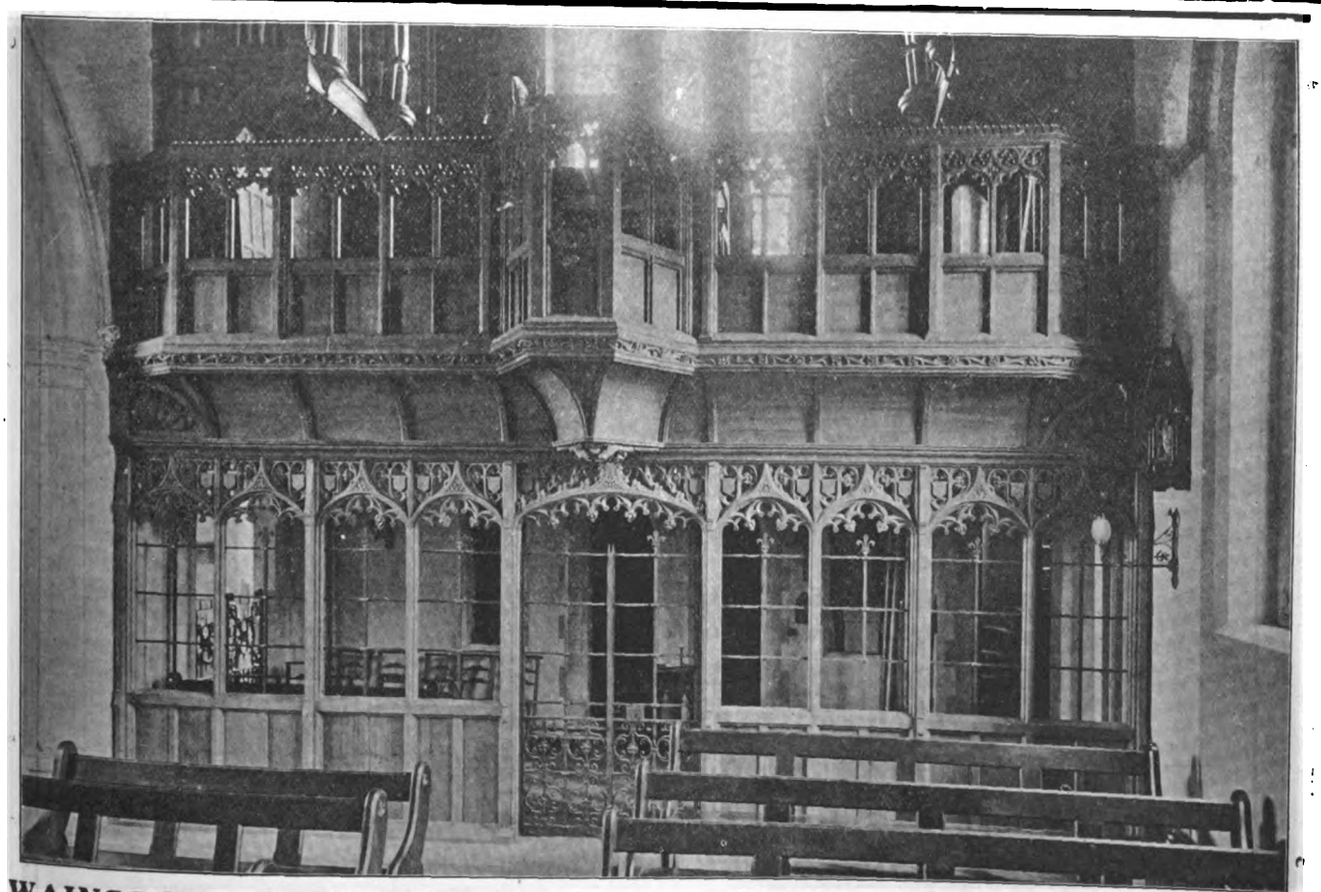


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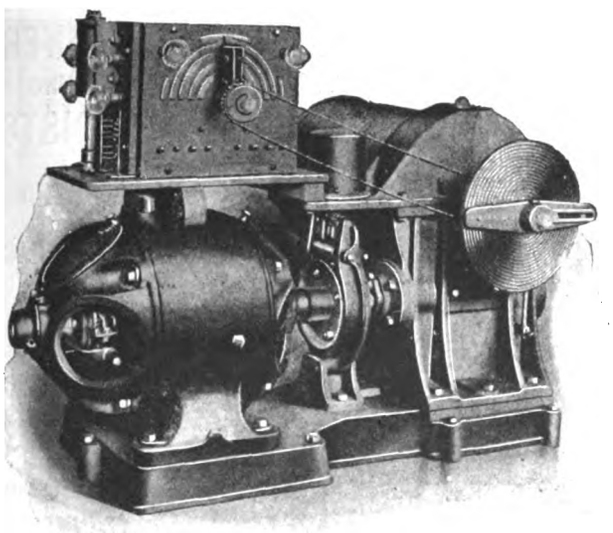
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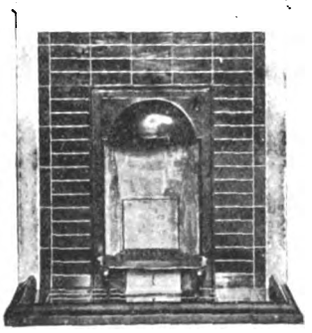
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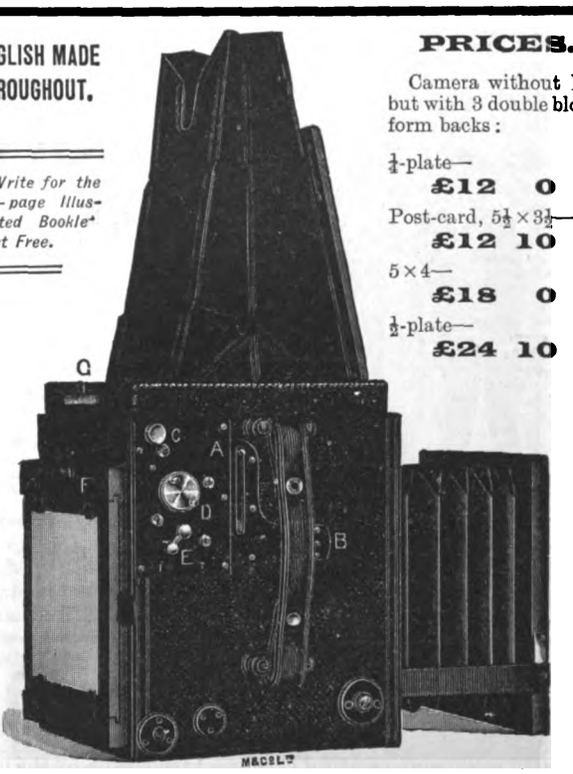
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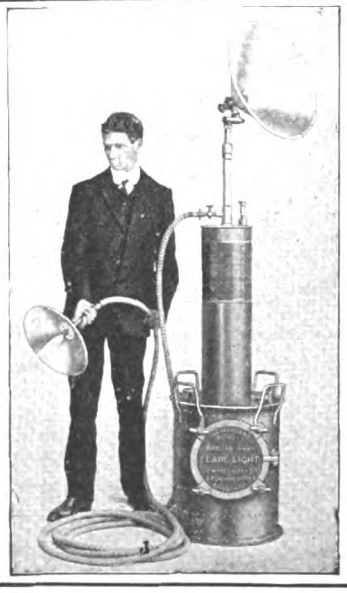
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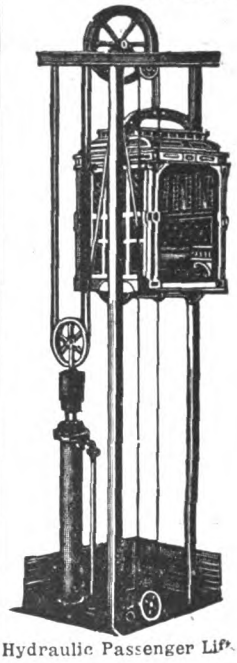
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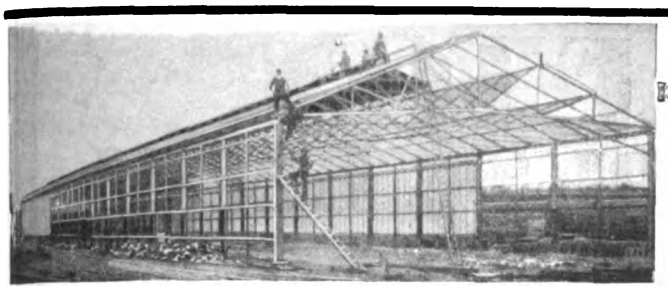
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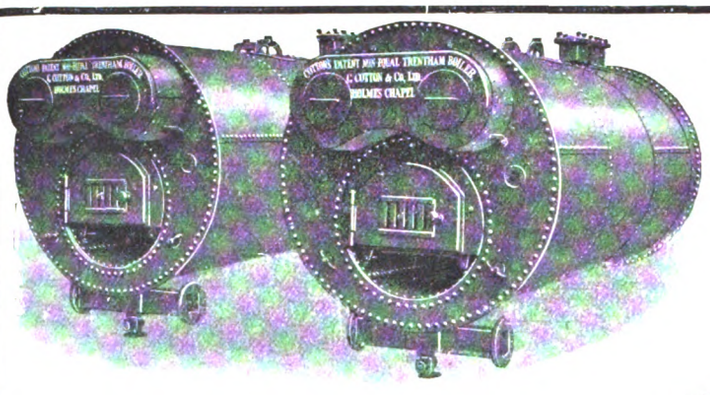
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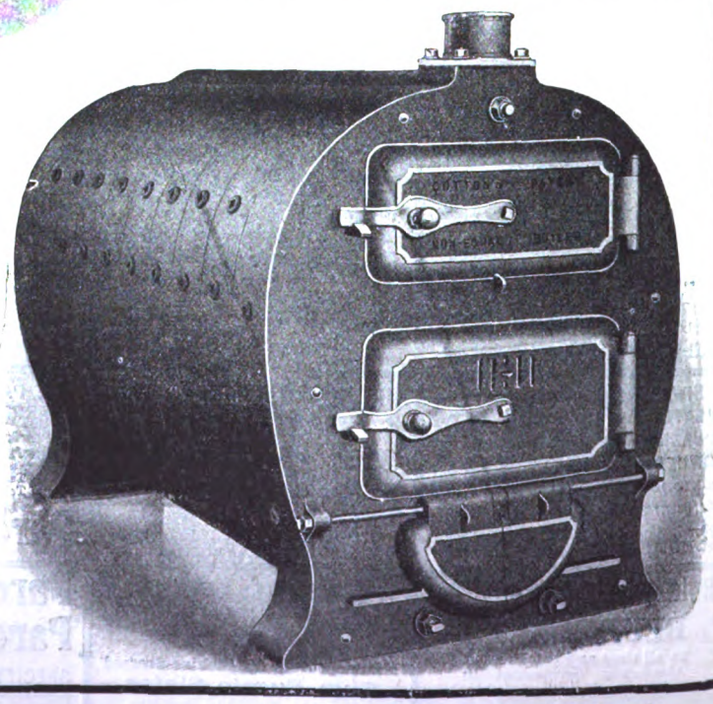


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Under no circumstances whatever can the Proprietors of this Journal guarantee alteration of copy if received after the first post on Tuesday mornings, and no proofs can be submitted if copy arrives later than first post on Saturday mornings.

EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

NOTICE.

Next Friday being Good Friday, THE ARCHITECT *will be published on Thursday. All advertisements intended for this Number must reach the Office not later than* 4 P.M. *on Wednesday, April* 7.

No alteration of advertisement copy can be allowed after Saturday morning, April 8.

COMPETITIONS OPEN.

EGREMONT.—The Wallasey Urban District Council invite designs from architects practising in Lancashire and Cheshire for Carnegie public library, Earlston Road, Liscard, Cheshire. Particulars on deposit of 2*l.*, to be refunded on receipt of designs or return of papers within seven days, from Mr. W. H. Travers, A.M.I.C.E., Public Offices, Egremont, Cheshire.

GLASGOW.—July 31.—The patrons of the Royal Incorporation of Hutchesons' Hospital invite designs for laying out for feuing and building about 195 acres of their lands of Thornliebank, Eastwood. Premiums of 100*l.*, 75*l.*, 50*l.* and 25*l.* will be awarded. Deposit 3*l.* 3*s.* Messrs. Hill & Hoggan, 194 Ingram Street, Glasgow.

READING. June 15.—The Berkshire County Council invite designs for offices, committee rooms, &c., on the Forbury, Reading. Mr. Mervyn Macartney, F.R.I.B.A., assessor. Premiums of 100*l.*, 75*l.*, and 50*l.* Deposit 1*l.* 1*s.* Apply to Mr. J. Fred Hawkins, county surveyor, Bank Chambers, Cross Street, Reading.

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APPLEBY.—April 13.—For mason, joiner, plumber, painter, plasterer, ironfounder and slater's work required in erection of elementary school at Appleby, Westmorland. Deposit 1*l.* Mr. James Hartley, architect, Swadford Chambers, Skipton.

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BEXHILL-ON-SEA.—April 16.—For the construction of a colonnade, shelters and bandstand, for the Corporation. Deposit 5*l*. Mr. George Ball, A.M.I.C.E., borough surveyor, Town Hall, Bexhill.

BINGLEY.—April 5.—For erection of a training college at Bingley, Yorks (whole or separate tenders). The West Riding Architect, County Hall, Wakefield. Deposit 1*l*. with the West Riding Treasurer, County Hall, Wakefield.

BIRKDALE (LANCS.).—April 5.—For new aisles and vestries, St. John's Church, whole or separate trades. Messrs. Austin & Paley, architects, Lancaster.

BRAMPTON.—April 14.—For small alterations at the Brampton police station, Cumberland. Mr. George Dale Oliver, county architect, Carlisle.

BRIGHAM (CUMBERLAND).—April 5.—For the joiner's work, plumbing, glazing and painting for two houses at Brigham. Messrs. W. G. Scott & Co., architects and surveyors, Workington.

BRISTOL.—April 8.—For the construction and maintenance for twelve months after completion, of (1) A steel-framed building covered with galvanised corrugated iron; (2) a small brick building; (3) a small wooden office, at the Royal Edward Dock. Mr. W. W. Squire, engineer, Cumberland Road, Bristol. Deposit 3*l*. with the Secretary of the Docks Committee, 19 Queen Square, Bristol.

BURY.—April 17.—For erection of fifty cottages (five pairs each of five types), Bolton Road, for the Corporation. Deposit 2*l*. Mr. Arthur W. Bradley, A.M.I.C.E., borough engineer and surveyor, Bank Street, Bury, Lancs.

CAISTOR.—April 8.—For erection of Grammar School, Caistor, Lincolnshire. Mr. Ernest Whitlock, architect and surveyor, 26 Scale Lane, Hull.

CHARTHAM DOWNS.—April 29.—For the erection of recreation-rooms and other works at the Kent County Lunatic Asylum. Deposit 5*l*. Mr. W. J. Jennings, architect, 4 St. Margaret's Street, Canterbury.

COMBE HAY.—April 14.—For building Council school at Combe Hay, Somerset. Mr. W. F. Bird, Midsomer Norton.

DARTMOUTH.—April 6.—For alterations, &c., at Shepleigh's Gift, Coombe. Mr. E. H. Back, C.E., M.S.A., architect and surveyor, Dartmouth.

DEWSBURY.—April 6.—For the mason, joiner, plumber, slater, plasterer, painter, heating and electric lighting engineer's trades in Nurses' Home. Messrs. W. Hanstock & Son, architects, Branch Road, Batley.

DEWSBURY.—April 8.—For the various works required in erection of three houses at Northfields. Messrs. Kirk, Sons & Ridgway, F.R.I.B.A., architects, surveyors and valuers, Market Place, Dewsbury.

DUDLEY.—April 17.—For erection and completion of a high school for girls (accommodation about 350 places). Deposit 3*l*. 3*s*. Apply to Mr. J. Hutchings, architect and surveyor, County Education Offices, Stafford.

EDINBURGH.—April 5.—For new service stair and other internal alterations in Council offices, Castle Terrace. Mr. R. M. Cameron, architect, 53 Great King Street, Edinburgh.

EDINBURGH.—April 7.—For the equipment and complete fitting up of the new slaughter-houses at Gorgie. Deposit 5*l*. 5*s*. Mr. J. A. Williamson, A.R.I.B.A., Public Works Office, City Chambers, Edinburgh.

EMBLETON.—April 14.—For the various works required in erection of a villa at Embleton, Cumberland. Messrs. W. G. Scott & Co., architects and surveyors, 2 Park Lane, Workington.

DURHAM.—April 13.—For (1) Cookery centre at Esk, Mr. F. E. Coates, Shire Hall, Durham. (2) Alterations at Annfield Plain infants' Council school, Mr. W. Rushworth, Shire Hall, Durham.

EXMOUTH.—April 7.—For additions to a furniture store in Tower Street, and for forming a covered shed at the back of Victoria Road. Messrs. Crews & Son, 4 Rolle Street.

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Felton.—April 5.—For various works required in erection of two dwelling houses. Mr. Fenwick Dobson, Front Street, Felton, Northumberland.

Gainsborough, &c. (Lincs.).—April 16.—For erection of, or additions to, elementary schools, for the Lindsey County Council education committee, viz.:—Ropery Road, Gainsborough (new block); South Killingholme (new school with teacher's house); Skegness Council (additions); Crosby (additions). Deposit 2*l.* 2*s.* in each case. Send names by April 5 to Messrs. Scorer & Gamble, architects, Bank Street Chambers, Lincoln.

Gateshead.—April 6.—For alterations and additions to the infirmary at the workhouse, Bensham. Messrs. Newcombe & Newcombe, architects, 89 Pilgrim Street, Newcastle-upon-Tyne.

Harrington.—April 5.—For the slating, plumbing, plastering, glazing and painting of a house at Harrington, Cumberland. Messrs. W. G. Scott & Co., architects and surveyors, Workington.

Hinckley.—April 6.—For erection of public baths at the rear of the Council Offices. Deposit 2*l.* 2*s.* Mr. E. H. Crump, A.M.I.C.E., engineer and surveyor, the Council Offices, Hinckley.

Hull.—April 5.—For additions to the "Phœnix" Printing Works, Manor Street. Deposit 1*l.* Mr. Arthur Easton, architect, 7 Land-of-Green-Ginger, Hull.

Ilford.—April 5.—For taking down the temporary school in Uphall Road, and removing and re-erecting same partly on the South Park school site in Water Lane, and partly at Little Heath, Goodmayes. Deposit 2*l.* 2*s.* Mr. H. Shaw, M.I.C.E., Town Hall, Ilford.

Ireland.—April 3.—For building eighteen single labourers' cottages, two double cottages, and for fencing sixteen plots. Deposit 5*s.* Mr. R. Goodbody, clerk to the Cloneygowan Rural District Council, Mountmellick.

Ireland.—April 7.—For building two dwelling houses in Catherine Street, Limavady, adjoining Orange Hall. Messrs. R. E. Buchanan & Co., architects, Castle Street, Londonderry.

Ireland.—April 7.—For erection of a pair of labourers' cottages in the Rathdown No. 1 rural district. Payment 5*s.* Mr. P. Cunniam, clerk to the rural district council, Loughlinstown.

Ireland.—April 7.—For alterations and improvements to Newton Stewart parish church. Messrs. R. E. Buchanan & Co., architects, Castle Street, Londonderry.

Ireland.—April 10.—For alteration and extension of Dungiven Presbyterian Church. Mr. Samuel Macartney, architect, Dungiven, Ireland.

Lockerley.—April 3.—For erection of two small brick bridges at Lockerley, near Romsey. Deposit 2*l.* 2*s.* Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

London.—April 15.—For erection of municipal buildings in Cambridge Road, Bethnal Green, N.E. Deposit 2*l.* 2*s.* Mr. E. E. Finch, borough engineer and surveyor, Town Hall, Bethnal Green, N.E.

Lower Shelf.—April 7.—For erection of a cottage at Lower Shelf, near Halifax. Mr. G. Reginald Oddy, architect, Northowram, Halifax, Yorks.

Nottingham.—April 10.—For building a Bulwell stone boundary wall, also for certain structural alterations to cottages in Brewhouse Yard, and to buildings in yard adjoining the Castle Waterworks works, Castle Boulevard. Deposit 1*l.* 1*s.* Mr. F. W. Davies, water engineer, St. Peter's Church Side, Nottingham.

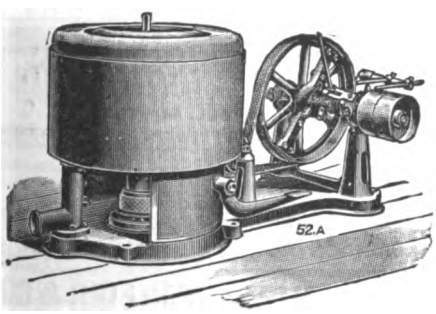
Radcliffe.—April 24.—For erection and completion of Council offices at Radcliffe, Lancs. Deposit 2*l.* 2*s.* Mr. W. M. Gillow, 66 Deansgate, Manchester, and Mr. R. Holt, 8 Victoria Street, Liverpool, architects.

St. Thomas.—April 6.—For the erection of Sunday-school buildings for the Trustees of Wesleyan Methodist Extension. Send names to Mr. Harbottle Reed, F.R.I.B.A., 12 Castle Street, Exeter.

Scotland.—April 7.—For the mason, carpenter, plumber, and slater's work of additions and alterations at the farm steading of Overtown, Pluscarden, Elgin. Mr. John Wittet, architect, Elgin.

Scotland.—April 8.—For mason, carpenter, plumber, slater, plaster, and painter's work of cottages to be erected at Easter Coltfield, Alves. Mr. John Wittet, architect, Elgin, N.B.

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SCOTLAND.—April 9.—For the mason, carpenter, slater, and cement works of reconstruction of steading at Brownhills, Elrick, Newmachar. Messrs. Burnett & Reid, 12 Golden Square, Aberdeen.

SCOTLAND.—April 10.—For the brick, joiner, plumber, plaster and slater, at licensed premises, Glencraig. Mr. James T. Scobie, architect, Dunfermline and Lockelly.

SCOTLAND.—April 13.—For reinforced concrete foundations, raft and walls of swimming bath at West Protection Wall, Dundee. Mr. J. Thomson, city engineer, 91 Commercial Street, Dundee.

SHERBURN HILL.—April 3.—For erection of new premises for the Sherburn Hill Co-operative Society, Ltd. Forward names to Mr. J. Walton Taylor, F.R.I.B.A., St. John Street, Newcastle-on-Tyne.

SLOUGH.—April 3.—For internal alterations to Cedar House. Deposit 1*l.* 1*s.* The Surveyor to the Council, Mackenzie Street, Slough.

STOKESLEY.—April 17.—For alterations and additions to the police station. Apply by April 7 to Mr. Walter H. Brierley, 13 Lendal, Yorks.

SURBITON.—April 26.—For erection and completion of extensions to the Electricity works in Ewell Road. Mr. John Armitage, architect, Sanctuary House, Westminster. Send names and 5*l.* deposit by April 14 to Mr. F. J. Bell, deputy clerk, Ewell Road, Surbiton.

TRURO.—April 6.—For construction of a retaining wall on the south side of Station Road, opposite to railway station. Deposit 1*l.* Mr. Fredk. A. Barnes, A.M.I.C.E., city engineer and surveyor, Municipal Buildings, Truro.

TRURO.—April 10.—For completing the tower of St. Paul's church. Rev. W. G. Kerr, St. Paul's Vicarage, Truro.

WALES.—April 5.—For building a police station at Tonyrefail, Glamorgan. The County Offices, Westgate Street, Cardiff.

WORSBOROUGH.—April 6.—For the whole or any portion of the works in erection of ten houses on Sheffield Road, Worsborough, Yorks. Mr. Arthur Whitaker, architect, Saville House, Worsborough Bridge, near Barnsley.

WALES.—April 6.—For erection of fifty or more cottages at Ebbw Vale, Mon. Mr. Wm. Harris, architect and surveyor, Bank Chambers, Bargoed.

WALES.—April 6.—For erection of farm buildings at Tyr-Rhos, Llwydcoed, Aberdare. Deposit 1*l.* 1*s.* Mr. J. Llewellin Smith, M.S.A., architect, Aberdare.

WALES.—April 6.—For erection of a new bathroom, &c., at Bay View, Tenby. Mr. J. Preece James, architect, Tenby.

WALES.—April 7.—For erection of the Glynn Vivian Art Gallery in Alexandra Road, Swansea. Deposit 5*l.* 5*s.* Send names to Mr. Glendinning Moxham, F.R.I.B.A., 39 Castle Street, Swansea.

WALES.—April 7.—For erection of two semi-detached villas at Monk Street, Aberdare. Mr. Thomas Roderick, architect, Clifton Street, Aberdare.

WALES.—April 7.—For erection of ten houses at Monk Street and Trevor Street, Aberdare. Mr. Thomas Roderick, architect, Clifton Street, Aberdare.

WALES.—April 8.—For erection of forty houses at Penmain, near Blackwood, Mon. Messrs. Webb & Davies, joint architects, High Street, Blackwood, Mon.

WALES.—April 8.—For erection of three shops, with offices over, at Mill Street, Pontypridd. Deposit 2*l.* 2*s.* Messrs. A. O. Evans, Williams & Evans, architects, Pontypridd.

WALES.—April 9.—For certain work at the Old County Prison, Haverfordwest, and for alterations, painting, and drainage work at the police station, Milford Haven. Mr. Arthur H. Thomas, assistant county surveyor, Pembroke.

WALES.—April 10.—For construction of a cattle market, sheds, boundary walls and other appurtenant work, at Narberth. Mr. J. Preece James, architect, Tenby.

WALES.—April 10.—For alterations to Caledffrwd, Clwytybont, Carnarvon. Mr. Ellis F. White, architect and surveyor, 17 Bridge Street, Carnarvon.

WALES.—April 12.—For erection of thirty or more cottages at Gelligaer Village. Mr. Wm. Harris, architect and surveyor, Bank Chambers, Bargoed.

WALES.—April 12.—For pulling down old buildings, and the erection of a Masonic lodge on the site at Narberth. Mr. J. Preece James, architect, Tenby.

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WALES.—April 14.—For erection of a butter stores, dwelling house, out-offices and boundary walls at Whitland. Mr. J. Preece James, architect, Tenby.

WALES.—April 14.—For church and hall to be erected at Ynysybwl. Deposit 1*l.* 1*s.* Send names to Mr. T. E. Richards, A.R.I.B.A., architect, Pontypridd.

WALES.—April 15.—For erection of a dwelling house at Tabernacle Road, Burry Port. Mr. A. Wilcox, Old Harbour, Burry Port.

WALES.—April 21.—For erection of a hall and classrooms at the Pisgah church, Talywain. Mr. D. J. Lougher, architect, Bank Chambers, Pontypool.

WELLING.—April 10.—For erection of a branch public library in Bellegrove Road, Welling, Kent. Deposit 1*l.* 1*s.* Mr. Thos. G. Baynes, clerk, Council Offices, Bexley Heath, Kent.

WEST AUCKLAND.—April 8.—For the whole or any portion of the work required in erection of a church hall. Mr. F. H. Livesay, architect and surveyor, Newgate Street, Bishop Auckland.

WHITTINGTON MOOR.—April 3.—For Council schools at Whittington Moor, near Chesterfield, to accommodate 432 infants. Deposit 1*l.* 1*s.* Mr. George H. Widdows, A.R.I.B.A., architect to the committee, St. Mary's Gate, Derby.

YORKS.—April 13.—For the following works for the education committee of the East Riding of York, viz.: (1) Erection of a Council school to accommodate eighty-nine children at Wawne. Deposit 1*l.* 1*s.* (2) Erection of a cloak room, &c., at the Council school at Burstwick. (3) Alterations and additions to the Council schools at Ryhill-cum-Camerton. The building surveyor, County Hall, Beverley.

MR. C. HOGG, C.E., Glasgow, has been appointed by the Aberfeldy water committee to report upon the various schemes submitted for an increased water supply for the burgh. Mr. Hogg will also act as consulting engineer in connection with the proposed drainage scheme for Dunfermline brought about by the dock extensions at Rosyth.

TENDERS.

BARNOLDSWICK.

For extension of sewage outfall works (Contract No. 1). Mr. W. BENNETT, engineer, Barnoldswick.

Kirk	£5,656 17 10
Nayler & Son	5,500 0 0
Firth & Co.	5,096 6 3
Bushby & Sons	5,065 1 7
Waring & Sons	4,903 0 0
Dent & Sons	4,830 16 11
Clegg Bros.	4,790 3 8
Brigg	4,751 14 0
Sugden	4,747 4 6
WARD & TETLEY, Bradford (*accepted*)	4,738 17 11
Brassington Bros. & Corney	4,701 5 6
Graham & Sons	4,560 0 0

BASINGSTOKE.

For alterations and additions to premises, Church Street, for the Conservative and Unionist Association. Mr. W. ROLAND HOWELL, F.R.I.B.A., Reading, and 18 Percy Street, W.

General building works.

Tigwell	£1,311 0 0
Mussellwhite & Sapp	1,297 0 0
Tarrant	1,281 10 0
Sutton & Co.	1,245 14 0
Jennings	1,195 10 0
Harris	1,129 0 0
Goodall & Co. (*recommended*)	1,118 15 0

Painting and decorating.

Doman & Sons (*recommended*)	92 10 0

BRIGG.

For making-up of Saw Mill Lane. Mr. E. K. CLARK, surveyor.

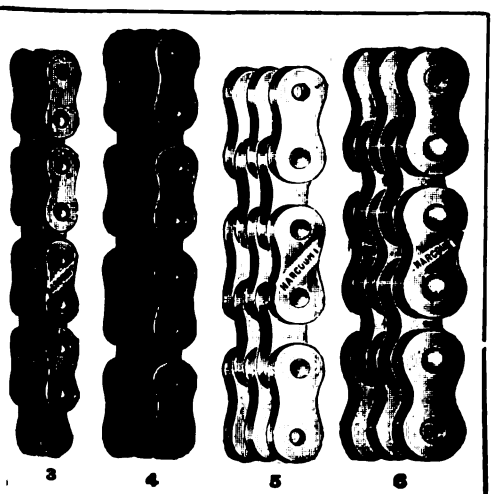
Huntsman	£1,438 9 6
Brumby, Robinson & Son	1,310 12 6
Milnes, Son & Co.	1,140 0 0
Sykes	1,088 0 0
Medforth	970 0 0
SANGUIN, Grimsby (*accepted*)	938 8 2

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The New Library, Pollokshields.
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The Dykebar Asylum, Paisley.
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For erecting a chancel, with vestries, &c., at St. Anne's, Brislington. Mr. H. M. BENNETT, architect, Bristol.

Blackmore	£1,635 0 0
Stephens & Bastow	1,627 0 0
Martin & Son	1,550 0 0
Tanner & Son	1,537 0 0
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Hayes & Sons	1,443 0 0
Forse & Sons	1,429 0 0
Chorley & Son	1,415 6 10
WILKINS & SONS, Bristol (*accepted*)	1,364 0 0

CLECKHEATON.

For the erection of secondary and technical school. Mr. W. H. THORP, architect, Phœnix Chambers, South Parade, Leeds.

Accepted tenders.

Robinson & Crowther, mason, bricklayer and excavation work	£6,699 10 0
Isherwood, carpenter and joiner	1,401 16 0
Nutter, plumber and glazier	1,239 0 0
Clapham & Walker, painter	142 18 0
Birkett, electrical work	182 10 0

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EAST FERRY.

For building an elementary school at East Ferry, Lincs. Messrs. SCORER & GAMBLE, architects, Lincoln.

Hickman	£703 0 0
Nicholson	681 18 7
Elmes	625 0 0
Selby	610 0 0
Waite	606 10 0
Harpham	606 0 0
Scarborough	604 16 4
Cooling	603 0 0
Kelsey	599 0 0
PUMFREY, Gainsborough (*accepted*)	573 0 0

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For erecting premises. Quantities by Mr. C. W. BELL, architect, Sunderland.

LUMSDEN, Jarrow (*accepted*)	£1,270 0 0

ENFIELD.

For erecting houses, Ladbroke and Alberta Roads. Mr. F. BETHELL, architect and surveyor, Enfield, Middlesex.

		Paving.
Burrage	£4,095 0 0	£51 0 0
Fairhead	4,030 0 0	32 0 0
Randall	3,850 0 0	29 0 0
Hall Bros.	3,728 13 0	75 0 0
Monk	3,725 0 0	45 0 0
Lea	3,165 0 0	12 0 0
HALL (*accepted*)	2,835 0 0	15 0 0

GUNTHORPE.

For building an elementary school at Gunthorpe, Lincs. Messrs. SCORER & GAMBLE, architects, Lincoln.

Hickman	£713 0 0
Nicholson	664 15 10
Elmes	620 0 0
Waite	604 10 0
Burrell	600 0 0
Scarborough	598 4 0
Perks & Son	598 0 0
Cooling	587 15 0
Kelsey	587 0 0
Pumfrey	573 0 0
MOODY BROS., West Stockwich (*accepted*)	570 13 2

HOUNSLOW.

For private street works, Victoria Avenue. Mr. J. G. CAREY, engineer, Hounslow.

Wimpey & Co.	£1,053 0 0
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Champniss & Co.	4,856	11	0
Ewart	4,648	13	1
Acme Flooring and Paving Co. (1904)	4,342	11	1
Ballard	4,287	3	0
Brummell	4,217	6	5
Hamiltons	4,209	17	2
Adams	4,150	19	11
Griffiths & Co.	4,138	12	9
Mowlem & Co.	4,098	16	5
Powdrill	4,097	17	2
Williams	3,968	18	2
Watson	3,871	16	0
Pedrette & Co., Finsbury Park, N. (*accepted*)	3,577	6	10

IRELAND.

For the erection of seventy-five houses as municipal artisans' dwellings at Glasthule, for the Kingstown Urban Council.

Hall & Co., Dublin (*accepted*)	£6,339	0	0

For erecting a technical school and free library, Hamilton Road, Bangor. Mr. E. L. Woods, C.E., architect, Bangor.

Hutchinson & Keith	£3,187	0	0
J. & W. Stewart	3,169	0	0
Campbell & Son	2,995	0	0
Courtney & Co.	2,920	0	0
J. & R. Thompson	2,898	0	0
Kidd	2,890	0	0
Thornbury Bros.	2,839	0	0
Paisley & Sons	2,835	0	0
McRoberts & Armstrong	2,786	19	4
Copeland	2,707	0	0
McIntyre Bros.	2,706	0	0
Dowling, Belfast (*accepted*)	2,625	12	3

LICHFIELD.

For private street works at Chose Terrace.

Atkins, Walsall (*accepted*)	£2,642	0	0

LONDON.

For setting back the premises Nos. 39 and 40 Bartholomew Close, for the widening of Kinghorn Street, for the Corporation.

Patman & Fotheringham	£951	0	0
H. & E. Lea	818	0	0
Shaw	624	0	0
Stevens	623	0	0
Lawrence & Sons	541	0	0
Ashby & Horner	495	0	0
Fryer & Co.	475	0	0
Nash	469	0	0
Wagstaff & Sons	457	0	0
Staines & Co.	433	0	0
Smith & Son (*accepted*)	389	0	0

For condenser pipe work (partly subaqueous), settling-tanks, valve chamber and river wall at Blyth's Wharf, for the Stepney Borough Council.

Mowlem & Co.	£12,901	0	0
Docwra & Son (the Diamond drill)	12,496	0	0
Pedrette & Co.	11,900	0	0
Rigby	10,500	0	0
Nott	8,953	17	4
Pedrette	8,900	0	0
Muirhead & Co.	8,419	19	6
Webb & Co.	8,307	17	9
Cochrane & Sons	8,219	0	0
Perry & Co. (Bow)	7,890	0	0
Aird & Sons	7,726	0	0
Jackson (*recommended*)	6,900	0	0
Handman & Co.	5,500	0	0

For the provision of a new working barrel, bucket, one new pump-rod and the execution of certain general repairs to the well pump of No. 2 engine, Orpington, for the Metropolitan Water Board.

Simpson & Co. (delivery 11 weeks)	£180	0	0
Thames Ironworks Shipbuilding and Engineering Co. (delivery 6-7 weeks) (*accepted*)	138	10	0
Seagers (delivery 12 weeks)	128	0	0

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LONDON—*continued.*

For surface-water drainage, kerbing, paving, &c., for the Hendon Urban District Council. Mr. S. Slater Grimley, engineer and surveyor.

Cross roads improvements.

Muirhead & Co.	£2,147	13	6
Champniss & Co.	1,815	15	0
Ewart	1,769	13	9
Acme Flooring and Paving Co. (1904)	1,722	12	9
Paterson	1,721	9	7
Griffiths & Co.	1,637	18	6
Watson	1,586	19	6
Brummell	1,567	2	5
Ballard	1,537	5	9
Williams	1,523	2	0
Hamiltons	1,515	6	2
Powdrill	1,479	12	8
Mowlem & Co.	1,447	18	3
Adams	1,417	5	11
Pedrette & Co.	1,383	4	8

Golder's Green, N.W., drain.

Muirhead & Co.	3,364	11	0
Paterson	3,187	12	6
Champniss & Co.	3,039	16	0
Ewart	2,878	19	4
Ballard	2,749	17	3
Adams	2,733	14	0
Hamiltons	2,694	11	0
Mowlem & Co.	2,650	18	2
Brummell	2,650	4	0
Acme Flooring and Paving Co. (1904)	2,619	18	4
Powdrill	2,618	4	6
Griffiths & Co.	2,500	14	3
Williams	2,445	16	2
Watson	2,285	16	6
Pedrette & Co. (*accepted*)	2,194	2	2

For the provision of a spare armature for Nos. 2 and 3 dynamos at Blackwall Tunnel.

Crompton & Co.	£252	0	0
Sneath	205	0	0
Westminster Engineering Co. (*recommended*)	184	0	0

LONDON—*continued.*

For the repainting of Westminster Bridge, for the L.C.C.

Inns	£3,156	0	0
Bagnall & Sons	2,786	5	3
Beaumont & Sons	2,670	0	0
Woollaston Bros.	2,499	13	10
Dudley	2,387	8	6
Vigor & Co.	2,383	0	0
Mowlem & Co.	2,322	0	0
Proctor & Sons (*recommended*)	2.137	6	5
Downham	1,822	19	1
Chief engineer's estimate	2,500	0	0

For erection of new iron buildings and other works at Swaffield Road, Wandsworth, S.W.

Hyde & Co.	£5,161	0	0
Fitt	4,960	0	0
Hawkins & Co.	4,720	0	0
Wire-Wove Roofing Co.	4,700	0	0
General Building Co	4,647	0	0
General Iron Foundry Co	4,588	0	0
Harbrow	4,570	0	0
Wall, Summerstown, S.W. (*accepted*)	4,106	0	0

For paving the roadway and footways of Kinveachy Gardens (part of), for Greenwich Borough Council.

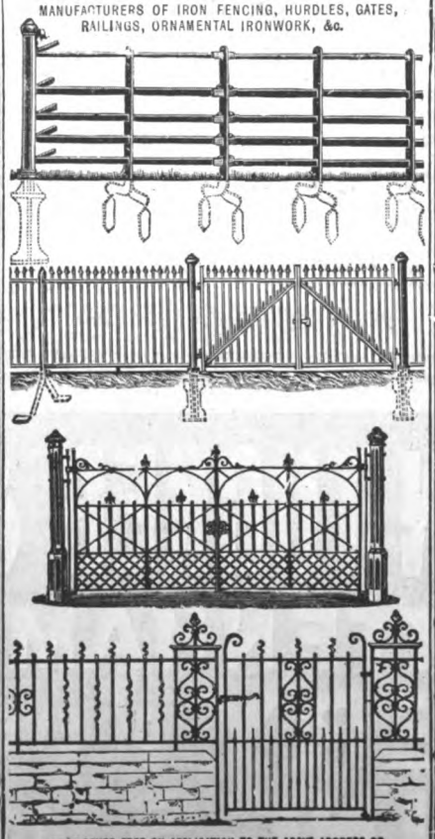
Martin	£653	0	0
Wheeler & Co.	634	0	0
Fry Bros.	632	0	0
Etheridge	600	7	6
Woodham & Sons	587	0	0
Mowlem & Co., Westminster (*accepted*)	568	0	0

MARPLE (CHESHIRE).

For supply of one set of three-throw horizontal ram-pumps, designed to deliver 6,000 gallons per hour against a working pressure of 130 lb. per square inch, delivered and fixed at the Council's pumping station at Norbury, for the Marple Urban District Council. Mr. D. J. Diver, surveyor, Public Offices, Marple.

Tangye & Co., Birmingham (*accepted*)	£128	0	0

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LONDON OFFICES:
11 KING WILLIAM STREET, E.C.
West End—166 PICCADILLY, W.

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MAIDSTONE.

For the erection of a house near Maidstone, Kent. Mr. St. Pierre Harris, architect and surveyor, 8 Laurence Pountney Hill, E.C.

Knight	£2,930 0 0
Wallis	2,737 0 0
Corben & Co.	2,700 0 0
Podger & Sons	2,583 0 0
Friday & Ling	2,490 0 0
Blay	2,477 0 0
Archer & Son, Gravesend (*reduced and accepted*)	2,476 0 0

ORPINGTON (KENT).

For the erection of a pair of shops in the High Street for Mr. St. Pierre Harris, architect and surveyor, 8 Laurence Pountney Hill, E.C., and Orpington.

Owen & Sons (*accepted*)	£1,000 0 0

For repairs to property at High Street. Mr. St. Pierre Harris, architect and surveyor, 8 Laurence Pountney Hill, E.C., and Orpington.

Somerford & Son	£95 0 0
Large (*accepted*)	82 10 0

SEATON.

For extensions to the Clarence Hotel, Seaton, Devon. Mr. A. W. Yeomans, F.R.I.B.A., Chard.

Poole	£530 0 0
Newton & White	526 17 6
Rider	510 0 0
Diment	475 12 0
Richards	460 10 0
Spiller, Chard (*accepted*)	445 0 0

SIDCUP.

For works of under-pinning and repairs to house property. Mr. St. Pierre Harris, architect and surveyor, 8 Laurence Pountney Hill, E.C., and Orpington.

Knight	£194 0 0
Champion	164 0 0
Clark & Durham (*accepted*)	149 0 0

SOUTHAMPTON.

For supply of cast-iron pipes and special castings, for the Corporation.

Jordans	£270 2 10
Dunt & Co.	269 2 6
Birtley Iron Co.	261 0 0
Cochrane & Co., Middlesbrough	260 0 0
Cloake	256 0 0
Cochrane & Co., Dudley	253 7 6
Stanton Ironworks Co.	249 3 4
Holwell Iron Co.	246 18 0
Staveley Coal and Iron Co.	244 7 6
Sheepbridge Coal and Iron Co.	244 2 9
Clay Cross Co., Chesterfield (*accepted*)	242 7 6

STOCKPORT.

For proposed Methodist church and schools, Edgeley. Messrs. Wrathmell & Blackshaw, architects, Stockport.

Moore, Stockport (*accepted*)	£1,748 0 0

STONY STRATFORD.

For street-paving at Wolverton.

Wilson & Martin (*accepted*)	£229 10 0

For laying Wolverton Road sewer.

Cowley & Son (*accepted*)	£48 19 9

SUTTON-AT-HONE.

For drainage work and repairs to twenty-eight houses at Sutton-at-Hone, near Dartford, Kent. Mr. St. Pierre Harris, architect and surveyor, 8 Laurence Pountney Hill, E.C.

Blay	£225 0 0
Rayner	213 0 0
Peaster, Swanley (*accepted*)	176 0 0

WALLINGFORD.

For erection of five houses, Wantage Road. Mr. Edwin G. Hearness, architect and surveyor, Wallingford.

Bartlett	£1,250 0 0
Kirby	1,249 0 0
Bosher & Sons	1,235 5 0
Bowden	1,205 0 0
Robbins (*accepted*)	1,100 0 0

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TORQUAY.

For the erection of Sunday-school premises, for the United Methodist Church, Chelston. Messrs. NORMAN G. BRIDGMAN, A.R.I.B.A., & WALTER H. BRIDGMAN, M.S.A., Torquay and Paignton.

Smerdon	£805 0 0
Yeo	792 0 0
Webber Bros.	770 0 0
Narracott	740 0 0
Vanstone	723 0 0
F. Hawkins	715 0 0
S. Hawkins	700 0 3
Bovey	684 0 0
Eales	670 0 0
Jackman	635 0 0
Phare	620 12 0
BROCK (*accepted*)	620 0 0

For alterations and organ chamber at the Primitive Methodist church. Messrs. NORMAN G. BRIDGMAN, A.R.I.B.A., & WALTER H. BRIDGMAN, M.S.A., Torquay and Paignton.

Yeo	£177 0 0
SMERDON (*accepted*)	153 10 0

YARMOUTH.

For alterations to the boiler-house at the workhouse.

Carter & Wright	£179 0 0
England	175 15 0
Burwood	172 0 0
Addingham	168 10 0
Pestell	164 10 0
Grimble	164 9 0
Barnes	163 10 0
Key	163 10 0
Beach	162 19 9
Moore	160 10 0
Grimble	159 10 0
Spencer, Santo & Co.	159 0 0
Jary	154 0 0
Moore & Sons	147 0 0
READ (*accepted*)	145 0 0

WALES.

For the erection of a cottage at Saundersfoot. Mr. J. PREECE JAMES, architect, Tenby.

Hare & Davies	£339 12 6
Williams	328 0 0
Lawrence	297 10 6
James	293 0 0
Thomas Bros.	289 0 0
RICHARDS & DAVID (*accepted*)	275 0 0
Parry	273 10 0

WEALDSTONE (MIDDLESEX).

For the construction of main intercepting sewer, for the Urban District Council.

Harrington & Co.	£3,073 0 0
Kavanagh & Co.	2,274 3 11
Wilby & Co.	2,160 5 0
Wimpey & Co.	2,157 12 2
Adams	2,150 18 3
Southorn & Co.	2,098 0 9
Ford	2,079 19 5
Catley	2,063 13 0
Wilson, Border & Co.	2,038 17 8
Bell & Sons	2,037 5 3
Champniss & Co.	2,015 9 0
Pedrette	1,999 15 3
Davies	1,983 12 0
Mann	1,930 0 0
Langley & Johnson	1,919 11 0
Rayner	1,919 10 11
W. & C. FRENCH, Buckhurst Hill (*accepted*)	1,776 5 6

THE Plymouth borough surveyor has been instructed to prepare plans, specifications and estimate for the construction of stables and cartsheds near the refuse-destructor at Prince Rock, with a view of transferring the stabling, &c., from Phœnix Wharf. In 1905 the surveyor prepared an estimate for stables and cartsheds at Prince Rock, to cost 6,740*l*.



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ILLUSTRATIONS.

UNIVERSITY COLLEGE HOSPITAL MEDICAL SCHOOL—LIBRARY.

DESIGNS FOR COTTAGES.

ST. AGNES CHURCH, FRESHWATER, I.W.

NEW PREMISES, OLD CAVENDISH STREET, W.

BUILDING AND BUILDERS.

The Coventry public works committee recommended that paving works be carried out at a cost of 16,607*l*., the greater part of which will be spent on granite setts.

Important structural changes at Aintree racecourse, near Liverpool, will be taken in hand almost immediately. It is intended to increase the size of the stand attached to the "Tattersall's" enclosure to accommodate about 1,000 additional spectators, and the capacity of the County Stand will also be considerably enlarged.

A new Free church is to be erected at Partick, N.B. Plans have been prepared by Mr. Petrie, architect, Wellington Street, Glasgow, and approved by the buildings committee in Edinburgh. Estimates for the work of erection have been received by the Deacons' Court, and it is expected that the work will be commenced very early in the month of April.

The Under-Secretary to the Home Department recently in the House of Commons gave the following figures of the Scottish output of granite during the ten years from 1898 to 1907:—1898, 440,513 tons; 1899, 445,753 tons; 1900, 416,221 tons; 1901, 434,015 tons; 1902, 451,808 tons; 1903, 440,534 tons; 1904, 451,095 tons; 1905, 404,688 tons; 1906, 382,155 tons; 1907, 357,966 tons.

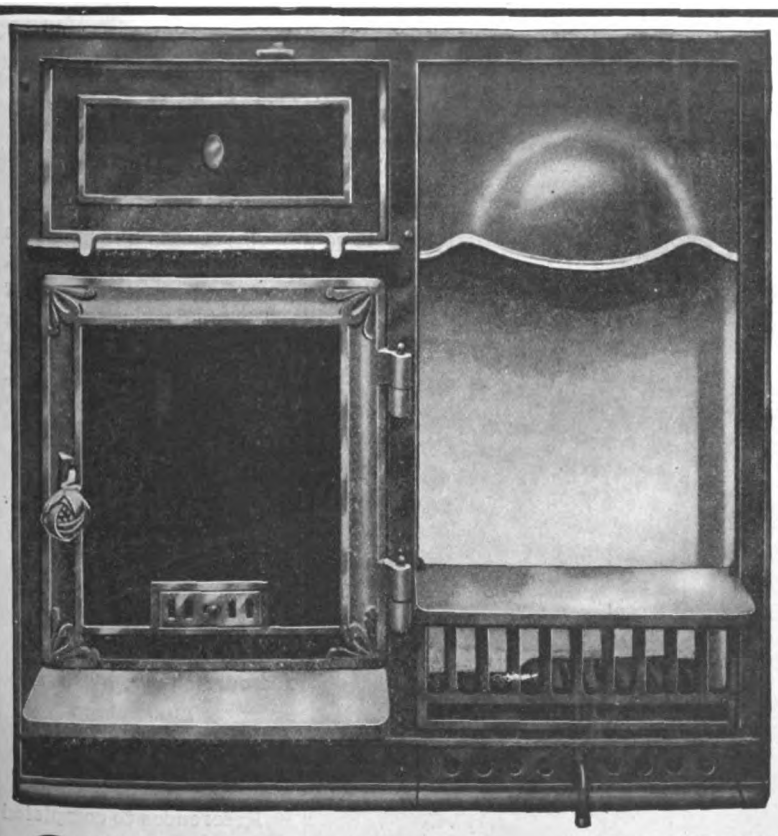
The annual meeting of the Norwich and District Master Builders' Association took place at Victoria Chambers, the President (Mr. W. Stacey Daws) in the chair. The report was unanimously adopted, and the following officials were elected for the ensuing year:—Chairman, Mr. B. E. Scarles; Vice-Chairman, Mr. W. G. Crotch; Treasurer, Mr. J. S. Smith; Secretary, Mr. J. H. Hatch.

The Royalty Skating Rink Company, Chester, has entered into a contract with the Portable Building Company, of Manchester, for the erection of the new roller-skating rink, adjoining the Royalty Theatre, Chester. The workmen are already clearing away the old buildings from the site, and the building will be ready for opening about the first week in May. Mr. William T. Lockwood, F.R.I.B.A., is the architect.

Sir Henry Randall's building scheme for the development of the Wellingborough Road district of Northampton is approaching fruition. A contract of nearly 5,000*l*. has been entered into with Mr. W. Higgins, of Northampton, for the construction of twenty-four houses and a shop and a new street, which is a continuation of Percy Road. There remains under consideration the building of houses on the Wellingborough Road. Mr. W. D. Gibbins is the architect and surveyor.

The Secretary of the South Shields education committee presented a report on Monday showing the approximate cost of providing additional school places, in consequence of the existing accommodation being reduced by the recent action of the Board of Education in requiring that in infants' schools places are to be calculated on the basis of 9 square feet of floor space per child, and in boys' and girls' schools on the basis of 10 square feet of floor space per child. The report estimated the cost of carrying out the necessary additions to be 12,000*l*. A protest is to be sent to the Board of Education.

The twenty-fifth annual general meeting of the Institute of Builders was held at 31 and 32 Bedford Street, Strand, W.C., on Thursday, the 25th ult. The annual report was submitted, and the audited accounts and balance sheet for 1908 were adopted. The following officers were elected:—President, Mr. W. F. Wallis, J.P. (Maidstone); vice-president, Mr. R. W. Neill, J.P. (Birmingham); treasurer, Mr. W. Shepherd (London); hon. auditor, Mr. F. N. Cowlin (Bristol); executive council, Mr. E. J. Strange (Tunbridge Wells), Mr. Ernest J. Brown (London), Mr. G. Bird Godson (London), Mr. Wr. Lawrence, jun. (Waltham Cross). A hearty vote of thanks was passed to Mr. J. Carmichael, J.P., for his able occupancy of the presidency during the past year.



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TRADE NOTES.

UNDER the direction of Mr. E. Maples Linton, architect, Newport, Mon., the "Boyle" system of natural ventilation, embracing the latest patent air-pump ventilators, has been applied to the Malpas schools, Malpas.

No. 20 OLD CAVENDISH STREET (the new building is included among our illustrations) has been occupied by John Soper, window blind manufacturer, for over forty years—having been established there by the father of the present proprietor in 1867. A special feature of their business is the carrying out of architects' special designs. All kinds of window blinds, both for inside and outside use, are made on the premises. One of their patents is a lever-action pulley for Venetian and other blinds which obviates the use of hooks for fastening the cords.

THE "Turk System" for the hygienic drying of new buildings is rapidly spreading itself all over the country, and Messrs. Setzer & Co., Manchester, are ready to consider any further applications for licences. It is equally applicable to buildings both great and small, whether it be to Manchester Infirmary, Chelsea Town Hall, a bank, warehouse, or villa. These possess the same need for quick drying in view of immediate use. The Turk system draws the moisture out as an orange is sucked of its juice. Its efficacy has caused its adoption by a large number of architects in London and the provinces.

MESSRS. HALL & PICKLES, iron and steel merchants, Manchester, have issued a (waistcoat) pocket catalogue and 1909 notebook for the benefit of architects, builders, &c., when selecting steelwork, and the booklet should prove extremely useful. It contains a large amount of data as to the sizes and weights of some of their stock. Wherever necessary the code word is also given so as to facilitate ordering by telegram. The pocket-book includes numerous tables, e.g., of safe distributed loads in tons for compound girders of various spans, built up from stock, and of safe dead loads in tons for compound sections when used as stanchions for various lengths.

IT is common knowledge that ozone, *i.e.*, intensely strong oxygen, acts as a powerful agent for the purification of the air from waste organic matter. These properties are now used for the purification of domestic drinking water. During the past three or four years fourteen towns have followed the lead of Nice and installed the necessary plant for carrying out the "Otto" process of sterilisation by means of ozone for the town supply. The Lahmeyer Electrical Company, Ltd., New Oxford Street, W.C., have patented and brought out an apparatus on identical principles for the ozonisation by electricity of drinking water. It can easily be fitted to any tap or main and renders the absolute germinisation of drinking water possible. Only one ozone producer is necessary in a house, as all the taps may be connected to it. The apparatus consists of an aluminium plate and a metal-lined glass plate, between which the electric rays pass. As these rays only commence to pass at higher electrical pressures, a small transformer converts the supply to the higher voltage. The two are self-contained in a covered case. The instant the water tap is turned on an automatic membrane contact switches the transformer into circuit, the high pressure terminals of which are connected to both plates of the ozone producing apparatus. Between these plates violet rays commence to pass which convert the ordinary oxygen of the surrounding atmosphere into ozone. The ozone thus formed is drawn from the producer through a thin metal tube into a special emulser screwed on to the tap, in which the ozone and the water mix. Searching tests with artificially contaminated water have proved that the treatment with ozone freed it from all bacilli. Science has once more been brought to bear on a very homely question and has achieved highly successful results. The filter is attached to the wall and is scarcely conspicuous.

THE Dundee Works Department have resolved to introduce electricity for ringing the curfew and morning call from the Old Steeple. The annual cost is estimated at 3*l.* and the initial cost at 25*l.*

IN order to provide for a constant supply of water to the main pumping-house and pressure cylinders in the South Yard, Devonport, for fire extinguishing purposes, it has been decided to substitute salt for fresh water. The supply will be obtained from the sea through 18-inch iron pipes.

D. G. SOMERVILLE & CO.

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References to completed structures given.

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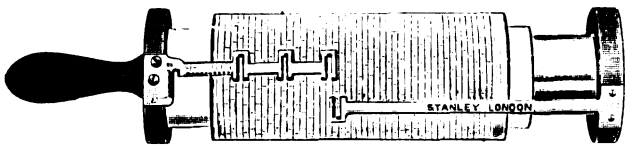
Works: Archangel Wharf, New Cross.
Glasgow: 68 Bath Street.

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A NEW SLIDE RULE.

THE accompanying illustration shows a co-ordinate spiral slide rule which has been invented by Mr. H. O. Barnard, A.C.H., F.R.A.S., &c., who is superintendent of the trigonometrical surveys undertaken by the Ceylon Survey Department. It is intended for the use of civil engineers and surveyors. Mr. Barnard thus describes its utility:—

"Like Professor Fuller's rule, it enables the user to perform, with speed and accuracy, arithmetical computations involving multiplication, division, proportion, continuous



fractions, powers, roots and logarithms; but, in addition, the natural and logarithmic values of trigonometrical functions of any angle can be determined by inspection with the same accuracy as in numerical computation, while the products, quotients, &c., of these functions by lengths or numbers, integral or fractional, are obtained with equal ease, rapidity and precision."

The pamphlet of instructions is minute in its directions and extends to nearly fifty pages. This labour-saving device has been introduced by W. F. Stanley & Co., Ltd., Great Turnstile, Holborn, W.C.

THE Budleigh Salterton District Council have decided (says *Truth*) to extend their sewer outfall further out to sea, and it was announced last week that they intend to rely on the contractor's promise to charge a fair price, so no estimate has been required. It is something quite new to hear of such work being undertaken for a public body without anyone having the slightest idea of its cost. If there is no contract any sum may be charged, and such slip-slop arrangements will certainly involve the unfortunate ratepayers of the town in heavy expenses, putting aside the probability of the matter ending in the Law Courts. Surely the Local Government Board has power to prevent such astonishing fatuity as is proposed.

VARIETIES.

THE staff of the Works Department at Chatham Dockyard is to be disbanded owing to no new buildings or other works being proposed.

THE Town Council of Bedford have resolved to apply for sanction of a loan for 14,455*l*., to defray the cost of a refuse destructor.

THE "combine" of Scottish makers of steel hoops and narrow strips has been dissolved owing to some firms having adopted methods to secure orders which were not in accord with the official understanding of the associated makers.

A SKATING rink is to be erected at Southend-on-Sea, on an excellent site in the centre of the town, within one minute of both railway stations, and with the trams passing the main entrance. The rink will be 180 feet by 80 feet, with a spacious promenade all round. Shops are to be erected on part of the site. The scheme is estimated to cost 7,000*l*., and plans have been prepared by Messrs. Cabuche & Hayward, of Queens' House, Westcliff, and 18 Eldon Street, E.C.

THE Mansion House Council on Dwellings of the Poor recently took out summonses against the owner of premises at Stepney, and as a result costs were awarded the Mansion House Council, and an abatement order was made. The Mansion House Council informed the Local Government Board that they felt that the condition of things was most undesirable, and they asked the Board to hold an inquiry as to the sanitary condition of the borough of Stepney. The public health committee of the borough council, to whom the matter was referred, report that they are quite satisfied that there is a complete answer to the charges made in respect of the premises in question. They court the fullest inquiry into the matter, and agree that the Local Government Board should be asked to hold the inquiry suggested.

MESSRS. MERRIFIELD, ZIEGLER & Co., cotton merchants, have erected a block of cotton offices close to the new Cotton Exchange, Liverpool. "Empire Buildings," as the new offices are named, occupy an area of nearly 600 square yards, with frontages to Spellow Place and Fazakerley Street. Messrs. Edmund Kirby, F.R.I.B.A., & Sons, were the architects of the building, and they have used the site to the best advantage in the erection of a block specially adapted for

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The "Bond" Fires are also highly satisfactory.—Yours truly, (Signed) GEORGE JACKSON.
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A LIST of ART PLATES published in "THE ARCHITECT," will be forwarded on application to GILBERT WOOD & CO., Ltd., Publishers, Imperial Buildings, Ludgate Circus, E.C.

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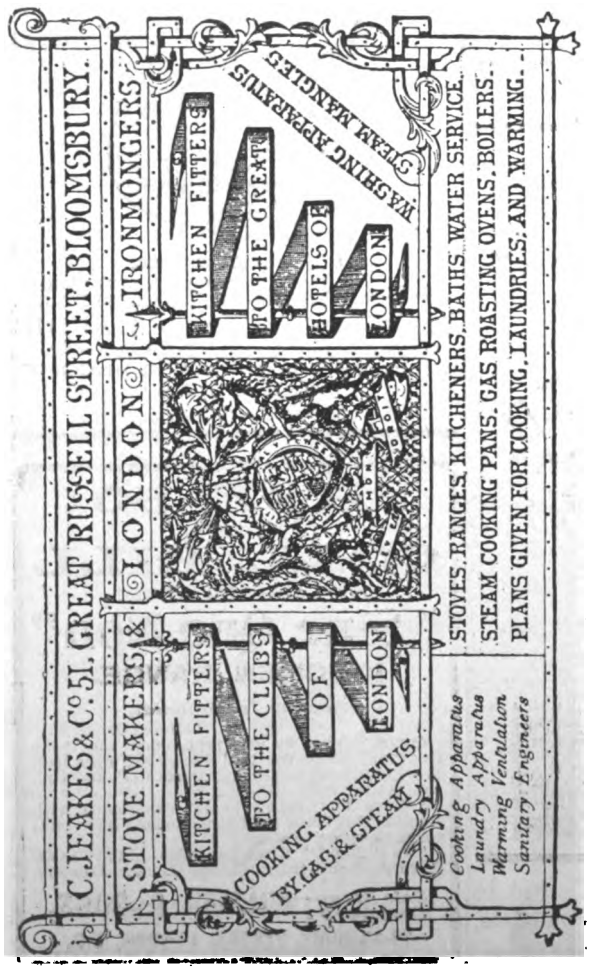
cotton offices, with the particular light in the various sale-rooms which is necessary for the sampling of cotton, and at the same time having ample office space with plenty of sunlight on all the floors. The building consists of four floors and a basement, the latter being approached by a wide flight of steps direct from the front entrance, which has been finely treated by the architects in a polished granite archway. All the cotton sale-rooms face north and north-east. There are open fireplaces for every suite of offices, no hot-water pipes being used in the building. All the lavatory accommodation has been placed at the top of the building, and a spacious lift communicates with each floor.

To those who are anticipating a restful and health-giving change from the present sphere of worry during the Easter recess, the A B C Excursion Programme just issued by the Great Central Railway Company will strongly appeal. Within its covers are conveniently tabulated a choice of resorts suitable for all tastes and requirements. The arrangements for Thursday, April 8, embrace nearly 600 seaside and inland resorts, extending through the Midland Counties, Yorkshire, Lancashire, Lincolnshire, North-East and North-West Coasts, and North of England generally. The trains are equipped with buffet cars, enabling meals to be served on board at a most reasonable tariff. The special expresses leave Marylebone at convenient times, and arrangements have been carefully made to shorten the journey of the long distance traveller by bringing his destination as near London as possible in point of time. For those who cannot leave until late on Thursday, extra fast trains are provided, departing from Marylebone at 10 p.m. and 12.30 midnight. Special trains will also be run on Good Friday, Saturday, Sunday, and Monday (Bank Holiday). Other noticeable features of the programme are the issue of Saturday to Monday week-end tickets, frequent day and half-day facilities, and cheap cycle and pedestrian tour tickets to the picturesque and historical country in Middlesex, Herts and "Beechy Bucks." Copies of this comprehensive publication may be obtained free at Marylebone Station, Company's town offices and agencies, or by post from Publicity Department, 216 Marylebone Road, N.W.

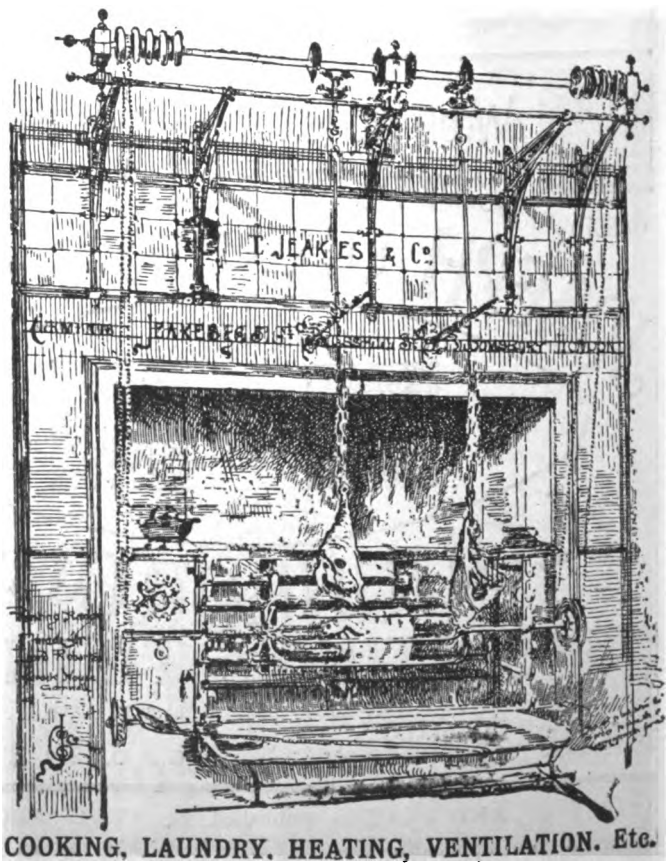
NEW CATALOGUES.

IT is almost half a century since the Maenofferen Slate Quarry Company, Ltd., were incorporated to purchase quarries in the parish of Festiniog, Merionethshire. Their underground workings have now reached a depth of 1,500 feet from the top of the inclined haulage tramway, and extend in a horizontal direction for about half a mile. It would be interesting to discover how many tons have been excavated and supplied to the trade. The total must be very high, for the slates are known on the Continent and in the British colonies. The main portions of the workings are in the "old vein" of Festiniog. The "best" Maenofferen slates are perfectly straight with a smooth surface and a uniform colour of deep blue-grey, which, owing to the absence of mineral marcasite, never becomes spotty. The remainder of the workings are in the "back vein." The standard thickness for the slates is six to the inch. Tests carried out by Mr. Bertram Blount, F.I.C., as to analysis, absorption of water, transverse breaking strain, and action of acids, are all of a very satisfactory character and well support his conclusion that "the slate is of normal composition, resists the action of acids well, and has a small absorption of water, and good transverse breaking strain." A word of commendation should be given to the excellent manner in which this booklet has been produced.

"Perpetuin" is the name of a new mineral paint free from organic substances, manufactured by the Steingewerkschaft Offenstetten A.G., Munich, and for which the sole agents in this country are Pattenhausen Bros., Ltd., 40 Great Tower Street, E.C. Its constituents are a dry powder and a petrifying liquid (a special solution of silica) called Perpetuin Fixative; the two can be easily mixed together. This liquid is a nonpoisonous colourless preparation which amalgamates chemically with the stone as well as lays on it a thin protective layer; it likewise prevents damp and mouldy walls. A preliminary undercoat of it is recommended where the surfaces are weather-worn, or when the absorbing capacity is remarkable. Plaster which is in a perfectly hard and clean condition generally needs merely an undercoat of Fixative and one coat of paint. In the case of fresh plaster or cement plaster which is only just surface dry, or for damp walls, two coats of Perpetuin paint may be applied



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directly. This durable and washable paint is suitable for exterior and interior work on stone, brick, plaster, stucco, mortar, cement, iron, wood, &c. It is said that for ordinary plaster of average absorption one cwt. of paint (45 lb. of colour powder and 67 lb. of Fixative) will cover about 175 square yards with the two necessary coats, the second coat being much thinner than the first.

The Stamford and Casterton freestone was specified by architects five hundred years ago, as, for instance, in the King's College Chapel and Clare College, Cambridge. The open quarries owned by Mr. J. Woolston, Stamford, have recently been equipped with modern machinery, so that large supplies can be delivered at short notice. From 10 to 15,000 cube feet of weathered stone of portable sizes is always kept in stock, and in addition there is a large stock of rock-faced and chopped walling stone. Mr. John Woolston claims that while it is the easiest wrought stone in England, it at the same time hardens with exposure.

Messrs. S. W. Francis & Co., Ltd., have brought out an up-to-date illustrated catalogue and list of prices descriptive of their shutters, brass front and stall plates, &c. The reputation of the firm was established many years ago, and the completeness of their latest catalogue shows that the business is a progressive one.

Messrs. R. Waygood & Co., Ltd., have issued a revised catalogue of their hydraulic lifts and hoists—work in which the firm have specialised for nearly forty years. The new edition deals shortly with that whole branch of engineering and explains low and high pressure systems—*i.e.* where the water is taken in the one instance from the ordinary street mains at a pressure varying from 30 lb. to 80 lb. per square inch, or from a tank at the top of the building; or, in the other, where the supply is obtained by pumping water into an accumulator usually loaded to 700 lb. per square inch. It also treats of direct acting and suspended lifts. The choice mainly depends on the load to be raised, height of travel, size of cage or well-hole in which the lift is to travel, the pressure of water available. The illustrations show how widely Messrs. Waygood have been called upon to carry out their operations. They are equally ready to supply a lift for raising a soup tureen as one for lifting a railway carriage.

The Check-Fire Door Co. in their doors make great use of asbestos, the pre-eminent fire-proof mineral. Layers of this composition are inserted between a thin sheet-iron cover-plate and a perforated cover-plate (for the exterior), and the whole fixed in an angle iron frame with a cover strip and triangular plates at the corners. The perforations prevent the asbestos from becoming red-hot, and likewise prevent the plate from buckling. The thin sheet iron which sustains the direct fire contact is so arranged that the tendency to buckle is overcome likewise. The outer covers can be ornamented to any desired extent without diminishing the efficacy. The Check-fire Door, it will thus be seen, embodies many ideas which are altogether novel, although the principles on which their efficacy depend have been long established.

The alphabetical and number index alone for the latest general catalogue of Messrs. Rownson, Drew & Clydesdale, Ltd., of 225 Upper Thames Street, E.C., extends to fourteen closely printed pages; but by its means the 560 pages that follow are made easy for reference. This is no easy feat in such a large business as that of wholesale and export hardware merchants, metalworkers and ironfounders, with their several departments. The multitudinous illustrations are remarkably well reproduced and have been carefully selected so as to avoid wearisome repetition of goods that only differ minutely. The principal departments are as follows:—Ironmongery and brassfoundry; stoves, ranges, baths, &c.; castings—special, general and sanitary; tools for wood and metal working; contractors' plant, engineers' stores; bar, hoop and sheet iron and steel, constructional and general wrought-iron work. Messrs. Rownson, Drew & Clydesdale can well claim that the goods offered are thoroughly up to date in design and construction, and of such quality as will maintain the good reputation they have long held in this respect. By maintaining large stocks they are ready for prompt despatch.

An exhibition of the arts, sciences, manufactures, industries, and products of Great Britain and of Japan, on an extensive scale, will be held at Shepherd's Bush next year. The Imperial Japanese Government are supporting the scheme.

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BOROUGH POLYTECHNIC INSTITUTE.

The annual exhibition of students' work was held on Saturday afternoon last at this well-known Institute in the Borough Road, and ample testimony was again afforded of the thoroughness of the instruction which is afforded in the various classes, under the superintendence of the Principal, Mr. C. T. Millis, M.I.C.E. In the art department, which is under the direction of Mr. R. B. Poynder, there was an interesting display, and it is noteworthy that the course of instruction here is arranged with a view to its application to the requirements of the building trades. The members' work, too, of the Photographic Society (Mr. A. G. Buckham, hon. secretary) reflected, generally speaking, great credit, and formed a record show. In the engineering and building trades' department ample provision is afforded for all that is requisite to afford sound instruction, and in order to accommodate the large number of students a new block of buildings was recently erected, comprising engineering laboratories, lecture theatre and drawing offices, &c., as mentioned some time ago. In the workshops open for inspection, relating to bricklayers, carpenters, plumbers, &c., there was much to be seen worthy of notice; and in the builders' drawing office the exhibition of work bearing on the various trades holds out great promise of the craftsmen of the future. Nor should mention be omitted of the practical work in the wood and metal workshops by boys of the Day Trade School, showing that students have scientific and technical instruction so as to qualify them for the various trades in order that they may become skilled and reliable workmen.

The Medico-Legal Society, at their last meeting, adopted the following resolution, which was carried on the motion of Dr. R. J. Collie:—"That the Council be asked to appoint a committee to consider and report as to what action (if any) by the society is desirable in the matter of the alleged unsatisfactory working of the Workmen's Compensation Acts." The discussion arose out of papers read by Mr. A. S. Morley and Dr. Collie, in the course of which the evils of malingering were alluded to and the tactics of speculative solicitors and unscrupulous doctors denounced.

AUSTRALIA'S GIGANTIC DAM.

By John Plummer, of Sydney.

The New South Wales Government has undertaken the construction of an immense engineering work in the shape of a reservoir, the storage capacity of which will be somewhat in excess of that of the Aswan dam in Egypt, and having a head of water fully 200 feet in height, against 90 feet at Assouan, the greatest head of the Aswan dam The undertaking is being achieved by throwing a colossal dam across the river Murrumbidgee, a magnificent stream in the southern portion of the State and which runs from east to west a distance of about 1,350 miles, of which 500 miles are navigable. The area of the basin drained by the river is estimated at 25,725 square miles, or, with its affluents, 57,000 square miles. It flows into the Murray, the Australian Nile, and thence to the sea, only a comparatively insignificant portion of its waters being used for irrigation purposes. The banks on the upper portion of the river are extremely high and even precipitous, the mountainous country through which it flows being intersected by numerous cliffs and yawning chasms of immense depth. Advantage has been taken of a portion of the lofty walls of rock formed by mountains rising in successive elevations during a part of the river's course to a height of 2,000 feet, to construct a dam 200 feet in height, thus throwing the river back a distance of forty miles and forming a vast lake, which will be fed also by the waters of two large tributary streams, the Goodradighee and the Yass, the whole constituting a body of water half as large again as that contained in Sydney Harbour, the quantity being estimated at 206,000,000,000 gallons.

The site of the dam is the narrowest part of an immense gorge, the structure itself being composed of cyclopean rubble in the form of blocks of red granite weighing from 10 to 15 tons each, bedded in concrete. The total height from foundation to crest will be about 240 feet, equal to the highest structure of its kind in the world. At the top it will span the gorge for a distance of between 800 and 900 feet, and at the bottom for about 150 feet, with a thickness of fully 200 feet, gradually diminishing to 20 feet at the top. When finished the dam will hold up 215 feet of

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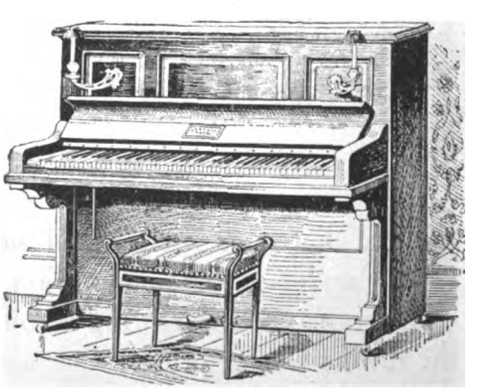


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water, and be furnished with a by-wash on either side for the passage of flood waters, discharging them into a gully of solid rock below the dam. The rocks on either side of the dam are of solid granite, and the work of construction has been likened to thrusting a cork into the mouth of a bottle to prevent the contents from escaping. In connection with the dam there will be a system of canals on either side, that on the north, which will be proceeded with first, embracing an area of about eighty square miles, affecting over one and a half million acres, of which 370,000 acres will be suitable for fruit-growing and intense culture generally, 260,000 acres for mixed farming, and 870,000 acres for pastoral purposes. There will also be a series of main and subsidiary distributing channels, taking off water at intervals from the main and branch canals to distribute it to the various small holdings.

An extensive area of the river flats and other low-lying country, of a rich character, will become permanently submerged, many hills transformed into small islands and a picturesque shore-line created, the surrounding scenery being of the grandest description. The quantity of high-class irrigable land commanded by the main canal is estimated at 357,000 acres, nearly half of which is freehold held in big estates, on which it is proposed to impose an irrigation rate, leaving the sub-division in the hands of the present owners if they should so desire. The balance, consisting of Crown, conditionally purchased and conditionally leased lands, the State Government proposes to acquire and sub-divide into small irrigation holdings of 100 acres each, and to dispose of the same to settlers on easy terms. These holdings will be liable to an irrigation rate of 5*s*. per acre foot, or an annual charge of from 10*s*. to 12*s*. 6*d*. per acre for a full supply of 24 to 30 acre inches. The soil in the locality, especially near the hills, is admirably adapted for irrigation culture, capable of growing to perfection all fruits suitable to the climate, also lucerne and fodder crops of every kind.

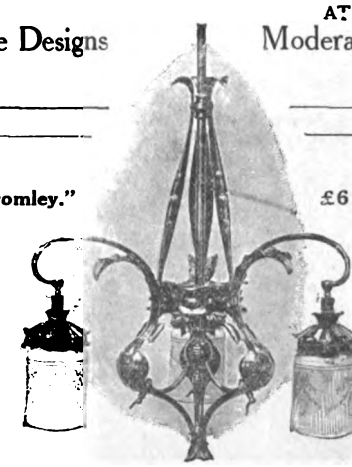
The work of construction was commenced in 1908, but already there is a large population of 600 or more workers and their families, with all the characteristics of a busy thriving township. No drinking-shops are allowed and sly grog-selling is vigorously repressed. A considerable portion of the machinery required is being obtained from America and England, the cost being unexpectedly increased to a considerable extent by the new Federal tariff. The machinery will be electrically driven from a central station, and will enable much of the construction work to be more easily effected. At present the main difficulty is to get the large quantities of cement required down the precipitous sides of the gorge. It is slid down part of the way by means of wire ropes, then carried in bags on poles, and finally in bags on the shoulder. The new arrangement will consist of a couple of immense Ledgerwood cableways of 1,200 feet span, capable of handling loads of 15 tons. Anchored on great travelling towers on each side of the gorge they will command the dam, and in addition there will be two other cables to handle the material from the by-washes. During the work of construction, which is being rapidly pushed on during the summer months, when the rainfall is lightest, the river will be partially diverted from its course.

The Egyptian Public Works Department invites tenders for the construction of sewage purification works for Cairo, for a main collector, for the surface water drainage of Cairo, and for the sewerage of Zeitoun and adjacent suburbs. Tenders are restricted to firms who, either themselves or their predecessors in business, during the last ten years, have carried out works in connection with sewage disposal of an aggregate value of E300,000*l*. A separate contract will be let for the rising main. Conditions of tender may be obtained in this country from the Commercial Intelligence Branch of the Board of Trade, London; Sir Douglas Fox & Partners, London; or Lieut.-Colonel Western, Westminster.

The Marylebone Borough Council propose to appeal to the Local Government Board against the refusal of the London County Council to sanction a loan of 8,000*l*. for the purpose of substituting electric for gas lighting in the principal streets of the borough where the distributing mains of the council's electricity undertaking are already laid. Meanwhile the electric supply committee of the borough council have decided to carry out the work. The town clerk states that the saving to the general rate account by the substitution of electric for gas lighting in the case of 1,964 lamps would be 951*l*. per annum.



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GLASGOW STREET PAVING.

The minutes of the Glasgow statute labour committee, submitted at the meeting of the Town Council last week, contain the report by the representatives of the Corporation of the First International Roads Congress, held in Paris last October. As a result of the Congress the representatives submitted a series of recommendations as to future paving in the city. The subscribers agreed that wood paving is not satisfactory. It is the most expensive kind of paving. It is very short-lived; it very soon becomes uneven and irregular, and therefore to some extent noisy, and climatic conditions are altogether detrimental to it. Accordingly the subscribers were not prepared to recommend any renewal or extension of this class of paving. In streets without tramways, in and near to the business parts of the city, and in main thoroughfares through the suburbs, in which streets and thoroughfares there is more or less continuous traffic, and where the gradient is not steeper than, say, 1 in 55, the paving thereof should be of compressed rock asphalte. There should be throughout the city a considerable extension of such paving. Where, in the same class of streets, the gradient is, however, steeper than 1 in 55 the paving should, according to circumstances, be square-dressed setts, either of granite or of whin; where of granite the setts should be nidged in the more important streets in the central districts of the city. Where, in such streets as have been described, there are tramways the paving to be used should be of square-dressed granite setts. Such setts should in the more important streets be nidged. If in any case the Corporation should determine to pave such streets with compressed rock asphalte, there should be a course of wheelers alongside the rails. In the case of those streets in the central and other districts of the city where there are no tramways, and where the traffic is not likely to be great, and which are more or less of a residential character, the paving should be of asphalte or tar macadam, according to the importance and gradient of the street, unless that gradient is so steep as to render the adoption of smooth paving inadvisable. In suburban streets where there are no tramways, and if of a main or important character, the paving should also be of compressed rock asphalte. In the less important of those streets the paving should be of tar macadam, and in the remaining streets having little or no vehicular traffic the paving should be that of ordinary macadam, the gradient being, of course, considered in each case. In such streets, if there are tramways, the paving should be of square-dressed granite setts, and the street should be paved over its full width. As regards private streets, courts and lanes, the paving should be as far as possible that recommended in the case of central and district and suburban streets, but each such street must be determined by its special and particular requirements, its situation, and its gradient. Rubble causeway being so insanitary and otherwise very objectionable should as far as possible, both in public and private streets, be superseded whenever opportunity arises. Where smooth paving is adopted, all gullies and manholes should be so constructed as to prevent detritus being carried into the sewers. If the Corporation should adopt the recommendations as to the smooth paving of streets it would be expedient that there should be in certain of such streets extensive and frequent sanding, and accommodation should be provided at junctions of streets or other suitable places for storing the sand or gravel to be used. They also call attention to the necessity of keeping absolutely clean streets paved with compressed rock asphalte, and suggest that the cleansing committee consider as to obtaining one or more watering machines, with squeegee attached, so as to remove all refuse and water immediately after the street had been watered or washed. The asphalte, if treated in this way, would dry very quickly, and would not be slippery. Private streets should not be taken over as public streets unless they are put into a condition in conformity with these recommendations. In new streets the various departments, as also the Post Office, should be taken bound as far as possible to lay their pipes and cables in the footpaths. If such pipes and cables are to be laid in the carriageway they should be laid before the street is completed, even if it means an extra capital expenditure, as it is impossible to restore a street satisfactorily after it has been opened, unless the street is to be re-paved over its full width. In any street where pipes or cables are laid by any department or by the Post Office, such department or the Post Office should be obliged to make reasonable provision for the future requirements of their respective undertakings. The report has been submitted to the sub-committee on streets repair.

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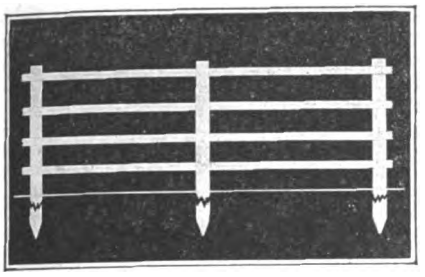
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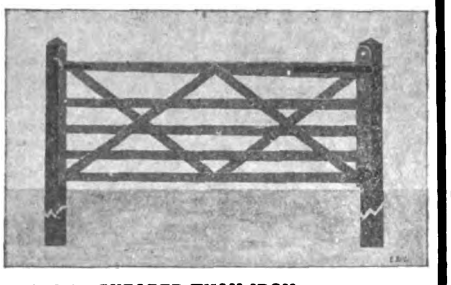
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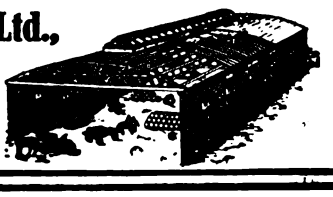
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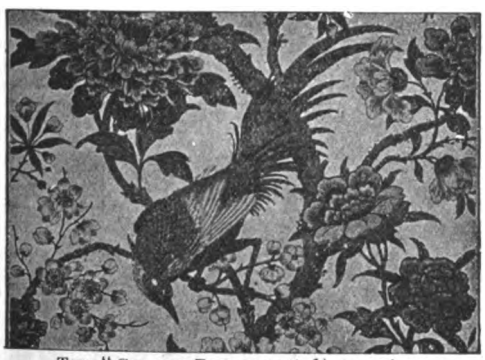
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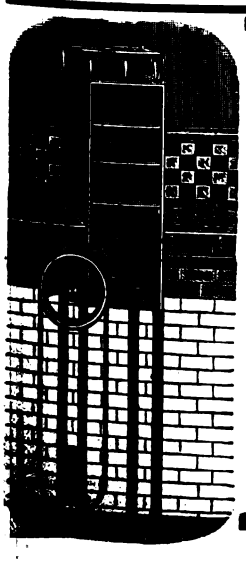
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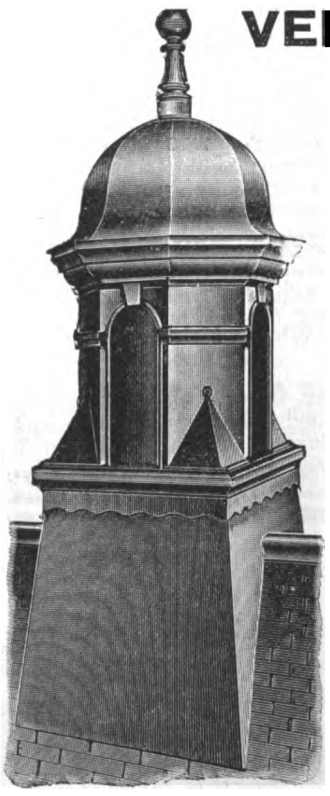
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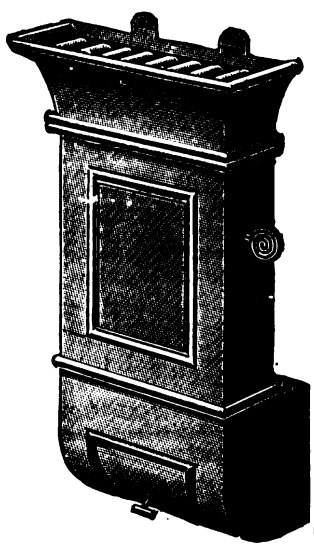
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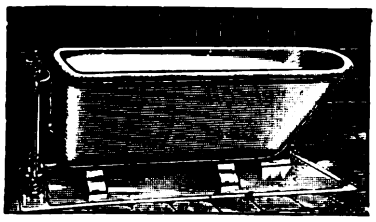
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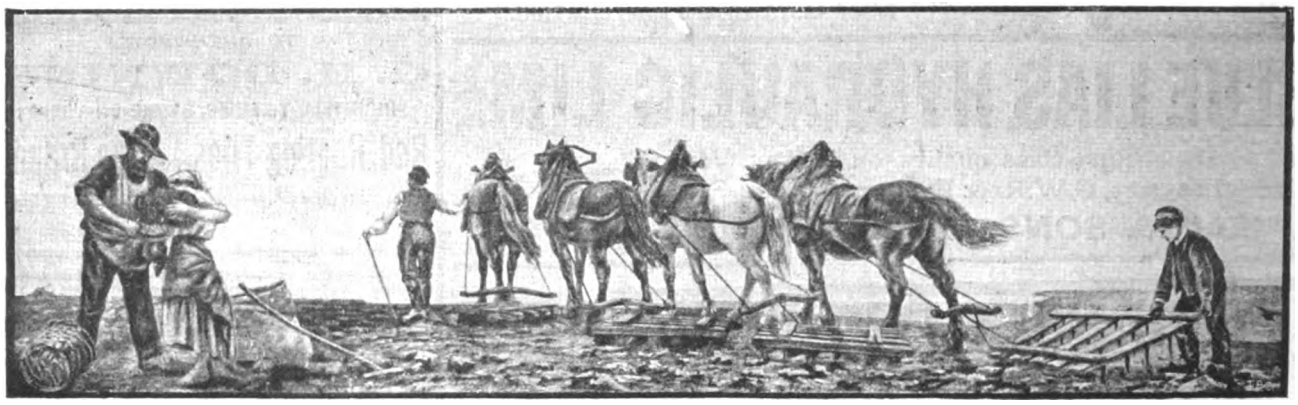
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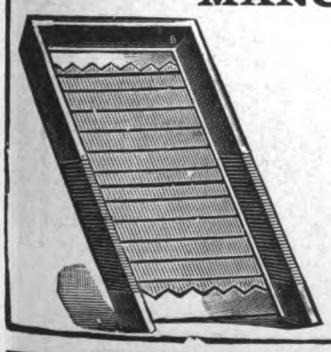
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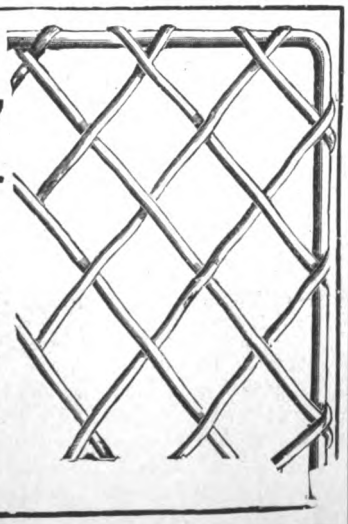
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Hôtel de Ville, Louvain.
Tournay, with Cathedral.
Palais du Prince, Liège.
Hôtel de Ville, Utrecht.
View of Cologne.
Hôtel de Ville, Cologne.
On the Walls, Cologne.
City of Cologne.
Near Godesberg.
Braubach-on-the-Rhine.
Andernach-on-the-Rhine.
Coblence.
The Cathedral Mayence.
Château de Martinsbourg, Mayence.
Roman Pillar and View at Igel.
The Dome, Frankfort.
Sachsenhausen, Frankfort.
View of the Castle at Heidelberg.
Basel.
Cathedral, Ratisbonne.
View in Ratisbonne.
Ancient Building in Ratisbonne.
Old Palace, Bamberg.
View in Bamberg.
Wurtzburg, Ancient Bridge and Castle.
View in Wurtzburg.
View in Augsburg.
View in Nuremberg.
Strasbourg, with Cathedral.
View in Strasbourg.
St. Omer, Strasbourg.
Ulm, with View of Hall.
View in Munich.
View in Prague.
Ancient Buildings in Prague.
St. Nicholas Church, Prague.
Thein Church, Prague.
Hôtel de Ville, Prague.
Street in Dresden.
Ancient Buildings in Dresden.
View in Dresden.
Zwinger Palace Dresden.
Zwinger Palace, Entrance Hall and Grand Staircase.
Hôtel de Ville, Brunswick.

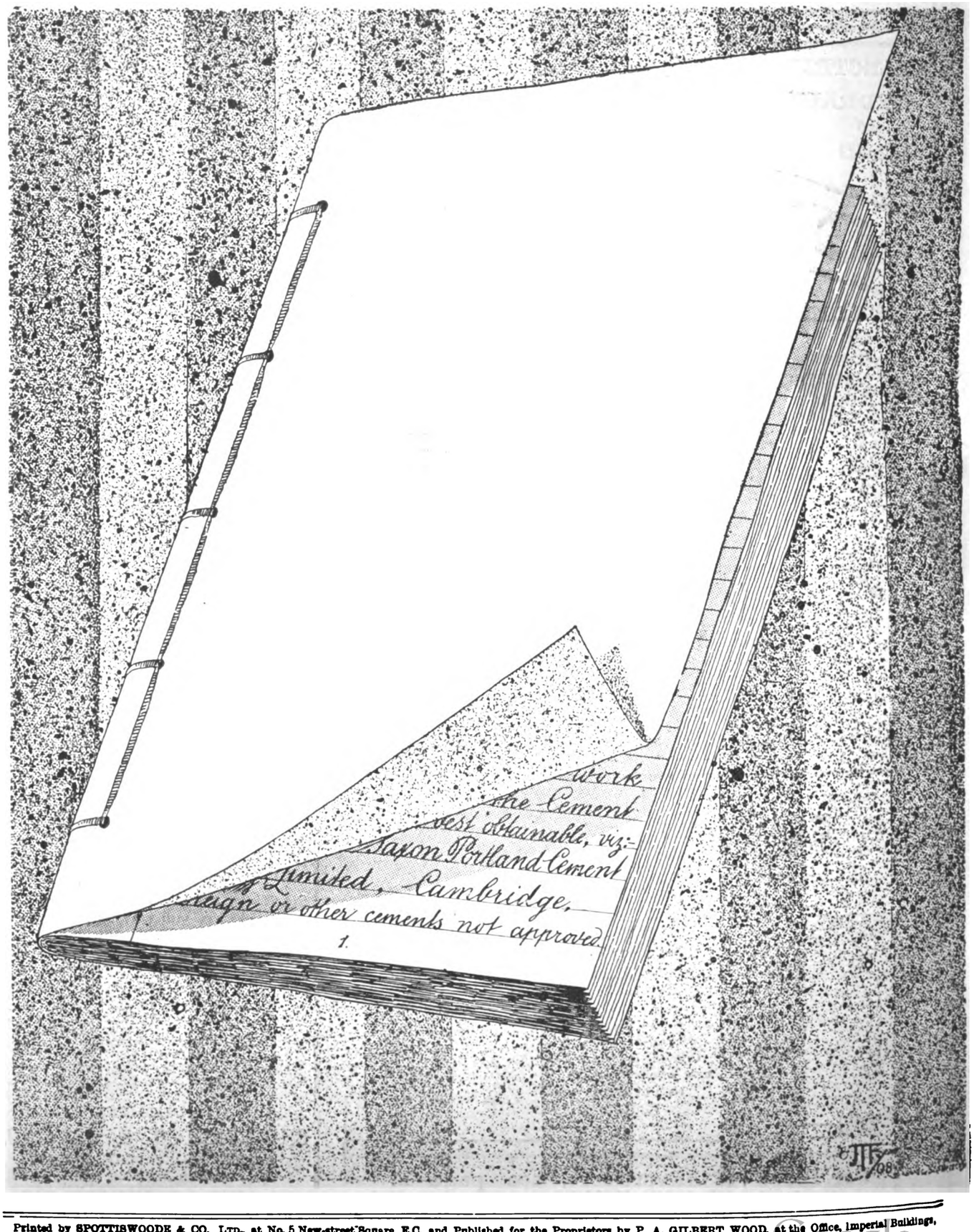
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A Business Supplement

The Contract Reporter.

to The Architect.

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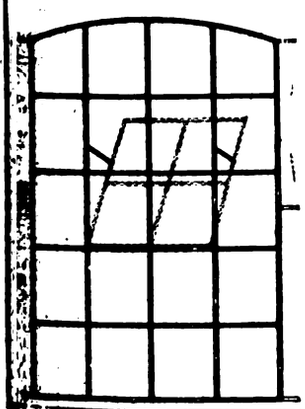
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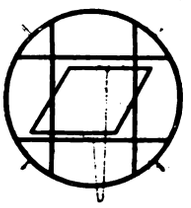
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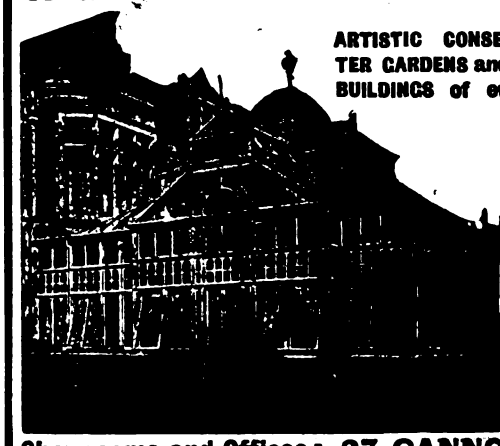
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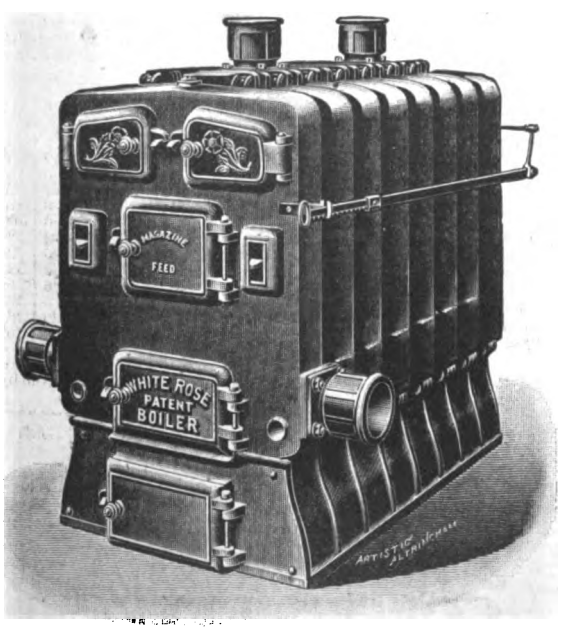
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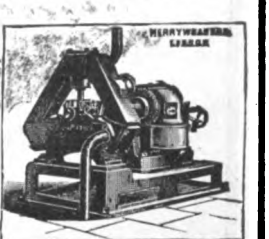
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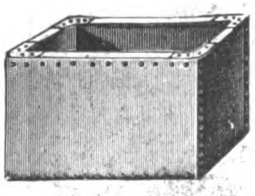
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Architect and Contract Reporter.

FRIDAY, APRIL 9, 1909.

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P. A. GILBERT WOOD,

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Under no circumstances whatever can the Proprietors of this Journal guarantee alteration of copy if received after the first post on Tuesday mornings, and no proofs can be submitted if copy arrives later than first post on Saturday mornings.

EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

**** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITIONS OPEN.

GLASGOW.—July 31.—The patrons of the Royal Incorporation of Hutchesons' Hospital invite designs for laying out for feuing and building about 195 acres of their lands of Thornliebank, Eastwood. Premiums of 100*l.*, 75*l.*, 50*l.* and 25*l.* will be awarded. Deposit 3*l.* 3*s.* Messrs. Hill & Hoggan, 194 Ingram Street, Glasgow.

MOSSLEY.—May 24.—For the erection of a mixed elementary school to accommodate 550 children, and an infant school for 300 infants, on land adjoining Mill Lane. Premiums 15*l.* 15*s.* and 5*l.* 5*s.* Borough Surveyor, Town Hall, Mossley, Lancs.

READING.—June 15.—The Berkshire County Council invite designs for offices, committee rooms, &c., on the Forbury, Reading. Mr. Mervyn Macartney, F.R.I.B.A., assessor. Premiums of 100*l.*, 75*l.*, and 50*l.* Deposit 1*l.* 1*s.* Apply to Mr. J. Fred Hawkins, county surveyor, Bank Chambers, Cross Street, Reading.

CONTRACTS OPEN.

APPLEBY.—April 13.—For mason, joiner, plumber, painter, plasterer, ironfounder and slater's work required in erection of elementary school at Appleby, Westmorland. Deposit 1*l.* Mr. James Hartley, architect, Swadford Chambers, Skipton.

BEXHILL-ON-SEA.—April 16.—For the construction of a colonnade, shelters and bandstand, for the Corporation. Deposit 5*l.* Mr. George Ball, A.M.I.C.E., borough surveyor, Town Hall, Bexhill.



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Allonby.—April 20.—For various works required in alterations to the Baths, at Allonby, Cumberland. Messrs. W. G. Scott & Co., architects and surveyors, 2 Park Lane, Workington.

Aston Manor.—April 20.—For construction of a substation at Alma Street. Deposit 1*l.* 1*s.* The Borough Surveyor's Office, Council House, Aston Manor.

Bagworth.—April 17.—For building three blocks of six cottages at Bagworth, for the Desford Coal Company, Ltd., Bagworth, near Leicester.

Bishop Wearmouth.—April 17.—For building a church at Bishop Wearmouth, Sunderland. Mr. C. A. Clayton Greene, architect and surveyor, 18 Norfolk Street, Sunderland.

Blackburn.—April 21.—For erection of a bandstand in the Corporation Park. Mr. William Stubbs, A.M.I.C.E., borough and water engineer, Municipal Offices, Blackburn.

Brampton.—April 14.—For small alterations at the Brampton police station, Cumberland. Mr. George Dale Oliver, county architect, Carlisle.

Bristol.—April 21.—For builder, plumber and electrician's work, separate tenders, connected with erection of a Council school at Southwell Street, Kingsdown. Deposit 2*l.* 2*s.* Mr. W. S. Skinner, F.R.I.B.A., Edinburgh Chambers, Baldwin Street, Bristol.

Bury.—April 17.—For erection of fifty cottages (five pairs each of five types), Bolton Road, for the Corporation. Deposit 2*l.* Mr. Arthur W. Bradley, A.M.I.C.E., borough engineer and surveyor, Bank Street, Bury, Lancs.

Chartham Downs.—April 29.—For the erection of recreation-rooms and other works at the Kent County Lunatic Asylum. Deposit 5*l.* Mr. W. J. Jennings, architect, 4 St. Margaret's Street, Canterbury.

Combe Hay.—April 14.—For building Council school at Combe Hay, Somerset. Mr. W. F. Bird, Midsomer Norton.

Consett.—April 14.—For the whole of the work in erection and completion of P.M. hall and classrooms, Consett, Durham. Send names to Mr. J. W. F. Phillipson, architect, Murton Chambers, 8 Grainger Street, Newcastle-on-Tyne.

Dartmouth.—April 22.—For erection of a pair of semi-detached villas at Townstal. Deposit 1*l.* 1*s.* Mr. W. Percy Marr, A.R.I.B.A., architect and surveyor, Dartmouth.

Dudley.—April 17.—For erection and completion of a high school for girls (accommodation about 350 places). Deposit 3*l.* 3*s.* Apply to Mr. J. Hutchings, architect and surveyor, County Education Offices, Stafford.

Durham.—April 13.—For (1) Cookery centre at Esk, Mr. F. E. Coates, Shire Hall, Durham. (2) Alterations at Annfield Plain infants' Council school, Mr. W. Rushworth, Shire Hall, Durham.

Eastry (Kent).—April 17.—For additional buildings to the National schools. Mr. D. E. Hughes, Eastry, S.O., Kent.

Embleton.—April 14.—For the various works required in erection of a villa at Embleton, Cumberland. Messrs. W. G. Scott & Co., architects and surveyors, 2 Park Lane, Workington.

Gainsborough, &c. (Lincs.).—April 16.—For erection of, or additions to, elementary schools, for the Lindsey County Council education committee, viz.:—Ropery Road, Gainsborough (new block); South Killingholme (new school with teacher's house); Skegness Council (additions); Crosby (additions). Deposit 2*l.* 2*s.* in each case. Send names by April 5 to Messrs. Scorer & Gamble, architects, Bank Street Chambers, Lincoln.

Haddenham.—April 19.—For erection of a classroom together with alterations and additions at the Council school, Aldreth Road, Haddenham, Isle of Ely. The County Surveyor's Office, Ely.

Hereford.—April 14.—For erection of one block of four cottages for the Hereford Co-operative Housing, Ltd. Deposit 2*l.* 2*s.* Messrs. Groome & Bettington, architects and surveyors, Palace Chambers, Hereford.

Hindley (Lancs).—April 15.—For erection of a Congregational church (St. Paul's), Hindley (sole tenders). Send names to Mr. Herbert Wade, architect, 27 Birley Street, Blackpool.

Hull.—April 21.—For the erection of goods offices, Wilmington, for the North-Eastern Railway Company. Mr. William Bell, the company's architect, at York.

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Ireland.—April 10.—For alteration and extension of Dungiven Presbyterian Church. Mr. Samuel Macartney, architect, Dungiven, Ireland.

Ireland.—April 19.—For reconstruction of, and additions to the Market House, in adapting it for a technical school, at Enniscorthy. Mr. T. Burke Lowey, architect, Colonial Chambers, 62 Dame Street, Dublin.

Ireland.—April 22.—For building and completing a manse on the Rabbit Brae, Limavady. Rev. William Browne, B.A., Catherine Street, Limavady.

Kettering.—April 14.—For erection of board room and offices, and master's house at the Kettering workhouse. Send names to Messrs. Gotch & Saunders, architects, Bank Chambers, Kettering.

Little Coates.—April 29.—For building an elementary school at Little Coates, Lincs. Send names by April 13 to Messrs. Scorer & Gamble, architects, Bank Street Chambers, Lincoln.

London.—April 15.—For erection of municipal buildings in Cambridge Road, Bethnal Green, N.E. Deposit 2*l.* 2*s.* Mr. E. E. Finch, borough engineer and surveyor, Town Hall, Bethnal Green, N.E.

London, S.W.—April 19.—For alterations and additions to Battersea station, for the West London Extension Railway. The Engineer, at Paddington (G.W. Railway) Station.

London.—April 22.—For erection of depot buildings on a site at Norman Road, Greenwich. Deposit 2*l.* 2*s.* The borough engineer and surveyor's office, Town Hall, Greenwich Road, S.E.

London, W.—April 29.—For external repairs at the Workhouse, Marloes Road, Kensington. Mr. W. R. Stephens, clerk, Marloes Road, Kensington, W.

Morley.—April 15.—For the various works (except plumbers') required in erection of additional premises, Prospect Mills, Morley, Yorks. Mr. T. A. Buttery, F.I.A.S., architect, Queen Street, Morley, and 1 Basinghall Square, Leeds.

New Mills.—April 17.—For erection of a Carnegie library in Hall Street. Mr. R. B. Preston, architect, 51 South King Street, Manchester.

Nottingham.—April 10.—For building a Bulwell stone boundary wall, also for certain structural alterations to cottages in Brewhouse Yard, and to buildings in yard adjoining the Castle Waterworks works, Castle Boulevard. Deposit 1*l.* 1*s.* Mr. F. W. Davies, water engineer, St. Peter's Church Side, Nottingham.

Nottingham.—April 14.—For alterations to factory, Mount Street. Deposit 1*l.* 1*s.* Mr. Frank B. Lewis, city architect, Guildhall, Nottingham.

Portsmouth.—April 27.—For certain alterations to the police department at the town hall. The Borough Engineer's Office, Town Hall, Portsmouth.

Radcliffe.—April 24.—For erection and completion of Council offices at Radcliffe, Lancs. Deposit 2*l.* 2*s.* Mr. W. M. Gillow, 66 Deansgate, Manchester, and Mr. R. Holt, 8 Victoria Street, Liverpool, architects.

Rotherham.—April 14.—For erection of South Grove Upper Standard school. Deposit 2*l.* 2*s.* Send names to Mr. Spurley Hey, director of education, Education Offices, Rotherham.

Scotland.—April 10.—For the brick, joiner, plumber, plaster and slater, at licensed premises, Glencraig. Mr. James T. Scobie, architect, Dunfermline and Lockelly.

Scotland.—April 15.—For the mason, joiner, slater, plumber, plaster, painter, heating and tiling works of extension to Falkirk High school. Messrs. A. & W. Black, architects, Falkirk.

Scotland.—April 13.—For reinforced concrete foundations, raft and walls of swimming bath at West Protection Wall, Dundee. Mr. J. Thomson, city engineer, 91 Commercial Street, Dundee.

Stevenage (Herts).—April 19.—For erection of a County Council school. Deposit 2*l.* 2*s.* The County Surveyor's Office, Hatfield.

Stockport.—April 13.—For the whole of the work required in erection of infants' school in Lewis Road, North Reddish. Deposit 3*l.* 3*s.* Send names to Mr. Arthur Lawton, Secretary to Education Committee, Stockport.

Stockton-on-Tees.—April 23.—For alterations and additions to the county police station. Mr. W. Crozier,

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A.M.I.C.E., county architect and surveyor, Shire Hall, Durham.

STOKESLEY.—April 17.—For alterations and additions to the police station. Apply by April 7 to Mr. Walter H. Brierley, 13 Lendal, Yorks.

SURBITON.—April 26.—For erection and completion of extensions to the Electricity works in Ewell Road. Mr. John Armitage, architect, Sanctuary House, Westminster. Send names and 5*l.* deposit by April 14 to Mr. F. J. Bell, deputy clerk, Ewell Road, Surbiton.

TRURO.—April 10.—For completing the tower of St. Paul's church. Rev. W. G. Kerr, St. Paul's Vicarage, Truro.

TRURO.—April 17.—For the restoration of five cottages at Clarke's buildings, Pydar Street. Mr. T. Pascoe, 36 Pydar Street, Truro.

WAKEFIELD.—April 16.—The West Riding education committee invite whole or separate tenders for builder, joiner, slater, plumber, plasterer and painter's works in alterations and additions to Emley Provided school. West Riding Architect, County Hall, Wakefield. Deposit 1*l.* with the West Riding County Treasurer, County Hall, Wakefield.

WALES.—April 10.—For construction of a cattle market, sheds, boundary walls and other appurtenant work, at Narberth. Mr. J. Preece James, architect, Tenby.

WALES.—April 10.—For alterations to Caledffrwd, Clwytybont, Carnarvon. Mr. Ellis F. White, architect and surveyor, 17 Bridge Street, Carnarvon.

WALES.—April 12.—For erection of thirty or more cottages at Gelligaer Village. Mr. Wm. Harris, architect and surveyor, Bank Chambers, Bargoed.

WALES.—April 12.—For pulling down old buildings, and the erection of a Masonic lodge on the site at Narberth. Mr. J. Preece James, architect, Tenby.

WALES.—April 14.—For erection of a butter stores, dwelling house, out-offices and boundary walls at Whitland. Mr. J. Preece James, architect, Tenby.

WALES.—April 14.—For church and hall to be erected at Ynysybwl. Deposit 1*l.* 1*s.* Send names to Mr. T. E. Richards, A.R.I.B.A., architect, Pontypridd.

WALES.—April 15.—For erection of a dwelling house at Tabernacle Road, Burry Port. Mr. A. Wilcox, Old Harbour, Burry Port.

WALES.—April 17.—For alterations at the hospital at the Headquarters Homes, Ely, Cardiff. Deposit 1*l.* 1*s.* Mr. E. Seward, F.R.I.B.A., Queen's Chambers, Cardiff.

WALES.—April 19.—For erection of six pairs of semi-detached houses at Glantaff Road, Troedyrhiw. Mr. T. Edmund Rees, architect and surveyor, Gernant, The Walk, Merthyr Tydfil.

WALES.—April 21.—For erection of a hall and classrooms at the Pisgah church, Talywain. Mr. D. J. Lougher, architect, Bank Chambers, Pontypool.

WALES.—April 22.—For the supply, delivery and erection in situ at the King's Dock, Swansea, of (1) one framed and braced steel single-storeyed transit shed, with sides and roof covered with galvanised corrugated iron, 400 feet long by 120 feet broad, in two spans of 60 feet; and (2) one framed and braced steel single-storeyed transit shed, with sides and roof covered with galvanised corrugated iron, 400 feet long by one span of 60 feet. Deposit 5*l.* 5*s.* Mr. Talfourd Strick, clerk, Harbour Offices, Swansea.

WALES.—April 28.—For reconstruction of the upper floors with fireproof staircases, new bath houses, &c., at the Monmouthshire Asylum, Abergavenny. Deposit 5*l.* 5*s.* Mr. E. A. Johnson, F.R.I.B.A., Abergavenny.

WELLING.—April 10.—For erection of a branch public library in Bellegrove Road, Welling, Kent. Deposit 1*l.* 1*s.* Mr. Thos. G. Baynes, clerk, Council Offices, Bexley Heath, Kent.

WREXHAM.—April 15.—For the completion of erection of the Alexandra schools. Send names to Messrs. Burrell & Willey, architects, Market Place Chambers, Durham.

YORKS.—April 13.—For the following works for the education committee of the East Riding of York, viz.: (1) Erection of a Council school to accommodate eighty-nine children at Wawne. Deposit 1*l.* 1*s.* (2) Erection of a cloak room, &c., at the Council school at Burstwick. (3) Alterations and additions to the Council schools at Ryhill-cum-Camerton. The building surveyor, County Hall, Beverley.

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TENDERS.

BIRMINGHAM.

For erection of warehouse and store rooms to Mr. Shufflebotham's Stores, Moseley, Birmingham. Mr. Chas. Hook Collett, High Street, Birmingham.

Chamberlain	£441	0	0
Smith	383	0	0
Morris (*accepted*)	363	0	0

BRAUNTON.

For erecting a house, stabling and outbuildings. Mr. H. W. Weir, architect and surveyor, Ilfracombe.

Woolway & Son	£1,250	0	0
Darch	1,076	0	0
Robins	1,032	0	0
Lucker Bros.	999	15	0
Slee & Son, Barnstaple (*accepted*)	924	16	4

CLEETHORPES.

For an elementary school for infants at Cleethorpes, Lincs. Messrs. Scorer & Gamble, architects, Lincoln.

Sprakes & Son	£2,542	4	0
Halkes Bros.	2,480	0	0
Parker & Son	2,450	0	0
Parks & Son	2,450	0	0
Thompson	2,324	0	0
Wainer	2,320	0	0
Pattinson	2,295	0	0
Nicholson	2,173	18	0
Scarborough	2,147	8	0
Marrows	2,128	0	0
Hewins & Goodhand, Grimsby (*accepted*)	2,097	0	0
Holmes & Richardson	2,097	0	0

GUILDFORD.

For the erection of a nurses' home in connection with the infirmary at the Union workhouse. Mr. E. L. Lunn, architect, 36 High Street, Guildford.

Smith	£2,800	0	0
Tribe & Robinson	2,699	0	0
Deacon & Son	2,687	0	0
Jenkins & Sons	2,648	0	0
Potter	2,645	0	0
Minter	2,642	0	0
Rowland Bros.	2,639	0	0
Bloxham	2,627	0	0
Swayne & Son	2,594	0	0
Higgs	2,580	0	0
Sandall	2,572	0	0
Ellis	2,563	0	0
Wallis	2,525	0	0
Potter	2,500	0	0
Wells & Co.	2,500	0	0
Higlett & Hammond	2,497	0	0
Hughes	2,497	0	0
Willis	2,493	0	0
Mitchell Bros.	2,486	0	0
Adams	2,477	0	0
Drowley & Co.	2,475	0	0
Davidson	2,454	0	0
Kemp & Co.	2,439	0	0
Cæsar Bros.	2,438	10	0
Cook & Sons	2,430	0	0
Lowe & Co.	2,421	0	0
Love	2,397	0	0
F. & G. Foster	2,393	0	0
Fry & Co., Paddington (*accepted*)	2,282	0	0

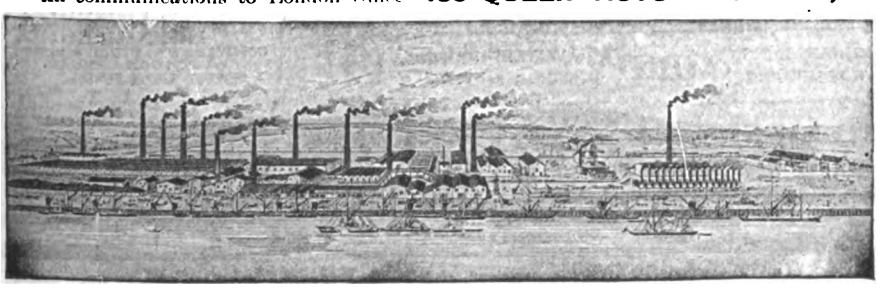
LONDON.

For building a steam laundry at Kew Bridge, Chiswick. Mr. C. H. Samson, F.R.I.B.A., architect, Rugby.
Sawyer & Son, Lewisham (*accepted*).

For building a steam laundry at Hounslow. Mr. C. H. Samson, F.R.I.B.A., architect, Rugby.
Sawyer & Son, Lewisham (*accepted*).

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G. H. RYAN, General Manager.

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LONDON—*continued.*

For the construction of a new road and sewers upon the Markfield Estate, South Tottenham. N. Messrs. David Burnett, Son & Baddeley, surveyors, 15 Nicholas Lane, London, E.C.

Killingback & Co.	£2,500 0 0
Dunmore	2,413 17 0
Neave & Son	2,350 0 0
Parry & Co.	2,298 0 0
Peill & Sons	2,255 0 0
Rowley Bros.	2,214 0 0
Ballard	2,095 0 0
Kavanagh	1,987 0 0
W. & C. French	1,975 0 0
Adams	1,963 0 0
Hamlett, Plaistow (*accepted*)	1,898 0 0

For engineering work in constructing the upper boiler-house, South-Western Fever Hospital, Stockwell. Mr. W. T. Hatch, M.Inst.C.E., engineer-in-chief, Metropolitan Asylums Board.

Elliott & Co.	£1,655 0 0
General Iron Foundry Co.	1,550 0 0
Gimson & Co. (Leicester)	1,522 0 0
Cannon & Hefford	1,495 0 0
J. & F. May	1,488 10 0
Wenham & Waters	1,475 0 0
Wall	1,425 0 0
Fryer & Co.	1,178 0 0
Windsor & Co., Fulham (*accepted*)	1,165 0 0

LONDON—*continued.*

For the supply and erection of penstocks, dams, &c., required for the northern low-level sewer No. 2 at the junction of Queen Street and Cannon Street.

The Thames Ironworks, &c., Co.	£1,760 15 0
Glenfield & Kennedy	1,339 0 0
Ashton, Frost & Co.	1,299 0 0
Blakeborough & Sons	1,262 0 0
Cochrane (*recommended*)	1,249 0 0

For the erection of conveniences for men and women at Archbishop's Park.

Line	£453 0 0
Mitchell & Son	450 0 0
Hyde & Co.	442 0 0
Harding & Son	434 17 0
J. & C. Bowyer	430 0 0
Barker & Co.	374 0 0
Bickerton (*recommended*)	363 5 0
Estimate	374 0 0

For the erection of an 8-foot boundary wall between Pageant's Wharf fire station and some adjoining property.

Mitchell & Son	£135 0 0
Johnson & Co.	121 10 0
F. & H. F. Higgs	115 0 0
Munday & Sons	112 0 0
Wall	108 0 0
Holloway (*recommended*)	107 0 0

For the supply of ranges as may be required for use in the Council's working-class dwellings.

	Price per Range. For any number not exceeding 50. £ s. d.	For any number exceeding 50. £ s. d.	Extra for feet. s. d.	Extra for sheet iron smoke plate instead of cast iron. s. d.	Prices for separate parts.
Falkirk Iron Co.	1 19 0	1 18 0	2 0	1 6	According to detailed schedule.
Hope Foundry Co.	1 18 0	1 17 0	1 2	0 4	Not stated.
Wright	1 17 0	1 17 0	1 3	0 3	14*s.* per cwt. Fire bricks 11*d.* per set.
Heap & Co.	1 16 8	1 16 8	1 0	0 3	According to detailed schedule.
Albion Iron Co. (London), Upper Thames Street (*recommended*)	1 14 0	1 14 0	1 0	Nil	11*s.* 6*d.* per cwt.

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For Index of Advertisers, see page X.

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LONDON —*continued.*

For the construction of a new embankment wall at the river frontage of the tramways permanent way depôt in Greenwich Road, Deptford.

Shelbourne & Co.	£5,671	0	0
Mowlem & Co.	5,491	0	0
Chafen & Newman	5,206	15	0
Leggott & Speight	5,082	10	6
Fasey & Son	5,012	3	6
Pedrette	4,979	8	11
Kavanagh & Co.	4.687	19	6
Muirhead & Co.	4,656	15	6
Ewart	4,635	9	6
Cochrane & Sons	4,579	17	9
Mitchell Bros.	4,331	3	6
Munday & Sons	4,324	0	0
Rowlingsons & Co.	4,209	15	9
Woodham & Sons	4,177	0	0
Kirk & Randall	3,775	0	0
Parkinson	3,460	0	0
Thomas & Edge (*recommended*)	3,326	0	0
Estimate of the chief engineer	4,500	0	0

For the erection on the Hitherfield Road site, Wandsworth, of a public elementary school to accommodate 240 mixed children and 130 infants.

Holliday & Greenwood	£11,520	0	0
Harris	11,364	0	0
Triggs	11,340	0	0
King & Son	11,143	0	0
Garrett & Son	11,099	0	0
Munday & Sons	10,987	0	0
W. Smith & Son	10,910	0	0
J. Smith & Sons	10,718	0	0
J. & C. Bowyer	10,687	0	0
Akers & Co.	10,634	0	0
Godson & Sons	10,528	0	0
Johnson & Co.	10,476	0	0
Marsland & Son	10,468	0	0
Carmichael	10,436	0	0
Downs	10,392	0	0
Galbraith Bros. (*recommended*)	10,117	6	9
Estimate of the architect (education)	10,614	0	0

LONDON —*continued.*

For the enlargement of the playgrounds of the British Street school, Poplar, and the erection of a house for the schoolkeeper.

F. & F. J. Wood	£2,681	0	0
Kent	2,431	11	10
Neal	2,328	0	0
Roberts & Co.	2,228	0	0
Brand, Pettit & Co.	2,203	1	4
Griggs & Son	2,199	13	2
Harris	2,174	0	0
Symes	2.160	0	0
Leng	2,111	0	0
McLaughlin & Harvey	2,094	0	0
Chessum & Sons	2,090	4	2
Shurmur & Sons	2,090	0	0
Lawrance & Sons	2,083	0	0
F. & T. Thorne (*recommended*)	1,936	0	0
Estimate of the architect (education)	2,076	0	0

For the construction of the raft foundation and retaining walls in connection with the new county hall.

Lawrance & Sons	£65,186	0	0
Mowlem & Co.	62,949	0	0
Higgs & Hill	61,462	0	0
Perry & Co. (Bow)	60,300	0	0
Carmichael	59,576	0	0
Kirk & Randall	57,891	0	0
Pearson & Son	57,544	15	5
Price & Reeves	57,255	12	0
Holloway	54,788	0	0
Holloway Bros. (London)	49,800	0	0
Wall	48,900	0	0
Dick, Kerr & Co.	48,416	2	3
F. & H. F. Higgs (*recommended*)	46,900	0	0
Architect's estimate	54,000	0	0

For the supply of four steel rolling-shutters for the paint shop at Holloway car-shed.

Sage & Co.	£198	0	0
Gibson & Co.	162	2	5
Francis & Co. (*recommended*)	136	17	10
Dennison, Kett & Co.	117	19	6

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Upper Saint Martin's Lane, London, W.C.

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LONDON—*continued.*

For the erection of a manual training centre for forty boys in connection with the Woolmore Street school, Poplar.

Grover & Son	£1,810 0 0
Snewin Bros. & Co.	1,755 0 0
Patman & Fotheringham	1,751 0 0
Clarke & Bracey	1,729 0 0
Stevens & Sons	1,718 0 0
McCormick & Sons	1,707 0 0
Brand, Pettit & Co.	1,636 18 9
Roberts & Co.	1,634 0 0
Lawrance & Sons (*recommended*)	1,563 0 0
Estimate of the architect (education)	1,644 0 0

For erecting two house-coal stores at the Eastern Fever Hospital, Homerton Grove, E. Mr. W. T. Hatch, engineer-in-chief, Metropolitan Asylums Board.

Fryer & Co., Paddington (*accepted*)	£199 0 0

For the supply and erection of wrought-iron boundary fencing for the land recently added to Maryon Park.

Eades	£697 17 7
Hawkins & Co.	633 0 0
Hill & Smith	568 0 0
McVey & Co.	498 11 9
Faulkner & Sons	459 0 0
Elwell (*recommended*)	430 0 0

For building work in boiler-house reconstruction at the South-Western Hospital, for the Metropolitan Asylums Board.

Windsor & Co. (*recommended*)	£650 0 0

MARPLE.

For supply of road materials, &c., for the Marple Urban District Council.

Accepted tenders.

Woodhead & Farrar, Chatterton Lane Quarry, Mellor, for supply of paving setts, from 11*s.* 3*d.* to 12*s.* 6*d.* per ton.

Rathbone & Sons, Macclesfield, broken stone, best quality, 7*s.*, and second quality, 5*s.* 9*d.* per ton.

Duckett, drain pipes.

NEWCASTLE-UNDER-LYME.

For the erection of Sunday-schools, &c., for the Brunswick Wesleyan Church. Messrs. Garside & Pennington, architects, Pontefract and Castleford.

Cooke	£2,300 0 0
Shufflebotham	2,290 0 0
Thomas	2,230 0 0
Gallimore	2,198 0 0
Jones	2,021 0 0
Heath, Stoke-on-Trent (*accepted*)	1,987 0 0

NORTHENDEN.

For the erection of schools for the Cheshire County Council, under the Sale and Ashton-on-Mersey district sub-committee. Messrs. Mangnall & Littlewood, architects, Manchester. Quantities by Messrs. Mangnall & Littlewood.

Gerrard & Sons, Ltd., Swinton (*accepted*)	£6,097 0 0

PALMER'S GREEN.

For the erection of the Palmer's Green Congregational school church. Messrs. G. Baines & Son, architects, 5 Clement's Inn, W.C.

Patman & Fotheringham	£1,891 0 0
Minter	1,853 0 0
Knight & Son	1,789 0 0
Brightman & Son	1,789 0 0
Lawrence & Son	1,775 0 0
Monk	1,760 0 0
Duthoit	1,690 0 0
Battley, Sons & Holness	1,679 0 0
Dove Bros.	1,665 0 0
Jerram	1,636 0 0
Mattock Bros.*	1,593 0 0

* Accepted, with additions, making the total 1,734*l.* 13*s.*

READING.

For the construction of public conveniences for men and women at the junction of King's Road and Kennet Street. Mr. John Bowen, A.M.I.C.E., borough engineer and surveyor.

Stone	£875 0 0
Fitt	797 0 0
Lewis & Bro., Reading (*accepted*)	770 0 0

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King's Theatre, Southsea. Proscenium Border, Piers, Architraves, &c. Messrs. F. Matcham & Co.
2 Great St. Helen's, E.C. Wall-lining, Dado, &c. Messrs. Ellwood & Sledmere.
Waldorf Hotel. Columns and Pilasters. Messrs. A. Marshall Mackenzie, F.R.I.B.A., & Son.
Central Library, Islington. Columns. Henry T. Hare, Esq., F.R.I.B.A.
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VICTORIA STATION, S.-E. AND C. RAILWAY.—PRINCIPAL FRONTAGE, FACING FORECOURT—WILTON ROAD FRONTAGE.

ST. GABRIEL'S COLLEGE, CAMBERWELL.—DETAIL OF MAIN FRONT.

EASTBOURNE INSTITUTE.—EAST ANGLE.

AUSTRALIAN CITIES IN THE MAKING.—PRINCE STREET, GRAFTON, N.S.W.

SCOTLAND.

For the construction of a sea wall, 860 yards long, at Prestwick.

J. & D. MEIKLE, Ayr (*accepted*)	£3,986 0 0

SHEEPRIDGE.

For the erection of a Wesleyan Sunday-school and alterations to the present chapel at Sheepridge, near Huddersfield. Messrs. GARSIDE & PENNINGTON, architects, Pontefract and Castleford.

Cooke	£2,300 0 0
Shufflebotham	2,290 0 0
Thomas	2,230 0 0
Gallimore	2,198 0 0
Jones	2,021 0 0
HEATH, Stoke-on-Trent (*accepted*)	1,987 0 0

SPENNYMOOR.

For making of streets. Mr. C. R. SPENCER, surveyor, Spennymoor.

Dixon & Co.	£327 10 0
Denham	250 0 0
Bell	232 17 0
PICKERING, West Hartlepool (*accepted*)	200 7 0

WIDNES.

For proposed alterations to the Warrington Road Council school, Widnes, for the Widnes education committee.

YEARSLEY, St. Helens (*accepted*)	£183 12 6

STAMFORD.

For erecting a six roomed cottage at Hudd's Mills. Mr. F. R. RYMAN, borough engineer, Stamford.

Hinson & Co.	£445 0 0
Howes	440 0 0
Rouse	439 0 0
Peasgood & Son	435 0 0
Scholes	432 0 0
Ireson	427 0 0
J. Peasgood	401 10 0
COOK, Stamford (*accepted*)	396 0 0

WALES.

For a block of offices in York Street, Swansea. Messrs. MARGRAVE & PEACOCK, architects, Swansea.

Bennett Bros.	£4,876 0 0
Lloyd Bros.	4,603 0 0
Richards	4,600 0 0
Jenkins	4,500 0 0
G. Davies	4,400 0 0
Davies & Sons	4,400 0 0
D. W. Davies	4,394 0 0
Turner & Sons	4,365 0 0
J. & D. Jones	4,350 0 0
Price Bros.	4,326 1 10
Lacey	4,300 0 0
J. & F. WEAVER, Swansea (*accepted*)	4,200 0 0

For the formation of new roads, sewers, &c., on the Maindee estate, Newport, Mon. Mr. HENRY BUDGEN, F.R.I.B.A., Cardiff.

Moon	£650 0 0
Reed	620 0 0
Leadbeter	615 0 0
REES, Newport (*accepted*)	600 0 0
Case	580 0 0
Morgan & Co.	575 15 0
Shaddock	546 12 6
Vincent	429 0 0
Morgan	260 0 0

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TRADE NOTES.

THE new post office, Spalding, is being ventilated by means of Shorland's patent exhaust roof and special inlet ventilators, the same being supplied by Messrs. E. H. Shorland & Bro., of Manchester.

THE Capital and Counties Bank have acquired the premises at 35 Queen Victoria Street, so long occupied as showrooms by Messrs. Tangyes, Ltd., and the necessary reconstruction is now taking place. The Portland stone columns on the frontage have all been cleaned by the Farnham patent sand-blast process, which has given them the appearance of absolutely new stonework.

RICHARD MORELAND & SON, LTD., give notice that they have removed their engineering works from Old Street to Silvertown. Their general offices will still remain at 80 Goswell Road, London, E.C.

THE London Fire Brigade's equipment was last week augmented by two more motor appliances each comprising a petrol motor escape van and combined "first aid" fire engine, thus completing orders for three such vehicles carried out by Messrs. Merryweather & Sons. These latest machines are driven by a 55 h.p. four-cylinder motor, and can travel at twenty-five miles an hour on the level with a full load and negotiate any hill in the London district. They were officially tested during the severe snowy weather at the beginning of March. The roads, covered inches deep in snow, presented no difficulties to the rubber-tyred motors. The tests were in every way satisfactory, being well maintained in spite of the adverse conditions.

VARIETIES.

THE baths to be provided in Accrington are part of a larger scheme, funds not being available at present for the whole project. The present outlay will be 10,500*l.* upon a swimming bath (75 feet long by 30 feet wide), and sixteen private baths. The full project when carried out will more than double this accommodation.

THE Dumfries Town Council last week discussed the question of restoring the town hall, which was burned some time ago, or providing a new town hall with municipal buildings. It was agreed in the meantime to adopt the restoration scheme, which can be carried out with 1,200*l.*, which was got from the insurance companies.

SURVEYING operations were begun last week in connection with the construction of oil tanks, which form part of the permanent works at the naval base at Rosyth. The site selected for the tanks is to the west of Rosyth Farm. Arrangements are being made for the forwarding of a number of Lubecker excavating machines, which are of German construction, and are said to be much more powerful than the ordinary type of steam navvy.

MODERN NAPLES.

AN interesting consular report has been sent by the British Consul-General at Naples on the trade of Southern Italy for the year 1908. Particular reference is made to the various engineering enterprises.

Iron and steel.—The work on the new smelting works at Bagnoli belonging to the Ilva Company is progressing rapidly, and it is hoped to commence working about the end of 1909, giving employment to 2,000 workmen. Large works are being carried out to collect the water from the surrounding hills, and it is hoped to obtain the 12,000 cubic metres (2,461,242 gallons) per day which are required. A large fresh water reservoir is being built. For ordinary use there is the Serino water, from the same source that supplies Naples. Powerful electric pumps are being constructed for the supply of sea water. The Ilva company has a capital of 20,000,000 lire (800,000*l.*).

Public works. Lake Avernus.—This classical lake, situated between Baia and Pozzuoli, and having a small outlet some three-quarters of a mile in length into the excellent anchorage of the bay of Baia, has long tempted engineers as a suitable place for constructing docks and shipbuilding yards. The lake is extremely deep, being in fact an ancient crater.

About sixty years ago the last of the Bourbon kings caused a quay to be built round it, constructing at the same time a small canal to the sea. The project was then abandoned, partly on account of its enormous cost and partly because the malaria from the neighbouring lakes of Patria

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and Licola rendered it unlikely that the enterprise would ultimately prove successful. In the present day so much has been done to conquer malaria that speculators are encouraged to hope that by carrying out works which would make a navigable canal from the sea to the lake, the splendid basin might be utilised by ships of the largest size, and that the admixture of a considerable supply of sea water might reduce the malarious character of the stagnant waters of the lake as now existing. Fever, which it was anticipated would cause great trouble at the Armstrong Pozzuoli works, which are only about two miles off across the bay, has never appeared there to any serious extent, and this is looked upon as encouraging to the new enterprise. The capital required, which will certainly be a large sum, is said to be forthcoming from Belgium, the project being that of an Italian civil engineer, and the representative of the company in Italy, an Italian naval officer of very wide experience in the construction of docks and harbours.

New railway station.—The direct railway from Rome to Naples is making good progress, and it has been decided to place the station of it at Toretta ; it will, however, be connected with the present railway station by a line which will run through the town. The new station is to cost 360,000*l.*

New supplementary aqueduct.—For some years a plan has been on foot to construct a new subsidiary aqueduct, but the expense was estimated at 10,000,000 lire (400,000*l.*) and the treasury was empty. On the other hand a serious danger threatened Naples that in the summer it would be without water, as the Serino water in the city reservoirs becomes very low.

The municipality attributed the fact to the waste by private people, and used sometimes to shut off the water at night and forego the watering of the streets. But these actions did not stay the diminution of the water in the reservoirs. The municipality did not realise the real cause, which is that the same amount of water comes into the city as in 1888, that the city has grown since then, that the Vesuvian communes have also received Serino water from the Naples supply, and that more water is used for the streets and for flushing the sewers.

Now at last the technical committee of the municipality have approved the construction of a new supplementary aqueduct, a modification of the plan of 1903 and at a cost of 200,000*l.*, for the following purposes:—

1. So that the city should not be deprived of water if the present aqueduct should be damaged.
2. To supplement the summer deficiency.
3. To furnish new industries with the necessary water.

Sewers.—A very important addition is to be made to the Naples sewerage system by the addition of a main drain, which will carry all the house drainage of the growing suburb of Posillipo into the Naples system, which has its outflow at Cuma. The sewer will run under the main road and will, besides taking all the drainage of about a mile of houses, have a connection with the new system, which will drain the village at the top of the hill. The houses between the road and the sea will not be affected by the new scheme, but a great benefit will be conferred on the most important residential suburb of the city of Naples.

AT the London Police Summons Court last week, before Alderman Sir Vezey Strong, William Musgrove, in the employ of Messrs. Charles Gude, builders' contractors, 177 Dalston Lane, appeared in answer to a summons for causing debris arising from the demolition of a building to be removed during prohibited hours. Constable Garrett deposed that when spoken to the defendant said that the stuff was from excavating, and not demolition. Defendant stated that the constable had made a mistake. The stuff being removed was taken from 17 feet below the pavement. As a matter of fact, no pulling down had been done there for some days. Sir Vezey: Surely excavating is, in a sense, part of the work of demolition. Defendant stated that his firm had been in a good many "big City pulling-down jobs," and there had never been any complaints before. Mr. Thomas Edwin Hutchinson, a builders' foreman, gave evidence to the effect that it was an essential point to the building trades of London. Sir Vezey said he could not see that it mattered whether the material arose from the demolition of the building above or at the foundation. The effect was the same. Believing, however, that the defendant had acted under a misapprehension, he should only impose a fine of 2*s.* 6*d.* and costs.

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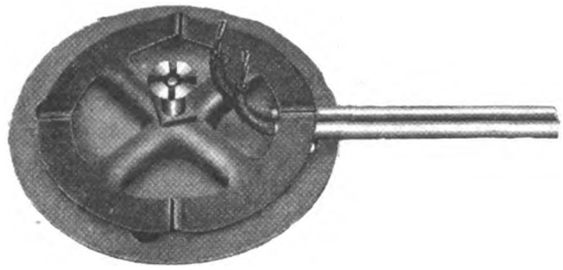
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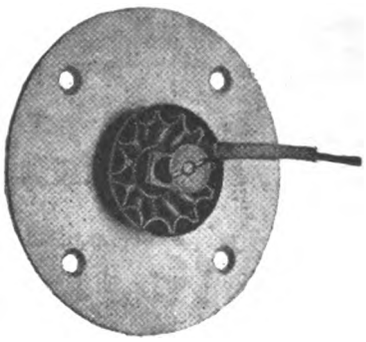
THE O.S. WIRING SYSTEM.

It is evident that the proposal to enable consumers of gas and electricity to economise on their quarterly bills by a general manipulation of the hands of the clock at certain seasons of the year has had no effect upon the keenness of the competition between those responsible for the supply of these illuminants and their appurtenances, as the invention of this extremely neat system of Messrs. Siemens Bros. shows.

The incandescent mantle of the gas engineer was responded to—somewhat tardily, perhaps—by the metallic filament lamp, which brought the cost of electric lighting within the reach of all, yet many, especially small consumers, have been unable to avail themselves of its advantages owing to the high cost of a reliable system of wiring. This want is about to be supplied by the introduction of the so-called O.S. system, for which the following advantages are claimed:—Inexpensive in material and labour; neat in appearance; no boxes, bends or elbows necessary; can be used with standard accessories; absolute electrical continuity; mechanically strong; screwing and other special tools un-



necessary; and, for the better kind of wire, watertight. It is very easily fitted, even by workmen inexperienced in electrical matters; in fact, in this respect the patentees might almost have entitled their explanatory pamphlet "Every man his own wireman." The conductor itself is metal-cased, there being two qualities of the wire; the cheaper, called "Kuhlos," is a single or stranded conductor of copper carefully insulated and surrounded by a closely compressed sheet of brass. The patentees do not claim for this kind that it is watertight, so that it would be used for surface wiring only in dry interiors. The better quality, called "Stannos," differs from the other in that its metal case is of tinned copper, rendered homogeneous by a special process, and is



intended for use in any situation for surface or concealed wiring. Both kinds of wire are easily bent by means of an inexpensive tool for the purpose, but in this respect the "Stannos" is decidedly preferable.

The wire is supplied in lengths of 55 yards. It is unnecessary to use wood casing or iron (or steel) conduit, the



wire being fixed as unwound from the coils by means of saddles or buckle clips. The consequent neatness of appearance is a potent recommendation. For concealed work the wire has the great advantage of being of such small diameter as to fit into a narrow groove, which is easily filled up and made invisible.

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The illustrations include two continuity fixtures, "Back entry" and "Side entry," for use with the "Kuhlos" and "Stannos" wires. They are made of iron, and are used at light and switch points or for junctions, and ensure perfect electrical continuity for the copper casing. The "Back entry" fixture would be used for concealed "Stannos" wiring, and the "Side entry" for "Stannos" or "Kuhlos" surface wiring.

The wire may be fitted up as a concentric return circuit. This, in fact, is by far the most economical use to which the wire may be put, but the regulations of the Board of Trade prohibit such an arrangement if to be connected direct to the general supply mains or to an auto transformer, but with a double-wound transformer the concentric return circuit would be permitted, and such an installation would be admirable from every standpoint.

The insulation of the wires is very satisfactory and should be enduring, especially in the case of the "Stannos," on account of its being watertight. The wires are tested at a pressure of 1,000 volts. For shipboard installations special watertight fittings are supplied.

BUILDING TRADES EXHIBITION.

ARRANGEMENTS are now definitely completed for the opening of the forthcoming Building Trades Exhibition on April 17, at twelve o'clock noon.

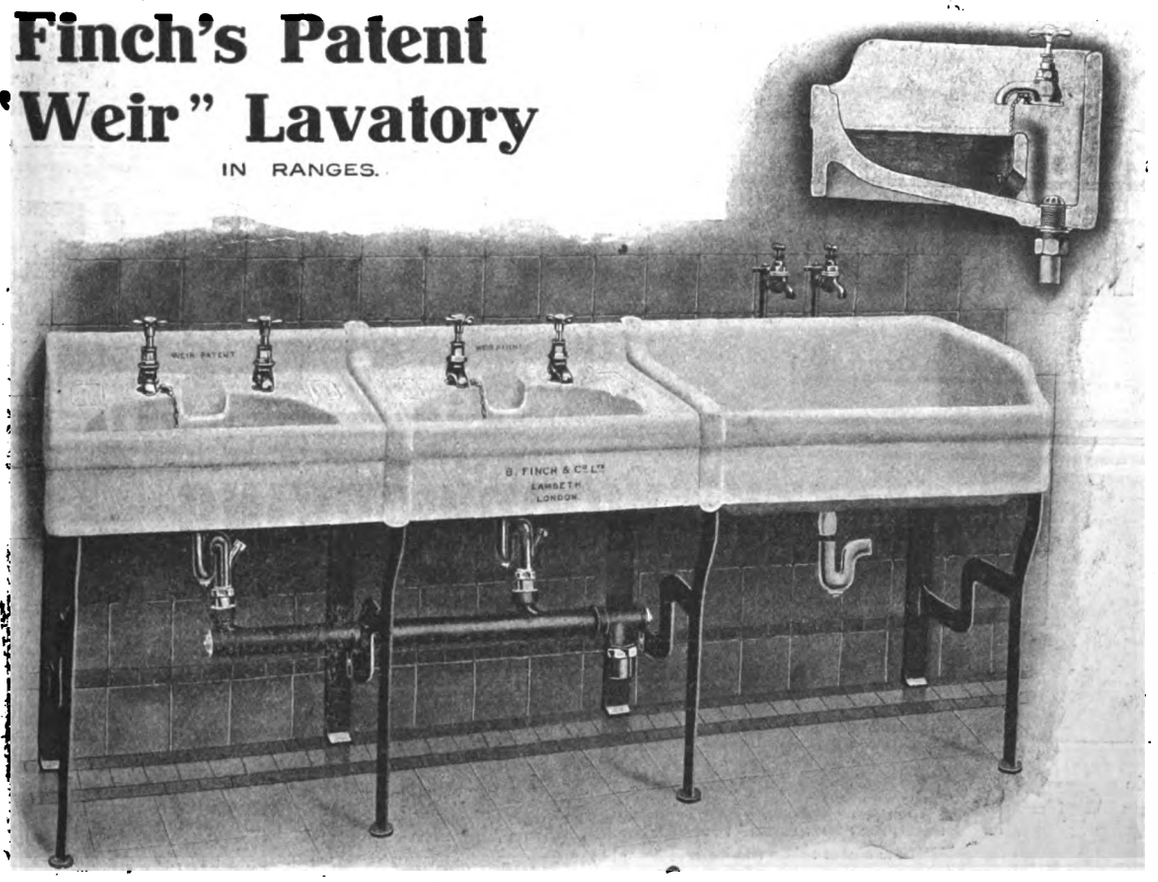
This office will be undertaken by Mr. Ernest George (president of the Royal Society of British Architects), who will be supported, amongst others, by Sir Aston Webb, R.A., Sir George Richmond, R.A., Sir George Frampton, R.A., Sir Brumwell Thomas, Mr. Walter Cave (president of the Architectural Association), Mr. W. E. Riley, Mr. T. W. Cutler, Mr. T. W. Aldwinckle, Mr. C. Harrison Townsend, Mr. Sidney Perks, Mr. G. H. Fellowes Prynne, Mr. W. H. Seth-Smith, Mr. R. Frank Atkinson, Mr. Arnold Mitchell, Mr. Arthur Keen, Mr. George Yeates, Mr. Allan George, Professor F. M. Simpson, Mr. Ernest Newton, Mr. John Slater, Mr. Arthur Bolton, Mr. H. P. Burke Downing, Mr. Matthew Garbutt, Mr. Wm. Grellier, Mr. F. R. Farrow, Mr. Banister Fletcher, Mr. A. H. Ryan-Tenison, Mr. Theodore Fyfe, Mr. F. Dare Clapham, Mr. Louis Ambler, Mr. Charles FitzRoy Doll, Mr. A. Needham Wilson, Professor Henry Adams, Mr. John W. Simpson.

The exhibition will remain open until Saturday, May 1. This year's event will eclipse all previous records, both in regard to number of exhibitors and the thoroughly representative character of the exhibits generally.

The following special visits have been arranged:—Saturday, April 17, Architectural Association, at three o'clock; Tuesday, April 20, National Federation of Building Trades Employers, at 5.30; Wednesday, April 21, Royal Sanitary Institute; Friday, April 23, Society of Architects; Saturday, April 24, Institution of Municipal Engineers, 10.30 A.M., and Royal Sanitary Institute; Monday, April 26, Surveyors' Institution, 2.30; Wednesday, April 28, Institute of Sanitary Engineers.

THE Norwich city engineer (Mr. A. E. Collins), in the course of his synopsis of the principal work done by his department last year, mentions that contract drawings, full size details, &c., have been prepared and contract let for new twelve-bed isolation pavilion at the Isolation Hospital, at a cost of 2,797*l*., and the work is making rapid progress. Numerous details have been made for various works in connection with Guildhall restoration, and several photographs have been taken from time to time, showing objects of interest. The necessary details for new oak roof over magistrates' court and new committee room are receiving attention. Necessary plans, sections, &c., have been prepared of guildhall and municipal offices in connection with proposed heating scheme. A scheme has been prepared for the provision of a lecture hall to seat 560 persons at the Castle Museum. Plans and estimates for proposed playground and gymnasium at Priory Yard have been made for submission to the Local Government Board. Also large scale drawings and estimate for proposed public convenience in the market, at the rear of the Wellington statue. Various sketches and photographs of the old city wall, recently exposed in Coburg Street, have been made and will be kept as records.

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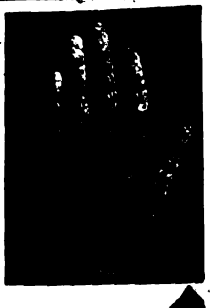
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THE CONCRETE INSTITUTE.

THE Concrete Institute, which was founded last year, has now attained a membership exceeding 600, of whom the larger number are members of the Institution of Civil Engineers, Royal Engineer officers, architects and surveyors holding public appointments or practising in their private capacity. The Institute has already been incorporated, the incorporation having recently been granted by the authorities concerned. The governing body is a Council of twenty-eight members, among whom are the Earl of Plymouth, C.B., president; Sir Douglas Fox, J.P., Sir Wm. Mather, LL.D., Sir Wm. Preece, K.C.B., Sir Henry Tanner, I.S.O., vice-presidents; Mr. Edwin O. Sachs, F.R.S.Ed., chairman; Mr. E. P. Wells, J.P., hon. treasurer; and Mr. A. E. Collins, M.Inst.C.E., hon. secretary. Standing committees have been elected to deal with various technical matters, and sub-committees of the standing committees have already been appointed to deal with matters of detail. It may be of interest to note the list of standing committees, with the names of their chairmen and hon. secretaries. They comprise the following:—

Science Standing Committee.—Mr. William Dunn, F.R.I.B.A., chairman; Mr. F. E. Wentworth-Sheilds, M.Inst.C.E., hon. secretary.

Parliamentary Standing Committee.—Mr. A. Ross, M.Inst.C.E., chairman; Mr. J. Ernest Franck, A.R.I.B.A., hon. secretary.

Reinforced Concrete Practice Standing Committee.—The Chairman of the Executive, chairman pro tem.; Mr. R. W. Vawdrey, B.A., Assoc.M.Inst.C.E., hon. secretary.

Tests Standing Committee.—Mr. W. T. Hatch, M.Inst.C.E., chairman; Mr. W. G. Kirkaldy, Assoc. M.Inst.C.E., hon. secretary.

Mass Concrete Standing Committee.—Mr. C. H. Colson, M.Inst.C.E., chairman.

The number of general meetings already held is four, and the next meeting will take place at the Royal United Service Institution on May 27. The Council and committee meetings take place at the offices of the Institute, No. 1 Waterloo Place, Pall Mall, S.W., to which address applications as to particulars should be made. The Institute is taking up a strong position in the matter of the proposed amendments to the London Building Acts, and has petitioned Parliament on the subject. The first volume of Transactions has already been issued, and the second volume will be issued this month. Circular letters with a view to collating information are being prepared on matters affecting the rusting of steel, expansion and contraction, algebraical notation, the specification of dampness in concrete mixtures, &c. It was originally intended to raise the annual subscription to two guineas per annum for new members at an early stage, but it has now been decided that the annual subscription of one guinea shall stand for new members who join the Institute before October next.

NOTTINGHAM STATION.

NOTTINGHAM, one of the principal railway centres in the United Kingdom, is admirably served in respect to railway facilities.

New Midland Station.—In point of accommodation the Midland Company's equipment in Nottingham is second to none of that of any provincial city. New commodious passenger and goods stations have been provided in convenient localities. The buildings which form the high-level portion of the former are conspicuous by the spaciousness of the scale upon which they have been planned and the handsomeness of the internal appointments. The frontage to Carrington Street is 320 feet and the block from front to rear 135 feet, whilst the general height of the building is 40 feet, the central clock tower rising to 72 feet. The entrances to the carriage annexe—320 feet by 56½ feet—have high elliptical arches, with Ionic columns and massive double gates of iron-bronze openwork. The booking hall, 104½ feet by 42 feet, has dark green glazed blocks and buff terra-cotta for the embellishment of the walls. The front of the booking office is treated in the same colours, and the roof of the hall is half-timbered. Of the eight ticket-windows seven are for third-class passengers, and they are classified into districts in the usual way. The cloak-room is spacious, and in addition to the customary partitions for luggage and parcels, a number of patent racks for bicycles are provided.

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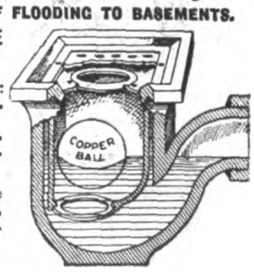
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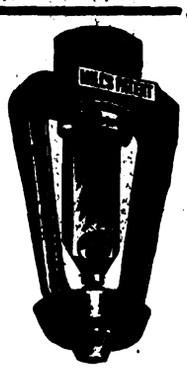
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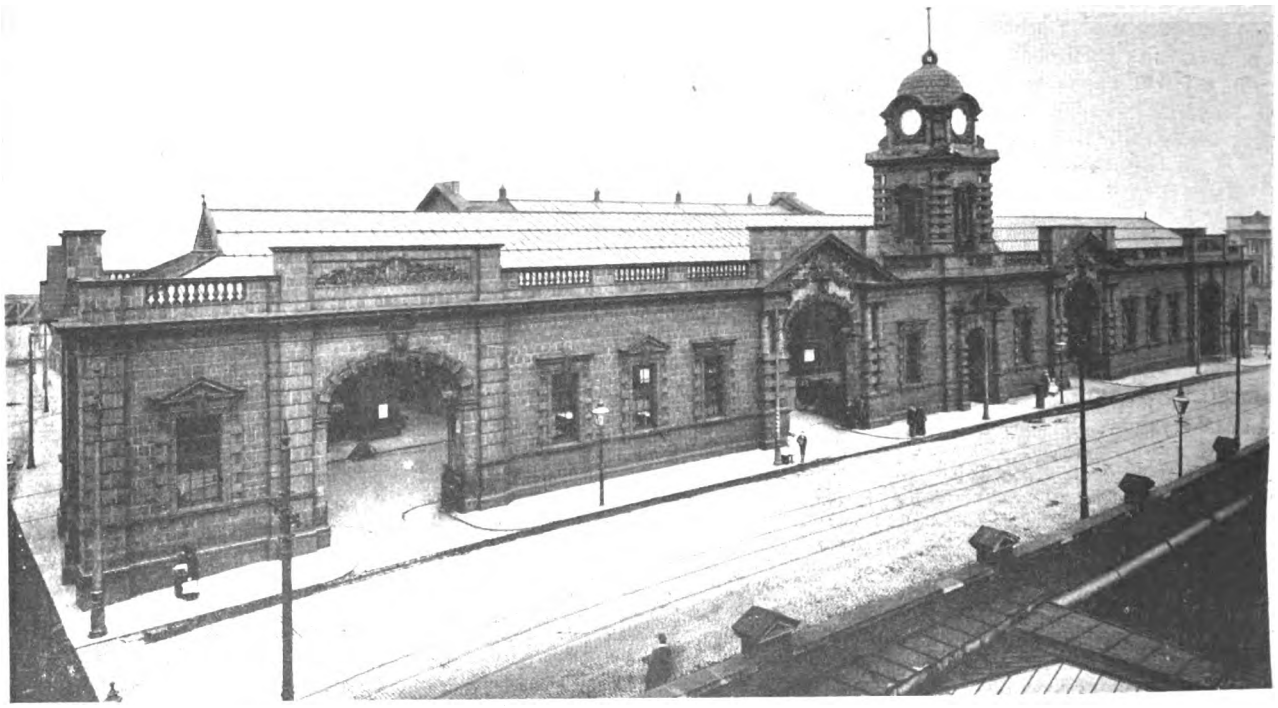


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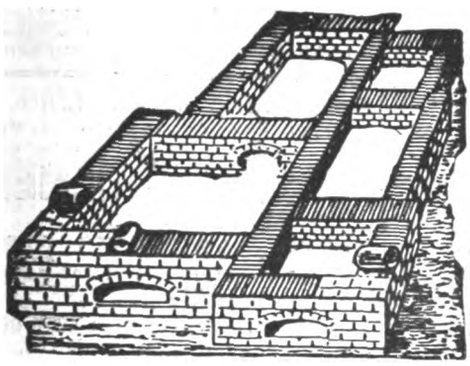
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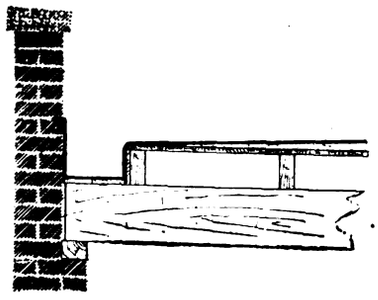
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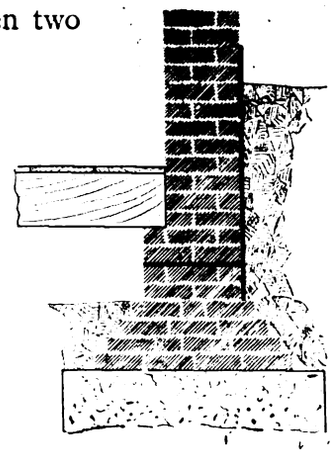
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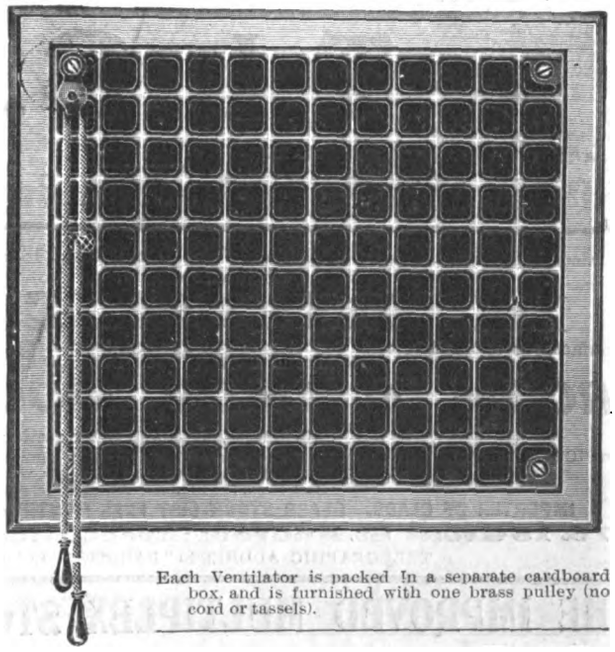
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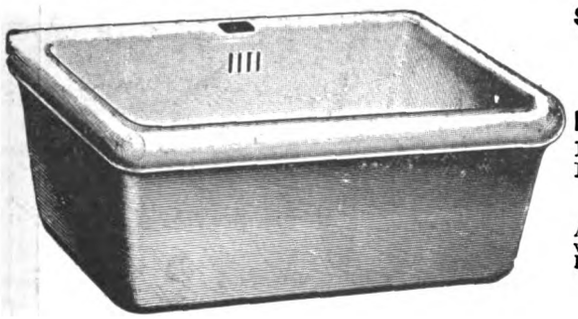
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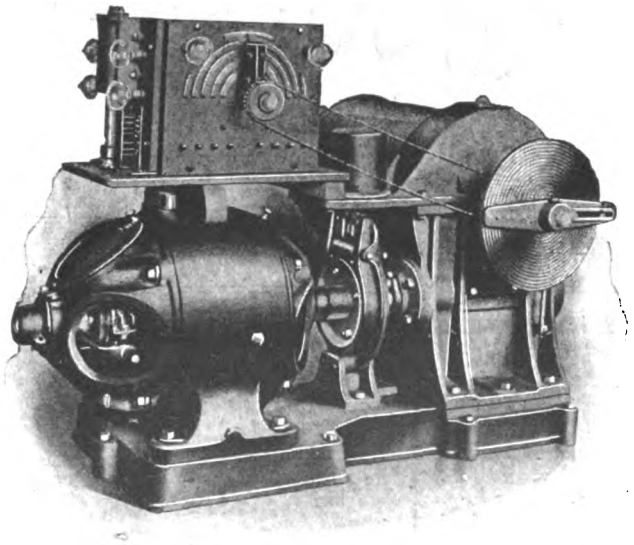
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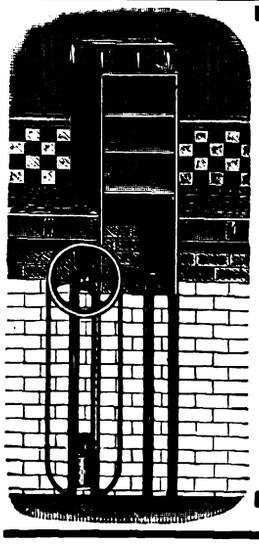
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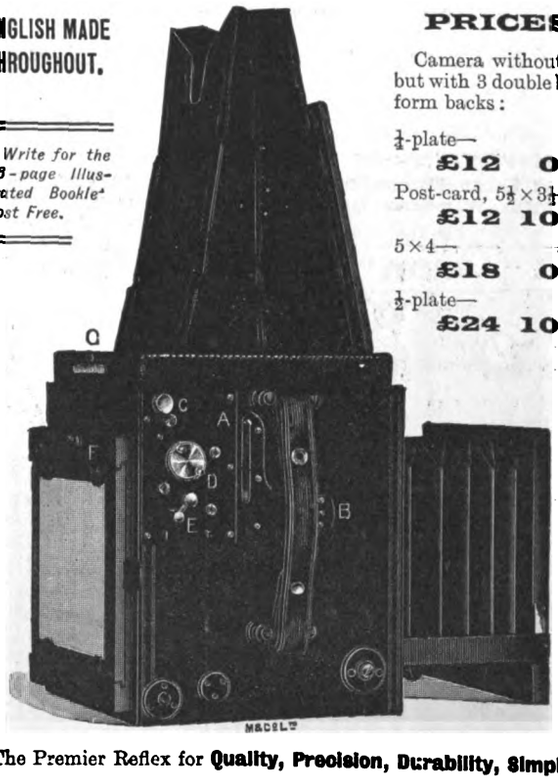
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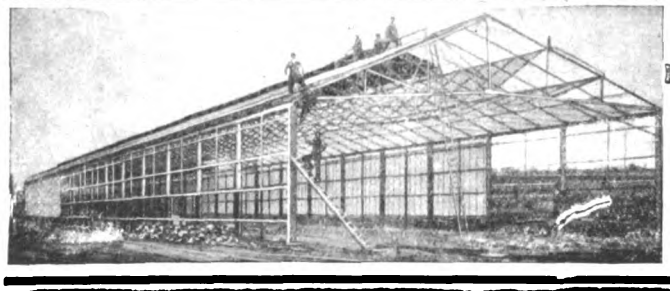
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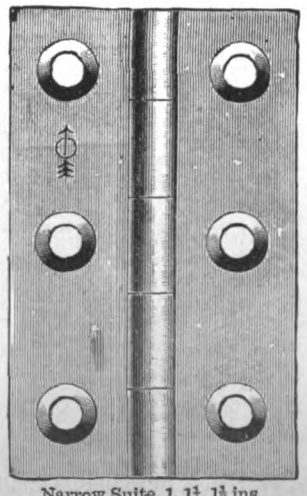
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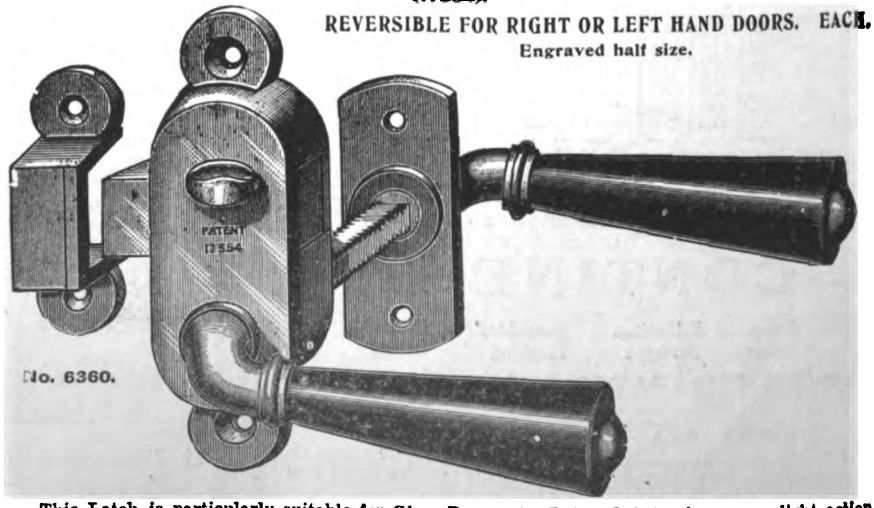
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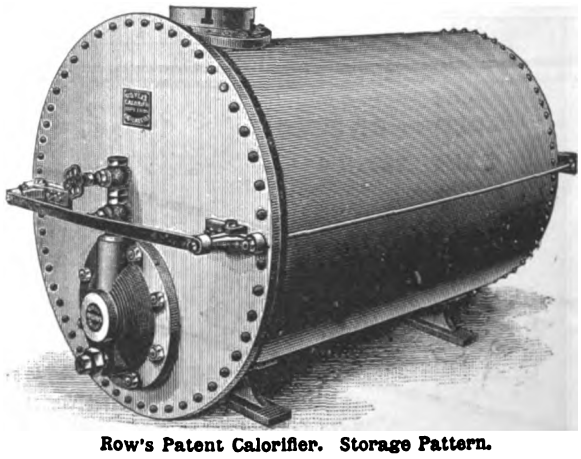


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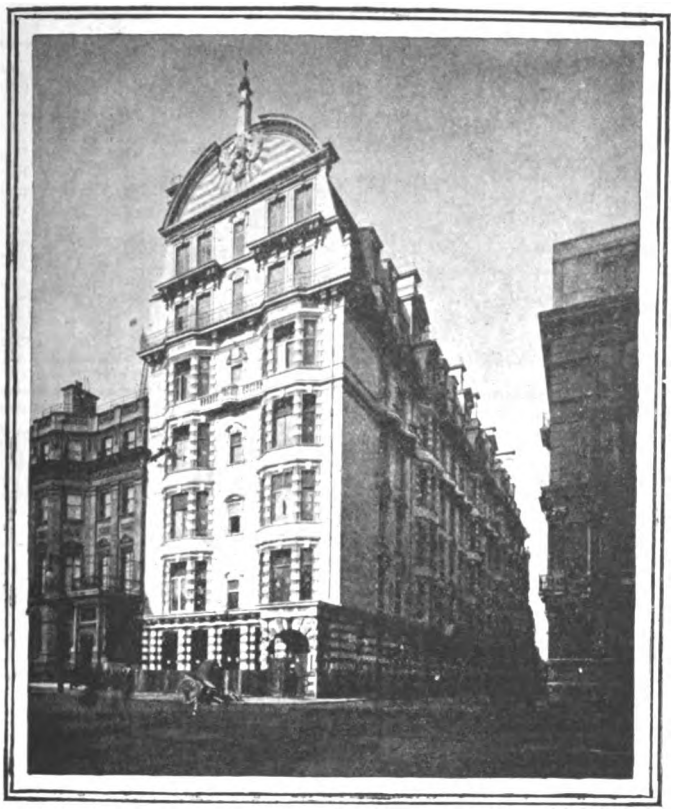
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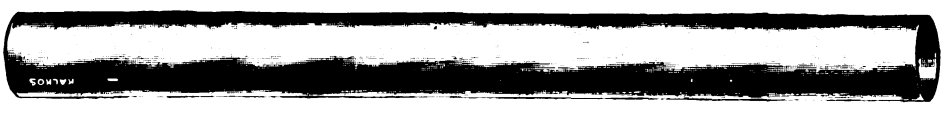


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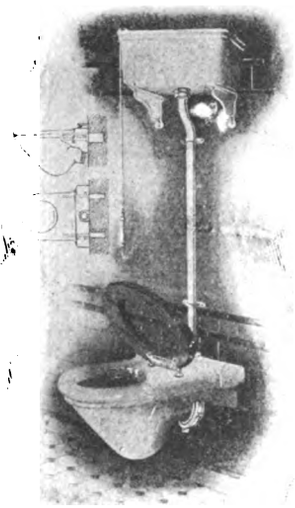
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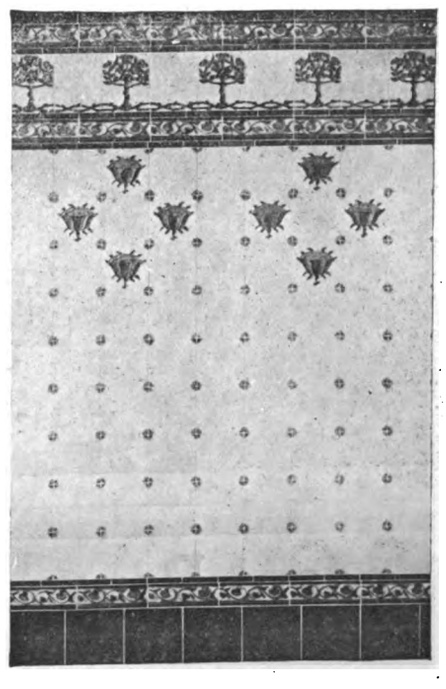
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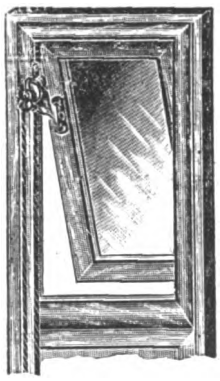
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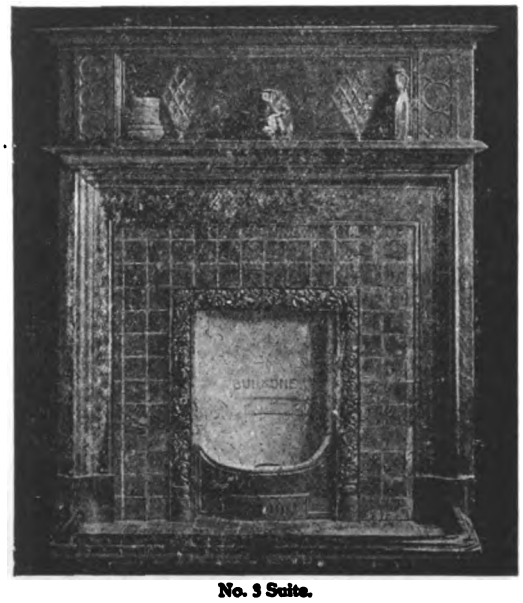
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THE

Architect and Contract Reporter.

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Under no circumstances whatever can the Proprietors of this Journal guarantee alteration of copy if received after the first post on Tuesday mornings, and no proofs can be submitted if copy arrives later than first post on Saturday mornings.

EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tender, and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

*** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITIONS OPEN.

GLASGOW.—July 31.—The patrons of the Royal Incorporation of Hutchesons' Hospital invite designs for laying out for feuing and building about 195 acres of their lands of Thornliebank, Eastwood. Premiums of 100*l.*, 75*l.*, 50*l.* and 25*l.* will be awarded. Deposit 3*l.* 3*s.* Messrs. Hill & Hoggan, 194 Ingram Street, Glasgow.

MOSSLEY.—May 24.—For the erection of a mixed elementary school to accommodate 550 children, and an infant school for 300 infants, on land adjoining Mill Lane. Premiums 15*l.* 15*s.* and 5*l.* 5*s.* Borough Surveyor, Town Hall, Mossley, Lancs.

READING.—June 15.—The Berkshire County Council invite designs for offices, committee rooms, &c., on the Forbury, Reading. Mr. Mervyn Macartney, F.R.I.B.A., assessor. Premiums of 100*l.*, 75*l.*, and 50*l.* Deposit 1*l.* 1*s.* Apply to Mr. J. Fred Hawkins, county surveyor, Bank Chambers, Cross Street, Reading.

SCOTLAND.—For secondary and technical school in Hamilton. This competition is limited to architects practising in the county of Lanark or county of the city of Glasgow. Mr. Patrick Keith, clerk, Hamilton Burgh School Board, 67 Cadzow Street, Hamilton.

CONTRACTS OPEN.

ALLONBY.—April 20.—For various works required in alterations to the Baths, at Allonby, Cumberland. Messrs. W. G. Scott & Co., architects and surveyors, 2 Park Lane, Workington.

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Annfield Plain (Durham).—April 19.—For additions to the Annfield Plain Industrial Co-operative Society, Ltd., premises. Mr. Geo. Thos. Wilson, architect, 22 Durham Road, Blackhill.

Ashton-under-Lyne.—April 20.—For alterations to servants' quarters at the district infirmary. Mr. C. H. Jenkinson, Albion Villa, Queen Street, Ashton-under-Lyne.

Aston Manor.—April 20.—For construction of a sub-station at Alma Street. Deposit 1*l.* 1*s.* The Borough Surveyor's Office, Council House, Aston Manor.

Bagworth.—April 17.—For building three blocks of six cottages at Bagworth, for the Desford Coal Company, Ltd., Bagworth, near Leicester.

Barnet.—April 21.—For erection of a pump house and the construction of a well shaft and machinery foundations at the workhouse. Mr. J. C. Melliss, M.I.C.E., 264 Gresham House, Old Broad Street, E.C.

Bishop Wearmouth.—April 17.—For building a church at Bishop Wearmouth, Sunderland. Mr. C. A. Clayton Greene, architect and surveyor, 18 Norfolk Street, Sunderland.

Blackburn.—April 21.—For erection of a bandstand in the Corporation Park. Mr. William Stubbs, A.M.I.C.E., borough and water engineer, Municipal Offices, Blackburn.

Bowburn Bridge (Durham).—April 23.—For reconstructing Bowburn Bridge in brickwork arch, 7 feet span. Mr. William Crozier, A.M.I.C.E., county surveyor, Shire Hall, Durham.

Bristol.—April 21.—For builder, plumber and electrician's work, separate tenders, connected with erection of a Council school at Southwell Street, Kingsdown. Deposit 2*l.* 2*s.* Mr. W. S. Skinner, F.R.I.B.A., Edinburgh Chambers, Baldwin Street, Bristol.

Bristol.—May 3.—For repairs to the main roof of the Bristol Joint Station, for the Great Western and Midland Railways joint committee. The Engineer, Paddington Station.

Bury.—April 17.—For erection of fifty cottages (five pairs each of five types), Bolton Road, for the Corporation. Deposit 2*l.* Mr. Arthur W. Bradley, A.M.I.C.E., borough engineer and surveyor, Bank Street, Bury, Lancs.

Canterbury.—April 21.—For erection of three dog kennels in the Store Yard, Pound Lane. Mr. Arthur C. Turley, A.M.I.C.E., city surveyor, Municipal Buildings, Canterbury.

Carnkie.—April 24.—For renovation of the Primitive Methodist Church, Carnkie, near Redruth, including reseating, erection of boundary walls and other works. Mr. Sampson Hill, architect, Green Lane, Redruth.

Chartham Downs.—April 29.—For the erection of recreation-rooms and other works at the Kent County Lunatic Asylum. Deposit 5*l.* Mr. W. J. Jennings, architect, 4 St. Margaret's Street, Canterbury.

Cheltenham.—April 21.—For erection of an engine room and the provision of a Crossley gas engine at the laundry at the workhouse. The Master of the Workhouse, Cheltenham.

Cockermouth.—April 19.—For the following works near the Church Lane end, at Low Lorton:—(1) Building a stone wall; (2) removal of thorn fence and the formation of a road. Mr. J. B. Wilson, A.M.I.C.E., 11 Main Street, Cockermouth.

Dartmouth.—April 21.—For additions and alterations to Tower Cottage, Parklands. Mr. E. H. Back, C.E., M.S.A., Dartmouth.

Dartmouth.—April 22.—For erection of a pair of semi-detached villas at Townstal. Deposit 1*l.* 1*s.* Mr. W. Percy Marr, A.R.I.B.A., architect and surveyor, Dartmouth.

Derby.—April 26.—For erection of extensions to the borough asylum to accommodate 126 patients, and for new workshops and bakehouse. Deposit 1*l.* 1*s.* Mr. B. S. Jacobs, F.R.I.B.A., architect and surveyor, Lincoln's Inn Buildings, Bowlalley Lane, Hull; or Messrs. Thorpe & Fryer, architects and surveyors, 23 St. James's Street, Derby.

Devizes.—April 30.—For erection of an engineer's house at the County Asylum. Deposit 1*l.* 1*s.* Mr. J. George Powell, county surveyor, County Offices, Trowbridge.

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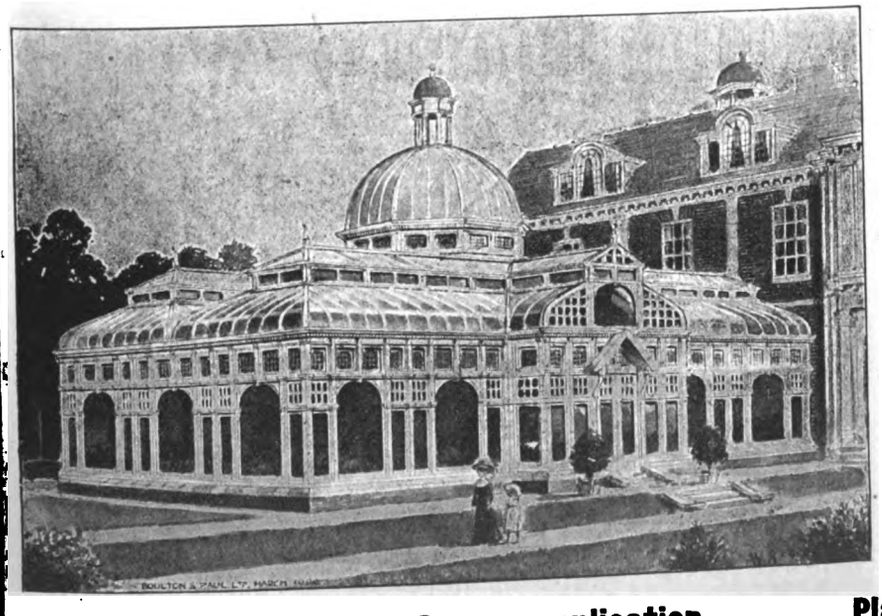
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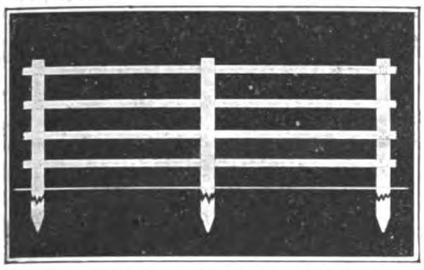
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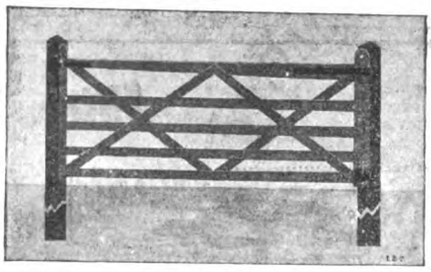
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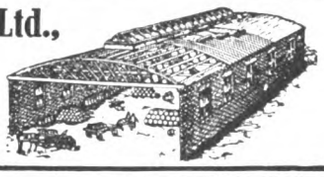
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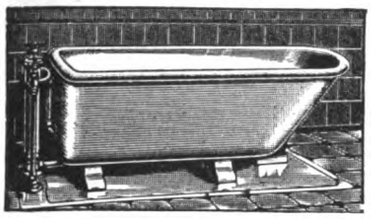
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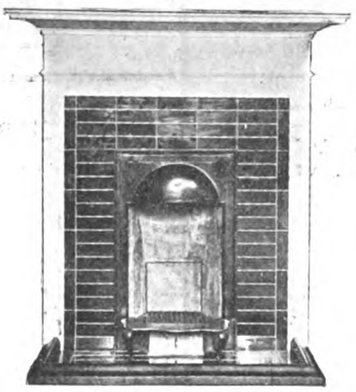
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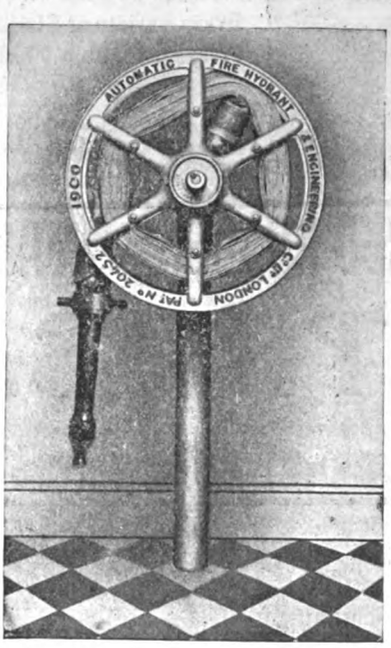
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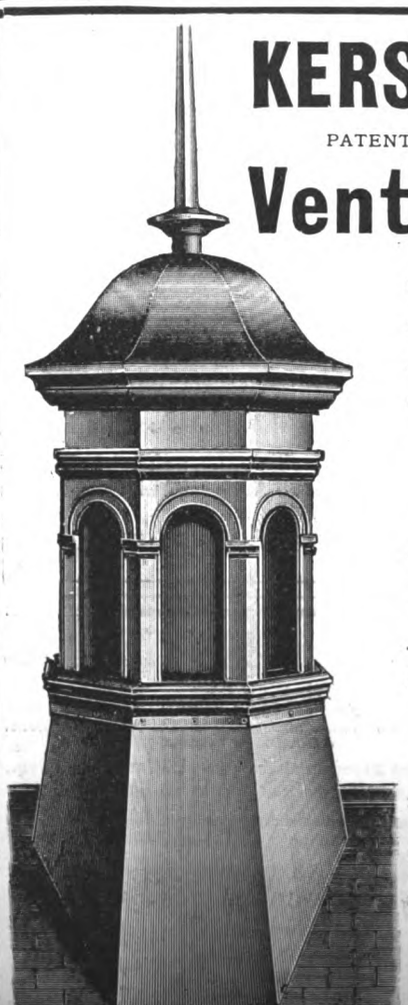
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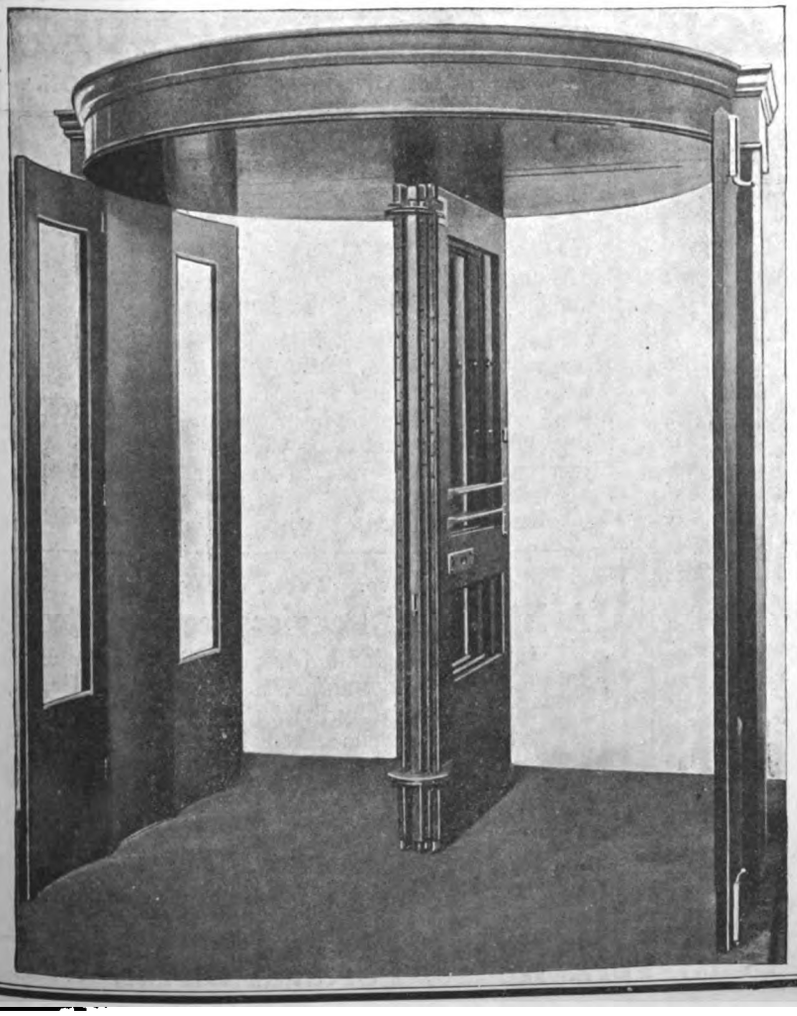
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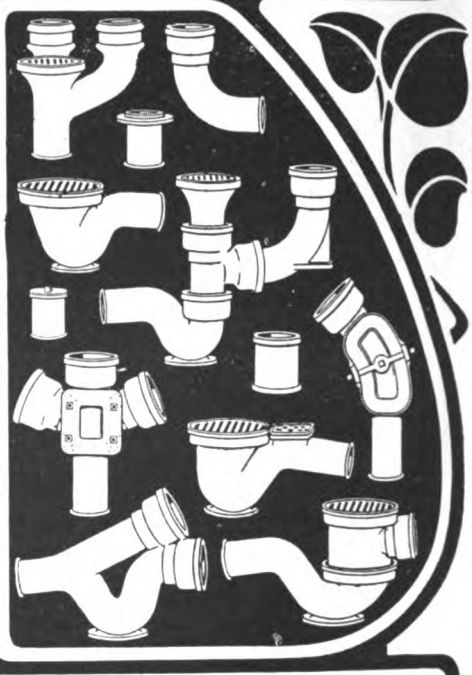
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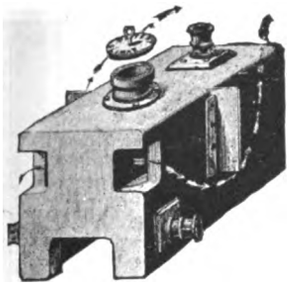
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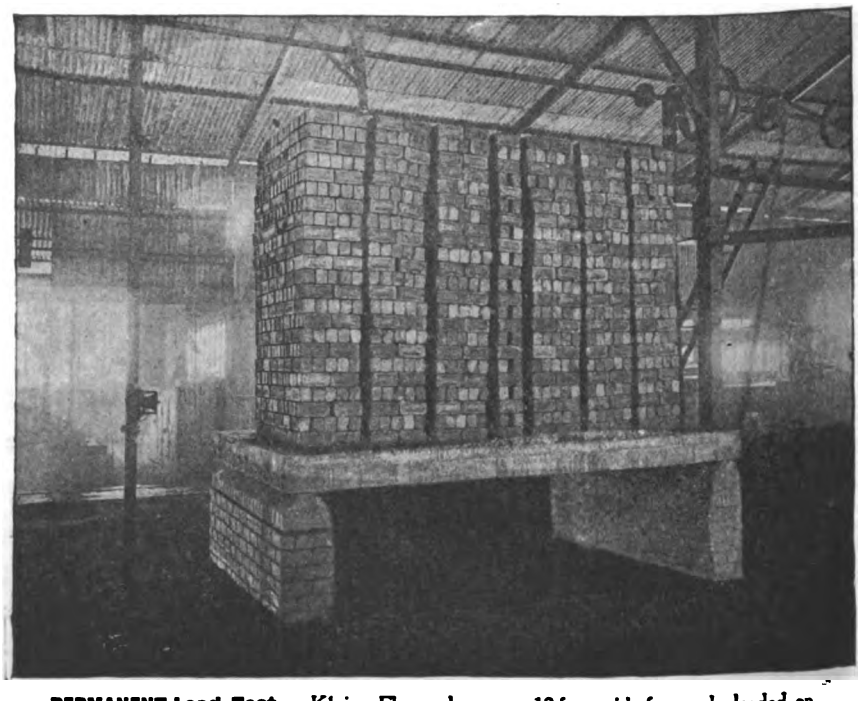
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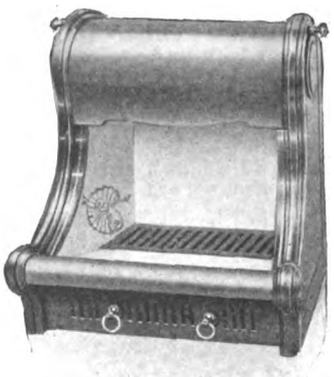
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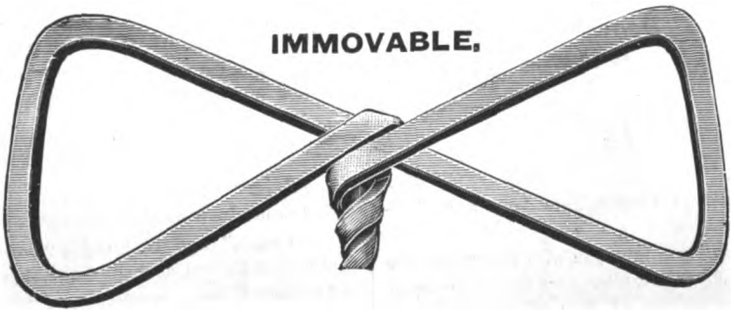
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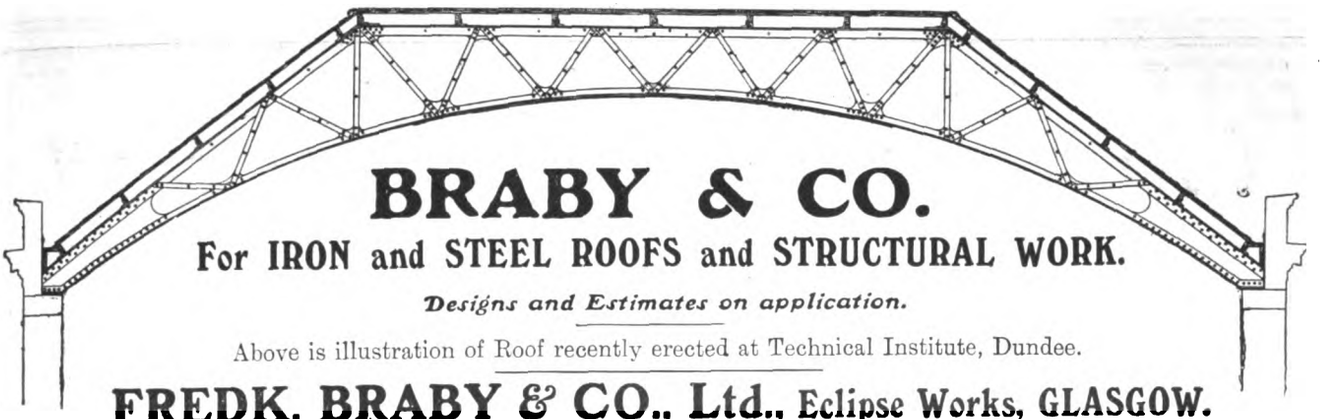
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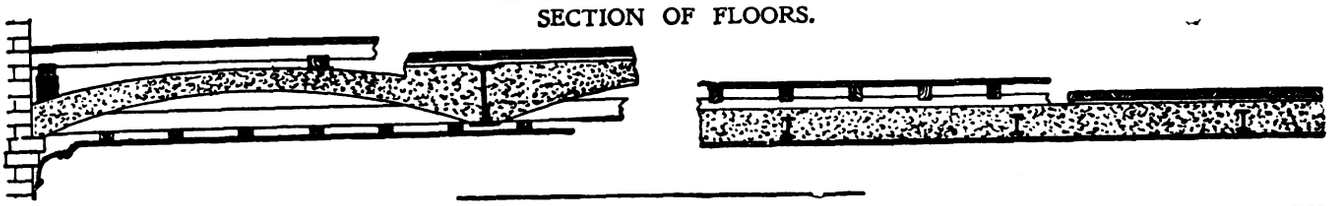
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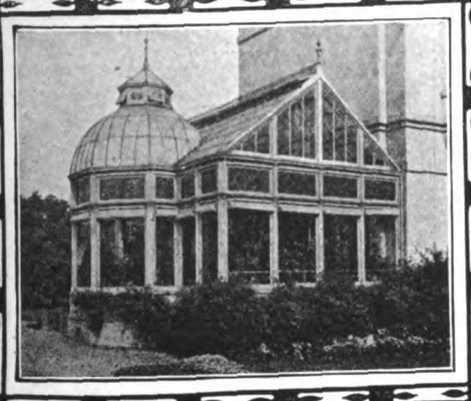
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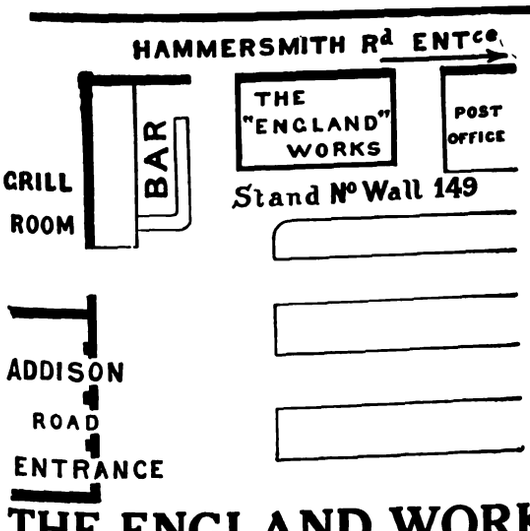
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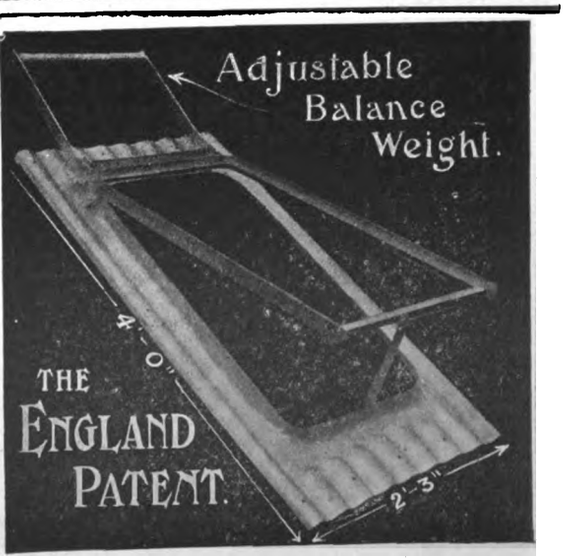
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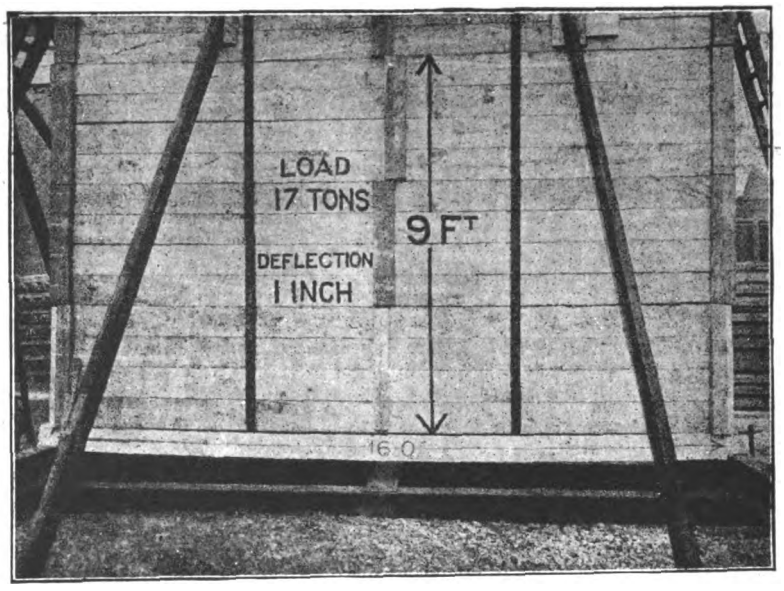
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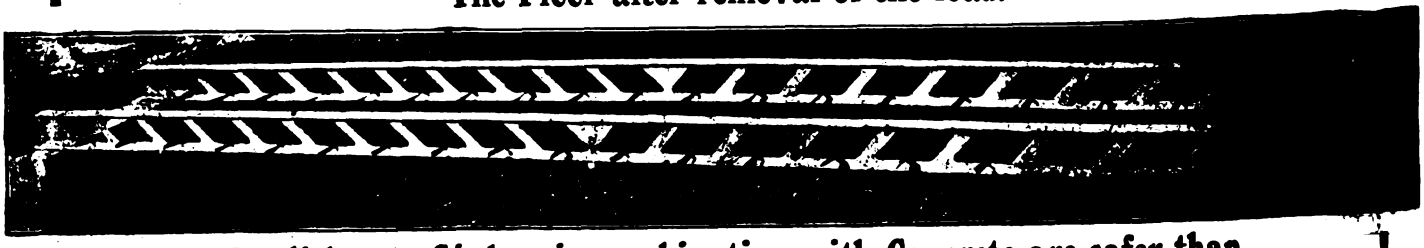
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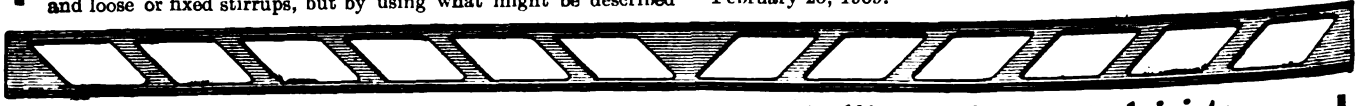
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Scotland.—April 27.—For the mason, plaster, and carpenter work of new dwelling house, East Haybogs, and of New Barn, Braeside. Mr. Alexander Dow, ground officer, or with Messrs. Hunter & Gordon, advocates, 80 Union Street, Aberdeen.

Scotland.—April 30.—For building a Baptist church, Port Ellen, Islay. Mr. James Quenton, Charlotte Street, Port Ellen, Islay, N.B.

Stevenage (Herts).—April 19.—For erection of a County Council school. Deposit 2*l.* 2*s.* The County Surveyor's Office, Hatfield.

Stockton-on-Tees.—April 23.—For alterations and additions to the county police station. Mr. W. Crozier, A.M.I.C.E., county architect and surveyor, Shire Hall, Durham.

Stokesley.—April 17.—For alterations and additions to the police station. Apply by April 7 to Mr. Walter H. Brierley, 13 Lendal, Yorks.

Surbiton.—April 26.—For erection and completion of extensions to the Electricity works in Ewell Road. Mr. John Armitage, architect, Sanctuary House, Westminster. Send names and 5*l.* deposit by April 14 to Mr. F. J. Bell, deputy clerk, Ewell Road, Surbiton.

Truro.—April 17.—For the restoration of five cottages at Clarke's buildings, Pydar Street. Mr. T. Pascoe, 36 Pydar Street, Truro.

Truro.—April 19.—For alterations and additions to Nos. 26, 27 and 28 Richmond Hill and Bosvigo Road. Mr. Noel F. Blamey, architect and engineer, Bodmin Road, St. Austell, and Princess Chambers, Plymouth.

Wales.—April 17.—For alterations at the hospital at the Headquarters Homes, Ely, Cardiff. Deposit 1*l.* 1*s.* Mr. E. Seward, F.R.I.B.A., Queen's Chambers, Cardiff.

Wales.—April 19.—For erection of six pairs of semi-detached houses at Glantaff Road, Troedyrhiw. Mr. T. Edmund Rees, architect and surveyor, Gernant, The Walk, Merthyr Tydfil.

Wales.—April 19.—For erection of a schoolroom, &c., at Ystradmynach. Mr. T. Roderick, architect, Clifton Street, Aberdare.

Wales.—April 20.—For rebuilding the premises of the Royal Oak Hotel, Byncethin. Mr. W. Y. Davies, architect, Coity Road, Bridgend.

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WALES.—April 21.—For erection of a hall and classrooms at the Pisgah church, Talywain. Mr. D. J. Lougher, architect, Bank Chambers, Pontypool.

WALES.—April 22.—For the supply, delivery and erection in situ at the King's Dock, Swansea, of (1) one framed and braced steel single-storeyed transit shed, with sides and roof covered with galvanised corrugated iron, 400 feet long by 120 feet broad, in two spans of 60 feet; and (2) one framed and braced steel single-storeyed transit shed, with sides and roof covered with galvanised corrugated iron, 400 feet long by one span of 60 feet. Deposit 5*l.* 5*s.* Mr. Talfourd Strick, clerk, Harbour Offices, Swansea.

WALES.—April 28.—For reconstruction of the upper floors with fireproof staircases, new bath houses, &c., at the Monmouthshire Asylum, Abergavenny. Deposit 5*l.* 5*s.* Mr. E. A. Johnson, F.R.I.B.A., Abergavenny.

WALES.—April 24.—For erecting retaining wall, iron work, and concrete floor at Avondale Hotel, Cymmer. Also tenders for alterations and additions to above hotel. The Secretary, Rhondda Valley Breweries Company, Ltd., Pontypridd.

WALES.—April 24.—For providing and erecting a four-stall public urinal, including the necessary masonry, &c., complete, at New Tredegar, Mon. Mr. J. H. Lewis, A.M.I.C.E., Blackwood, Mon.

WALES.—April 24.—For erection of school to accommodate 260 infants, Risca, Mon., and for alterations to the existing school buildings. Deposit 3*l.* 3*s.* Mr. John Bain, architect, County Council Offices, Newport.

WALES.—April 24.—For erection of schoolroom and the rebuilding of Wesleyan Chapel, Amlwch, Anglesey. Mr. W. F. Brindle, architect and surveyor, &c., Mona Street, Amlwch, and High Street, Llangefni.

WALES.—April 26.—For erection of twenty houses at Ynysddu. Mr. D. J. Thomas, architect, High Street, Blackwood, Mon.

WALES.—April 28.—For erection and completion of vestry and class rooms, and other works on chapel, for the Saron Welsh Congregational Church, Williamstown, Rhondda. Mr. W. D. Thomas, architect and surveyor, Tydvil House, Porth, Glam.

WALES.—April 29.—For three houses to be erected at Coychurch, Bridgend. Mr. W. Y. Davies, architect, Coity Road, Bridgend.

WHITGREAVE.—April 23.—For erection of cottages and buildings on small holdings in the parish of Whitgreave, Staffordshire. The County Estate Agent, 3 Martin Street, Stafford.

WILLESBOROUGH (KENT).—April 19.—For the execution of repairs to the teacher's dwelling house at the Willesborough Council School. Mr. W. J. Spicer, 27 Romney Road, Willesborough, Ashford, Kent.

WREXHAM.—April 27.—For alterations and additions to goods shed for the Great Western Railway Company. The Resident Engineer, Birmingham Station.

THE Blackburn Town Council have decided upon a scheme to cost 113,000*l.* for the utilisation of the Blakey Moor site, which was acquired for 80,000*l.* Buildings, to include police headquarters, a sessions house, police courts, a large public hall and smaller assembly rooms are to be built. The Corporation already possess borrowing powers for the building of police quarters, but the consent of the Local Government Board will have to be obtained before the erection of the public hall is begun.

AT the monthly meeting of the Riccall Rural District Council, Yorks, a letter was read from Messrs. Gelder & Kitchen, architects and surveyors, of Hull, stating that Messrs. Watson & Sons, soap manufacturers, Leeds, were about to erect a large oil mill at Selby, and they on a later date would submit plans to the Riccall Council for confirmation. As the firm were very anxious to proceed with the work the architects had advised them to put in the foundations during the period that they were preparing plans, getting the contract let, and plans approved by the Council. The architects said they had written to the clerk so that there might be no disrespect shown in proceeding with the foundations. The Council approved of the architects' action, and agreed to the foundations being put in pending the production of the necessary plans, the members expressing pleasure in helping forward the project.

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TENDERS.

BRAMPTON (CUMBERLAND).

For construction of waterworks. Contract No. 1.—For cutting trenches, hauling, laying and jointing about thirty-one miles of 6-inch, 5-inch, 4-inch and 3-inch cast-iron pipes; for the supply and fixing of sluice-valves, &c., and the construction in ferro-concrete of Castle Carrock reservoir (97,500 gallons), Cowran reservoir (72,000 gallons), and Blaeberry bent tank (10,000 gallons), and other works. Contract No. 2.—For the manufacture and delivery to Brampton or How Mill stations, Cumberland, of about 1,050 tons of 6-inch, 5-inch, 4-inch and 3-inch cast-iron spigot and socket pipes, together with all bends, junction tapers and other specials (vertical cast pipes of British manufacture only). Messrs. TAYLOR, WALLIN & TAYLOR, engineers, Newcastle-upon-Tyne.

Contract No. 1.

Pollock	£14,725	0	0
Peters & Collins	11,963	0	0
Arnold & Son	11,621	0	0
Streeter & Co.	8,830	0	0
Deakin	8,504	0	0
Nunn & Co.	8,451	0	0
Ferguson	8,441	0	0
Bell & Sons	8,432	0	0
Wilson, Stocks & Co.	8,390	0	0
Cooke & Co.	8,254	0	0
Thorpe	8,180	0	0
Dobson	8,080	0	0
Ashley	7,986	0	0
Bushby & Sons	7,931	0	0
Ewart	7,857	0	0
Davies	7,845	0	0
Macdonald	7,832	0	0
Laing & Sons	7,796	0	0
Denham	7,515	0	0
Dougill & Sons	7,473	0	0
Henderson & Wilson	7,434	0	0
Thompson & Sons	7,346	0	0
Mackay & Sons	7,271	0	0
Easten	7,056	0	0
FIRTH & Co., Leicester (*accepted*)	6,919	0	0
Brebner & Co.	6,219	0	0

Contract No. 2.

Stanton Ironworks	7,042	0	0
McEwan & Co.	6,861	0	0
Davies	6,765	0	0
Cochrane & Co.	6,759	0	0
Thompson & Sons	6,621	0	0
McLaren & Co.	6,609	0	0
Dougill & Sons	6,603	0	0
Stewart & Co.	6,520	0	0
Easten	6,521	0	0
Oakes & Co.	6,476	0	0
Cochrane & Co.	6,455	0	0
Stanton Ironworks	6,356	0	0
Nunn & Co.	6,343	0	0
Staveley Coal and Iron Co.	6,048	0	0
CLAY CROSS Co., Chesterfield (*accepted*)	6,012	0	0

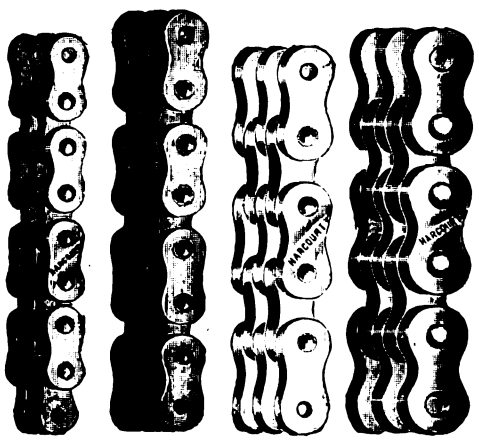
FENTON (STAFFS).

For erection of a fire brigade station, foreman's residence, &c., for the Urban District Council.

Mould	£1,535	0	0
Wardle	1,450	0	0
Beckett	1,339	1	8
Challinor & Hughes	1,330	0	0
Ball & Robinson	1,290	0	0
Caulcott	1,276	0	0
Walters	1,275	0	0
Cooke	1,261	10	0
Chatfield	1,240	0	0
Wilton	1,207	0	0
Goodwin	1,200	0	0
Heath	1,188	0	0
Bennion	1,177	8	0
TOMPKINSON & BETTELLEY, Longton (*accepted*)	1,175	0	0
Yoxall	1,165	0	0

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The Post Office, Montreal.
The New Lunatic Asylum, Bristol.
The Houses of Parliament, Brisbane.
The Holborn Viaduct Buildings, London.
The New Library, Pollokshields.
The Asylum, Letterkenny.
The Dykebar Asylum, Paisley.
The Metropolitan Carriage Works, Saltley.
The Royal Artillery Barracks, Manchester.
The Cottage Hospital, Walsall.
The Fever Hospital, Bristol.
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EMNETH.

For erection of two cottages at Emneth, Norfolk. Messrs. Walker & Walker, architects, Wisbech and Terrington.

Wilkinson & Son (*recommended*)	£380	0	0

FRODSHAM.

For the partial completion of new house, Frodsham. Mr. Samuel Davies, M.S.A., architect, Frodsham.

Gleave & Son, Frodsham (*accepted*)	£1,490	0	0

Heating.

Lea & Son	80	0	0

HASLEMERE (SURREY).

For erection of a house at Haslemere. Messrs. F. J. Hodgson & W. Symmonds, architects, Guildford and Haslemere.

Chapman, Lawry & Puttick	£594	0	0
Ticehurst	550	0	0
Milton & Sons	539	0	0
Austin	523	10	0
Haslemere Builders	509	0	0
Smith	505	0	0
Holden & Son	495	10	0
Doughton	495	0	0
Marshall, East Liss (*accepted*)	447	0	0

LIVERPOOL.

For erection of engine-beds, boiler settings, tanks for condensing plant, &c., at the Lister Drive power station No. 2.

Henshaw & Sons (*recommended*)	£6,495	0	0

LONDON.

For erection of ice-making works, Paddington. Mr. H. Phelps Drew, architect, Covent Garden, W.C.

Higgs & Hill	£11,484	0	0
Thomas & Edge	11,467	0	0
Spencer, Santo & Co.	11,055	0	0
King & Son	11,044	0	0
Prestige & Co.	10,987	0	0
Richards & Co.	10,883	0	0
Minter	10,695	0	0
Ashby & Horner (*accepted*)	10,952	0	0

LONDON—*continued.*

For electric lighting of the North-Eastern Fever Hospital, South Tottenham, N., for the Metropolitan Asylums Board.

Weston & Sons	£7,983	0	0
Wenham & Waters	7,680	0	0
Foote & Milne	6,928	0	0
Lund Bros. & Co.	6,500	0	0
Warren, Smith & Co.	6,300	0	0
Blackburn, Starling & Co.	6,149	0	0
Speedy, Eynon & Co.	5,950	0	0
Pinching & Walton	5,807	0	0
Johnson & Phillips	5,702	0	0
Fryer & Co., Paddington (*accepted*)	5,095	0	0
Tilley Bros.	5,064	0	0

MANSFIELD.

For erection of three houses, Blind Lane. Mr. Arthur E. King, M.S.A., architect and surveyor, Mansfield.

Percival	£1,100	0	0
Tweltridge & Co.	1,080	0	0
Frisky	1,052	0	0
Copestake	1,026	9	0
Witham & Sons	977	3	8
Bristowe	973	0	0
Vallance & Blythe, Mansfield (*accepted*)	945	0	0

NUNEATON.

For the erection of a public slaughterhouse.

Hickman, Market Harborough (*accepted*)	£1,248	4	0

For the erection of a covered way thereto.

Hickman (*accepted*)	£220	0	0

PEASEDOWN ST. JOHN, NEAR BATH.

For erection of two stone-built cottages. Mr. G. H. Gibson, surveyor, Victoria Square, Radstock.

Padfield	£540	0	0
Hobbs	500	0	0
Bird & Son	500	0	0
Moore & Sons	464	0	0
C. G. Coles	460	0	0
Coles Bros., Peasedown St. John (*accepted*)	404	0	0

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SCOTLAND.

For electric light installations, for the Edinburgh Marine Gardens, Ltd., 13 George Street, Edinburgh. Messrs. Walker & Ramsay, architects, 123 Wellington Street, Glasgow.

Woodward & Co.	£738 5 9
Malcolm & Allan	702 7 0
Safety Light	683 9 5
Morton	652 15 2
Scott & Co.	598 17 6
Stewart & Bucher	595 9 2
Munro & Co.	593 16 9
Bennett & Rutherford	570 19 4
Lowdon Bros. & Co.	556 14 0
Anderson & Munro	552 6 0
Stevens	539 4 0
Kennedy, Stark & Co.	517 19 0
Colquhoun & Co.	492 5 0
Pratt Bros., 109 Dalny Road (*accepted*)	477 12 0

TAUNTON.

For new side galleries and other alterations, &c., at the Victoria Wesleyan chapel, Victoria Street. Mr. F. R. Roberts, Taunton.

Smith	£278 0 0
Potter	249 10 0
Gleed Bros.	239 0 0
Manning & Son	235 0 0
H. J. Spiller	230 0 0
A. J. Spiller	219 15 0
Moggridge, Taunton (*accepted*)	215 10 0

WREXHAM.

For alterations and additions at the electricity works, Willow Road. Mr. J. England, borough engineer.

Jones	£525 0 0
Davies	425 0 0
Stephens, Wrexham (*accepted*)	365 17 0

For erection of a shelter and other works at the Wm. Jones Recreation Ground. Mr. J. England, borough engineer.

Hughes, Wrexham (*accepted*)	£140 5 0

TRIMDON (DURHAM).

For an extension to the Trimdon branch premises of the Station Town Co-operative Society. Mr. J. Wilson Hays, architect, Wingate.

Watson & Co.	£1,112 3 7
Draper & Sons	1,100 0 0
J. A. Tweddle	1,025 0 0
Oliver	982 17 0
Coates	951 0 0
Makepeace & Valks	929 12 2
E. M. Tweddle	925 0 0
Hutton	847 0 0
Thompson, Wingate (*accepted*)	784 10 0

Received too late for Classification.

BRISTOL.

For heating and water-supply apparatus to the new school for the blind, Southmead, Bristol. Messrs. Edmeston & Gabriel, architects, Bristol and London.

Crispin & Sons, Bristol (*accepted*)	£2,345 0 0

Ayr Dean of Guild Court have passed plans for an entertainment and roller-skating pavilion to be erected at Boswell Park, Ayr. The buildings, which have been designed by Mr. J. Campbell Reid, A.R.I.B.A., Glasgow, are to be constructed of white fibre plaster, with steel-girder roof and patent roofing material, and the estimated cost is 3,000*l*.

The question of English *versus* German contracts created a scene at the meeting of the Spalding Urban Council recently. A committee reported in favour of paving in the town being done with German material under the direction of a German foreman, on the ground that it was cheaper than English work. After a heated discussion, it was agreed that the work should be done by English materials and labour, the German proposal being negatived.

The Swansea sub-property committee recommends the acceptance of the tender of Messrs. Lloyd Bros. for the erection of the Glyn Vivian Art Gallery. There were altogether eleven tenders. The contract price is not yet made public, but it is stated it is below the sum of 10,000*l*., which Mr. Vivian has promised to give for the erection of the building.

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TRADE NOTES.

Farrow & Jackson, Ltd., of 16 Great Tower Street, E.C., and 8 Haymarket, S.W., and 91 Mansell Street, E., announce that they have just registered "Farjak, London," in substitution of "Farrow-Jackson, London," as a telegraphic address, thus saving one word in the message.

Sanitarians teach us that many serious diseases are preventible, among them typhoid fever, cholera, diphtheria, &c. They are made preventible through our knowing the sources whence infection comes to us. Drinking water is liable to constitute a source of disease, and especially of typhoid fever itself. Cholera has been abolished by watchful care over public water supplies, but typhoid fever and diphtheria still remain with us. The ensuring that our drinking water shall be pure and free from all chance of conveying disease germs to us is therefore at once a plain and effective mode of arresting disease attack. Whenever any water is suspected to be of a suspicious character, it should be filtered, but proper filtration is one thing, and partial and ineffective filtration quite another thing. There is only one road of safety in this important matter, namely, to use a filter which has been tested and approved by scientists (Dr. Sims Woodhead, Dr. Andrew Wilson, and others), and which has been proved to yield a water absolutely germ-free. Such filters are those made by the Berkefeld Filter Company, 121 Oxford Street, London, W. All interested in the subject of pure water should send for the literature of the Berkefeld Filter Company, which will be sent free on application.

The Manchester City Council last week approved of proposals to construct baths for Withington at a cost of 20,000*l.*, and a municipal school at Fallowfield to cost 13,400*l.*

Mr. Richard D. Batchelor, artesian and consulting well engineer, of 73 Queen Victoria Street, E.C., and Chatham, has been awarded the contract for a large boring 1,000 feet deep for the water supply of the Lewes Union, Chailey, Sussex.

BUILDING TRADES EXHIBITION.

The wisdom of Mr. Greville Montgomery, when he boldly transferred the Building Trades Exhibition from the Agricultural Hall to Olympia in 1907, was amply shown by the results. The change from Islington to Kensington was a proof of the growing interest, both technical and non-technical, in these displays. That interest could not fail to be fostered when the exhibits were brought to so central a position and so admirable a rendezvous as Olympia, and thereby the public and the trade were mutually benefited. Among those professionally concerned with building these biennial exhibitions have for some time been looked forward to keenly and have attracted large numbers from all over the country and even from abroad. Of late the circle has been widening until that expectation is now shared by those who are the essential complement of the building trade—*i.e.* the general public. On each successive occasion the standard of the exhibition has been raised and is made more and more representative, until now it is almost impossible to learn everything that is to be learnt in a single visit. The various societies that have already arranged special visits show the truth of what has been just said. It will be found that the Building Trades Exhibition of 1909 is one step in advance of any that have gone before, and that in itself is no easy achievement.

We give a few preliminary notices of what will be seen when Olympia is declared open to-morrow (Saturday) by Mr. Ernest George, F.R.I.B.A.

The stand of the *British Uralite Company (1908), Ltd.* (No. 215, Row N annexe), consists of a building, 20 feet by 16 feet, in imitation of old-fashioned half-timbered work, this effect being produced by means of narrow strips of dark-coloured asbestone fixed at intervals on the surface of the flat asbestone sheets forming the walls. The whole building shows the adaptability of the company's manufactures for the construction of bungalows, &c. The walls are of asbestone sheets, 6 feet by 3 feet, nailed direct to wood framework, one part being arranged to show a plain flat surface inside, similar to plaster, and the other panelled

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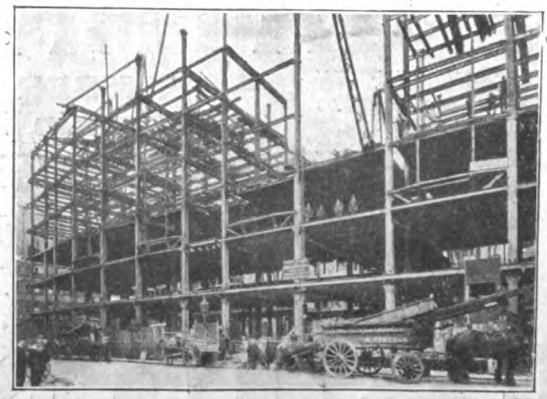
out with moulding. The ceilings are of uralite sheets, part fixed direct to ceiling joists to form a plain flat ceiling, and the remainder fixed above the ceiling joists, thus obtaining the effect of an old-fashioned timbered ceiling. The roof is laid with asbestone diagonal tiles on battens, with the exception of the dormer, which is covered with 12-inch by 8-inch asbestone slates. The dwarf partition on view is composed of the new uralite fireproof plaster slabs now being placed on the market by the Uralite Company. It may be mentioned that while these partition slabs are among the cheapest on the market, they possess the excellent fire-resisting qualities of uralite.

The *Art Pavements and Decorations, Ltd.*, exhibit at Stand 104, Row F, comprises mosaics, marble, wall and floor tiles, parquetry and block flooring, and Armadek composition flooring. In the marble section are nearly



100 varieties of coloured marbles suitable for all descriptions of decorative work. They include Siberian green (recommended for walls and floors owing to its hardness, durability and rich marking), Calacata (a white marble with delicate grey veins, very suitable for panelling walls), and Listavenna (a white marble with light-green veins), and many other varieties. The effect is shown of various marbles in combination. This part of the exhibit is completed with steps and risers in statuary and Sicilian marble. The mosaic section includes samples of Roman, terrazzo and breccia mosaic. In the parquetry section are various patterns in oak, walnut, mahogany and teak; and in the wood-block flooring department in deal, pitch pine and oak floors. The Armadek composition flooring forms a jointless, fireproof and sanitary floor at a low cost. This material can also be used for dados and carried up from the floor with a cove skirting. In the tile section are shown a specimen lavatory and two bathrooms lined with dull glazed Medmenham tiles. These tiles have been produced to meet the demand for tiles free from a highly glazed surface. The exhibit further comprises wall tiles suitable for hall or staircase, a large range of dados in antique enamelled tiles, and chimneypieces with surrounds in Medmenham tiles. The border to this part of the exhibit is laid in a new hydraulic tile with grooved non-slipping surface, suitable not only for floors of factories, &c., but also for treads of staircases, gangways, paths, swimming-baths, &c.

James Latham, Ltd., 124 Curtain Road, E.C., have secured larger space than in 1907, and need it to show very finely figured mahogany, oak, walnut, ash, satinwood, teak, kauri pine, maple and pine, &c. The four latter items show that our Colonies are not left out. High-class home-grown timber, such as oak, walnut, beech, sycamore and brown oak, &c., are represented by excellent examples. The sample of English oak is from a tree which was 4 feet through the centre 6 feet from the ground and from 250 to 300 years old. The walnut is about 150 years old, and the brown oak sample about 700 years old. It may here be mentioned that Messrs. J. Latham, Ltd., recently handled a parcel of this latter wood from trees which formed part of an avenue in the Midlands which is mentioned in Domesday Book as being a well-grown plantation then, so the wood must have been at least 1,100 years old. Mouldings, floorings, hand-rails, &c., in mahogany, oak, teak and American whitewood, form a strong feature of the exhibit. They are of good design and excellently machined. Hardwoods are finely represented in the samples of veneers, both sawn and knife-

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STOCKPORT TOWN HALL.—THE COUNCIL CHAMBER.

THE CENTRAL STATION HOTEL, GLASGOW.—THE LOUNGE.

cut. One of the features of Stand No. 260, Row R, will be actual specimens, growing in pots, of many of the woods used in the trade, such as oak, walnut, ash, beech, maple, pine, &c.

The *Associated Portland Cement Manufacturers (1900), Ltd.*, Stand No. 63, Row D, again afford visitors a complete insight into the manufacture, testing and possible uses of Portland cement. There are shown the raw material, with specimens of the upper chalk formation, and clay from the estuary of the Medway and from the company's own deposits in Kent. Samples of slurry, representing the mechanical mixture of the raw materials in definite chemical proportions and thoroughly incorporated, are on view. Also a large quantity of 1-inch section briquettes of various ages, to be tested for tensile stress in the course of the Exhibition. The standard method of gauging briquettes, pats for setting time, and making tests for constancy of volume under the conditions in the standard specification are also shown. Crushing tests of 2¾-inch cubes, consisting of neat Portland cement and a mixture of three of standard sand to one of Portland cement, are made, and various aggregates, both suitable and unsuitable for mortar and concrete work, are given. The company's business in plaster of Paris, Keene's, Parian and Roman cements, is represented by samples of each, and mouldings made with their superfine Keene's cement mixed with various colouring oxides. The useful handbook, "Everyday Uses of Portland Cement," is on sale at this Stand. It is (as we mentioned some few weeks ago) well got up, profusely illustrated, and affords much information to users of Portland cement generally. The Stand itself contains photographs of notable undertakings in different parts of the world in which the company's brands of cement have been used.

The *Oakeley Slate Quarries Company, Ltd.*, of Blaenau-Festiniog, North Wales, and 53 Parliament Street, S.W., show at Stand No. 97, Row F, a fine specimen of random slating executed by Mr. John Macquire, of 108 Southwark Park Road, S.E.; there are also excellent examples of slabs, with specimens of slates from the finest to the heavier qualities. Some of them have been on roofs before the year 1803, and there are also slates from an old smithy where they were exposed to sulphurous fumes for over seventy years. These two exhibits effectively demonstrate the endurance of the Oakeley old-vein rock. These slate mines have been working for upwards of 200 years and are among the largest in the world; operations are carried on at twenty-six floors or levels, of a depth from top to bottom of 1,400 feet; and there are over forty miles of rails and tramroads on the property. Upwards of 4,000,000 tons of their finished roofing slates have found markets in parts of the world varying as widely as Russia and West Africa, and from 1888 to 1906 no less than 14,000,000 tons of slate rock and waste were quarried. The works throughout are electrically equipped on the three-phase system. This exhibit affords an opportunity to inspect the process of roofing-slate manufacture without a journey to the quarries in North Wales.

Hall's Distemper exhibit (Stand 75, Row D) is intended to demonstrate some of the possibilities of decoration with various paint and distemper specialties of *Sissons Bros. & Co., Ltd.*, of Hull and London. The exhibit takes the form of a cottage with porches, and contains a completely furnished living-room and bedroom, and has been designed by Mr. T. Gordon Jackson, architect, of 2 Broad Street Place, E.C. This scheme can be easily adapted to any permanent building, and advice will be gladly furnished. The decorations employed are as follows:—Externally the rough-cast walls are coloured with Hall's distemper (cream colour No. 17, outside quality); the roof, which is of weather boarding, is coloured with Hall's distemper (outside quality No. 9); the wood framing is treated with green oil paint (Aperfectol No. 129); while the gable timbers are treated with Rustikol, a cheap preservative stain for outside woodwork (dark oak); the doors and window frames are finished in white enamel (Sisco white Japan). Internally the living-room has an attractive scheme, in which the walls contrast



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well with painted and stained woodwork; the walls are coloured with Hall's distemper (No. 77, flamingo red); the posts and beams are stained with Sissons' (dark oak) turpentine stain; while the doors, skirtings, seats, &c., are finished in white enamel (Orientolac). The furniture is in Sissons' (dark oak) turpentine stain, which reproduces natural woods with one coat and costs 75 per cent. less than grainwork. The bedroom is in a restful tone of blue, and the walls are coloured with Hall's distemper (No. 47). The woodwork (except the posts and beams) is finished with Sisco white japan, an elastic enamel. The furniture here is stained with Sissons' mahogany turpentine stain. In the back porch are shown a number of the firm's actual decorative specialties.

The *Saxon Portland Cement Company, Ltd.*, Cambridge, show samples of the constituents of their cement, from the time the chalk and clay deposit is excavated until it is ready for use. The exhibits commence with the raw material, which contains from 15 per cent. to 25 per cent. of clayey matter and an average of 79 per cent. of carbonate of lime. As the proportion of lime varies considerably, the ground marl is first dried and put through a mixer to ensure a uniformity of the lime and clay before it is made into blocks and loaded into kilns. But when the rotary kiln is used the marl is burnt in its powdered state. Samples are given of each of these, as well as of the clinker that results from the two different kinds of kilns. The next sample in chronological order is that of the clinker after passing the first stage of the crushing or grinding process. The final stage shows Saxon cement as powder, and consisting of about 60 per cent. of absolute "flour" (the cementitious part of the material). It has an average fineness such as to leave only 1 per cent. on a sieve having 5,800 holes per square inch. The output of the Saxon and Norman Works is 100,000 tons per annum, and the company guarantee its uniform excellence.

Messrs. W. Oliver & Sons, Ltd., of 120 Bunhill Row, E.C., are, as usual, showing specimens of the best quality seasoned hardwoods fit for immediate use, both in the rough and polished. One specialty is a very fine six-bevel panel Cuba mahogany entrance door with carved wooden frame; they are also showing various hardwood floorings of the highest quality. It may be here mentioned that on the occasion of the visit of the Prince of Wales to the 1907 Exhibition, his Royal Highness, on expressing a wish to see some New Zealand timber, was conducted to the Stand of Messrs. W. Oliver & Sons. Their exhibit is always a source of pleasure to anyone who can at all appreciate high-class timber. Many parts of the world are represented in it.

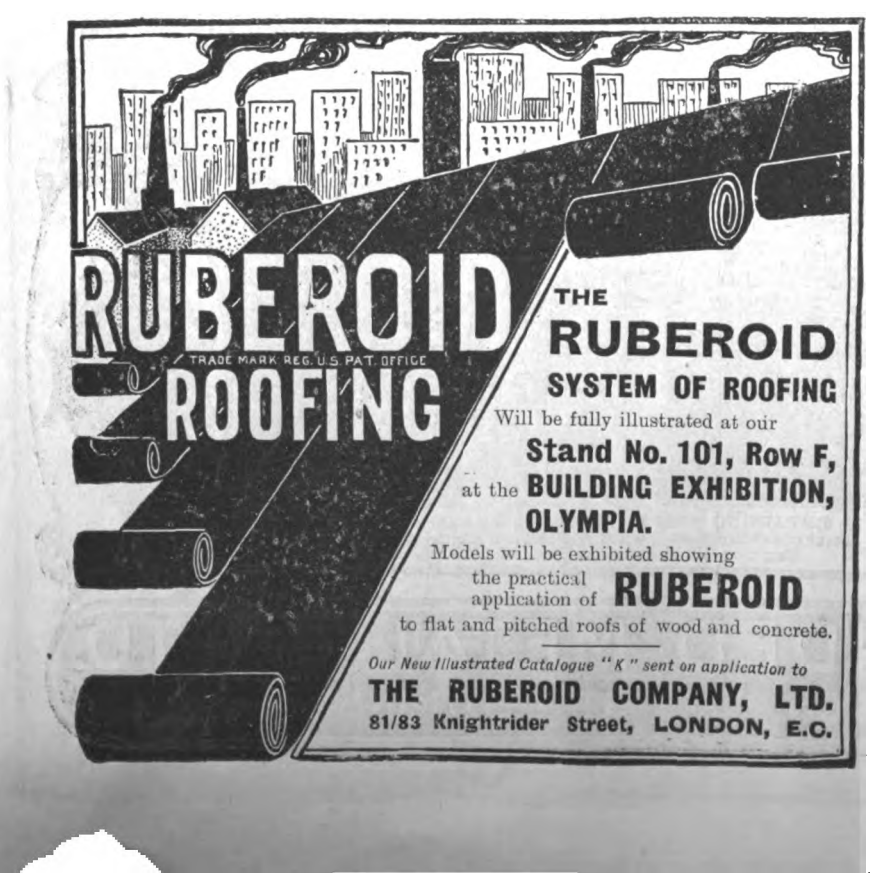
Stand No. 219, Row N, is held by *George Wooliscroft & Son, Ltd.*, of Hanley, who make a fine display of constructional faïence, terra-cotta, red and blue goods and a large variety of tiles. The front of the Stand shows their different kinds of faïence and terra-cotta work to advantage. Inside there is a choice selection of modern fireplaces on the floor-level principle, including the glow, quadrate and patent down-draught. The last named is provided with an additional flue for the purpose of burning anthracite coal in the open grate. Harmony reigns in these fireplaces, for the surrounds, the mantel and the curbs are all of slabbed tiles or faïence. On the floor are specimens of tesselated and ironstone adamant tiles in many designs. Slabbed tile panels and wall and dado tiling are arranged round the walls. Attention is called to the patent grip back tiles, as supplied for the underground electric railways of London and other important contracts. The tiled-top oak tables, for hotel and restaurant use, combine beauty, sanitary advantages and strength of structure. The roof tiling shows a wide variety of colour and finish, comprising the gradations of tone from fast red to blue, and includes handmade sand-faced Aspera and Grip roof tiles, the latter doing away with the necessity of nailing. Red and blue Staffordshire goods for all purposes and antique and fancy glazed tiles are also displayed.

The "Devon" fire of *Candy & Co., Ltd.*, has to live up to a high reputation ever since it was placed equal first in the official tests carried out some three years ago jointly by the Office of Works and the Smoke Abatement Society, under the direction of Sir Henry Tanner. The results were so satisfactory that they may be again mentioned. During thirty-two hours the "Devon" fire consumed 20.43 lb. of coal, against the 27.92 lb. which was the average of the thirty-six other grates, while the heat was 4 per cent. higher and the smoke 25 per cent. less than that

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of the others. This last fact is of itself a powerful recommendation, and was probably overlooked by Sir Aston Webb, R.A., when he expressed his opinion that coal will be superseded by electricity in fifty years because of the latter's smokeless heating powers. The love of the fireside is implanted too deeply in the national mind to be easily eradicated, and there will be no need for any drastic change while such firms as *Messrs. Candy & Co., Ltd.*, are able to combat the smoke evil by their application of scientific knowledge to the cheerful open grate. Perhaps this advantage may not have irresistible attraction for the architect's or builder's client, but what cannot fail to attract him is the gain in heat and reduction in the coal bill; and all these can be enjoyed in grates of great artistic charm which can be had in designs suitable for any style of building.

During their 110 years of existence *Messrs. Shaw & Carter*, of Birmingham, must have witnessed many changes in their business as lock manufacturers and brass and bronze metal founders. Among their numerous patents is the "Shawcar" patent adjustable tubular hat and coat hooks; they are cheap, strong, compact (the projection of each hook from the centre is 3½ inches), and are easily fixed on to the tube by two bolts, which also secure the wire panels in the rebates. The firm sell a series of indestructible adjustable hooks fixed by screws. The "Shawcar" anti-friction ball-bearing lock carries with it a guarantee for wear during twenty years, and the makers undertake to repair any lock returned through faulty workmanship. Hardened steel balls are applied in a revolving bronze or brass cup to the latching action, which is operated by the follower, made of hardened steel. Another anti-friction patent is their double ball-bearing axle-pulley, in which the balls take a bearing on the wrought-steel cheeks and spindle so as to prevent the wheel from binding on the cheek and to secure perfect running. Messrs. Shaw & Carter, it is needless to add, are able to supply all kinds of door furniture and other fittings which play so important a part in a house in creating an impression. They have an improved casement-stay and a patent automatic rain and draught proof water bar for the top rail of wood casements and fanlights.

B. Finch & Co., Ltd., are, if we remember rightly, newcomers to the Building Trades Exhibition; they certainly have not been included in the last two or three. Their sanitary appliances may consequently be extended a genuine welcome, for although in the past numerous English makers of the same lines have ably demonstrated the vast improvements made in sanitary goods, yet it is well that the general public should realise how many firms now pay special attention to hygiene. One of B. Finch & Co.'s contributions is the "Weir" lavatory. In this they do away with the primitive immovable overflow opening, and replace it with a cylindrical recess at the back of the basin well below the top rim. The overflow passes down this chamber (which is large enough to admit the hand with a sponge for cleaning) and through a grating at the bottom. This weir can carry off water supplied under pressure from the largest lavatory valves, and at each discharge the overflow chamber is automatically flushed, the water escaping through the grating. For schools, &c., the "Weir" lavatories can be obtained in table ranges. Messrs. Finch also show surgical lavatories, a bath shower worked by a single lever, and a "Silent Facile" closet, for use where there is not enough room for the ordinary water-waste preventer with flush pipe. The water is silently discharged by the gentle pressure of the button and then silently fills.

Mellowes & Co., Ltd., sanitary engineers and specialists, Sheffield, are showing some first-class sanitary fittings, including new models in w.c.'s and lavatories. One of these has a w.c. basin with a specially large water area and is without mouldings, for cleanliness. By the new process the highly finished earthenware looks equal to heavy fireclay. There is also a new lavatory made in the same process and which likewise has a specially large plain basin, while the price is very low considering the quality. They are also showing first quality bath, with 4-inch roll-edge, with and without a needle and shower bath fixed through the roll. Special attention is called to the plumbing work executed by their workmen, which includes special joints constructed in vertical lead waste-pipe for expansion. This allows stacks of pipes to remain perfectly perpendicular. Messrs. Mellowes are willing to prepare schemes, with estimates, free of charge, for drainage, plumbing, heating work, water supplies, &c. They are also makers of and exhibiting the "Eclipse" patent roof glazing bar, which consists of a steel

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The new Opal Tiles of lustrous surface with clean cut edges.
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core entirely surrounded by a lead sheath, on each side of which are three webs, the first two being rubbed down on to the glass from the outside and the third rubbed up to the glass from underneath. A perfectly watertight joint is thus formed between the glass and the lead, and no paint or packing of any description is required. Rusting of the bar is prevented by the strong lead cover soldered up at each end. It is adaptable to all roofs, also to domes, screens and window glazing. Breakage of glass from expansion or contraction is rendered impossible by the bead on the bar. "Eclipse" glazing is guaranteed watertight for a term of years.

Hartley & Sugden, Ltd., of the Atlas Works, Halifax, wish visitors to Stand 123, Row G, to pay special attention to the Series K and H of their cast-iron sectional "White Rose" boilers, which, being provided with a higher feed-door, can take in a very large quantity of coal and will burn for a long time without attention. There are two new boilers in the cast-iron "Sentinel" and new "Gas" boiler. The "Sentinel" is for small greenhouses and other cases where a quantity of fuel has to last through the night and yet only a small fire is required. This boiler is low in price as well as economical in working. The cast-iron "Gas" boiler is also inexpensive, and exceedingly handy where a small apparatus is needed for heating an office or single room. Some of the types of boilers that have made this firm's name familiar to thousands of people, such as the "Savile" for domestic supply, the "Chatsworth," the "Halifax" and the "Effective" are shown on the Stand. The radiators are of both plain and fluted patterns.

The exhibit of the *Trussed Concrete Steel Company, Ltd.*, is of value to all interested in reinforced concrete. Prominent is a small model plant showing the manufacture of the Kahn trussed bar, which is owned by the company. During the Exhibition model bars will be given away. A practical exhibit is a model wooden beam, demonstrating the comparative value of rigid shear members (as shown by the Kahn bar) and loose shear members. The beam shows the practical impossibility of failure by shear when rigid members are used. Another exhibit is a model reinforced concrete beam, which enables the onlooker to see how the concrete packs itself around the diagonals of the Kahn trussed bar at the point of juncture with the main bar. To architects considering the advantages of reinforced concrete for lintels, the model lintel shown is of much interest, and also to any builders desirous of finding cheaper methods of lintel construction than rolled steel joists. A beam is also exhibited to prove that Kahn trussed bars, when embedded in concrete, do not depend upon adhesion. Engineers start with the assumption that the reinforcing steel in a concrete beam must be thoroughly embedded in order to derive its tensile stress by the adhesion of the concrete to it. This is true if loose shear members are used. However, in the test referred to the main tension bar is not embedded in the concrete, the shear members alone running up into the mass. The test beam is, of course, of a purely academic nature, and is only designed to show that the fundamental principles of the Kahn bar differ from every other. The exhibit includes photographs of works under construction, sample bars of various sections, the Ideal pile for repair work, and model tanks showing a new method of making concrete waterproof.

The *Expanded Metal Company, Ltd.*, again show examples of some of the widely differing uses to which the material is put. But there must necessarily be many omissions, for to make it fully representative the exhibit would have to include sea-defence works, reservoirs, bridges and other large undertakings. What is actually shown is examples of expanded steel-concrete fire-resisting flooring, roofing and walling, expanded steel-concrete retaining walls, sewers, conduits, &c., and expanded metal lathing and plaster partitions, ceilings, steelwork encasing and so on. The material is turned to domestic account as well in such made-up goods as workmen's lockers, builders' screens and riddles, workshop divisions, fencing, &c. Expanded metal is a material that no architect or engineer can afford to ignore, and the Stand is certain to attract as much attention as any of its predecessors at these Exhibitions, which is equivalent to saying that it will be a general object of interest to visitors, both technical and non-technical.

The *Kleine Patent Fire-Resisting Flooring Syndicate, Ltd.*, are the staunch champions of bricks for use in fireproof floors. Rectangular bricks (solid and hollow, according to the load) are laid, with thin iron tension bands placed on edge and inserted in each joint. By using hollow bricks the

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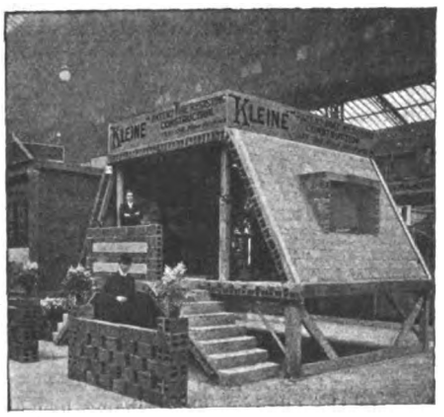


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dead weight of the floor (over short spans up to 9 feet) is not more than 25 lb. per foot super. The width of the spans without joists may be as much as 22 feet; but for big loads the greatest practicable width is 12 feet. The floors can be constructed at almost any speed desired, the centring is removed after a few days and the brick soffit is ready for plastering. The accuracy of the calculations on which these floors are constructed is proved by the fact that although millions of square yards have been in use during the last fifteen years, no "Kleine" floor has yet collapsed. Roofs



and staircases as well as floors are carried out on this system. Mr. W. Noble Twelvetrees some months ago carried out fire, water and load tests on three types of floors. His conclusion was that "the results of the tests prove conclusively that all three floors behaved in a perfectly satisfactory manner, the resistance of the construction to fire and water leaving nothing to be desired. The behaviour of Floor A was particularly noteworthy in respect of its fire-resisting and load-bearing capacity, after exposure to thermal influences and strains more severe than those obtaining in actual practice."

The *Maximum Light Window Glass Company* are demonstrating the effects of the "Maximum Daylight Glass" for increasing the daylight in buildings; the "Cat's Eye Glass," the new product made for partitions, door panels, &c.; and "Max Silk Glass," a new design in figured rolled glass. Any glass that can substantiate its claim to increase the light passing through windows from 500 to 2,000 per cent. may well claim to be called the "Maximum." The glass is made in sheets 100 inches by 40 inches, of various tints. The "Cat's Eye" is a new type of rolled glass chiefly used for obscuring the view without detracting from the light.

Sam Deards is acting as sole agent and manager for Smale's duplex block-making machine, which can be seen at Stand No. 2, Row B. The machine is called "the Rapid," and it can turn out, we are told, "concrete blocks, 18 inches by 9 inches by 4½ inches (equivalent to seven stock bricks), at the rate of two a minute, 120 an hour, or over 1,000 a day, at a cost of materials and labour of less than 1½*d.* each." At this rate it should certainly be possible to complete a six-roomed cottage in a single month, including the ten to fourteen days during which the blocks are setting. These machines may be either hired or purchased.

The *Well Fire and Foundry Company, Ltd.*, have made and sold no less than 100,000 of their patent fires, and these have been installed in such buildings as Caxton House, Westminster; the British Medical Association, W.C.; Lancaster City Hall and the Bradford City Hall. Some idea of the multiplicity of designs employed may be obtained by London architects from a visit to the very commodious showrooms at 33 Dover Street, Piccadilly, or by provincial practitioners at the local showrooms in Edinburgh, Manchester and Liverpool. The company produce excellent wood chimneypieces, as well as the general artistic setting to their fires, so as to ensure a worthy frame to their patent. Kitchen ranges and sanitary fittings are another feature of their activity. Their Stand may always be calculated upon to afford general interest to visitors.

For the vacant office of surveyor and sanitary inspector under Heath Town District Council there are seventy-five candidates. The Local Government Board have suggested that in consequence of the rapid growth of building operations and other work the two offices should be separated, and therefore different appointments made.

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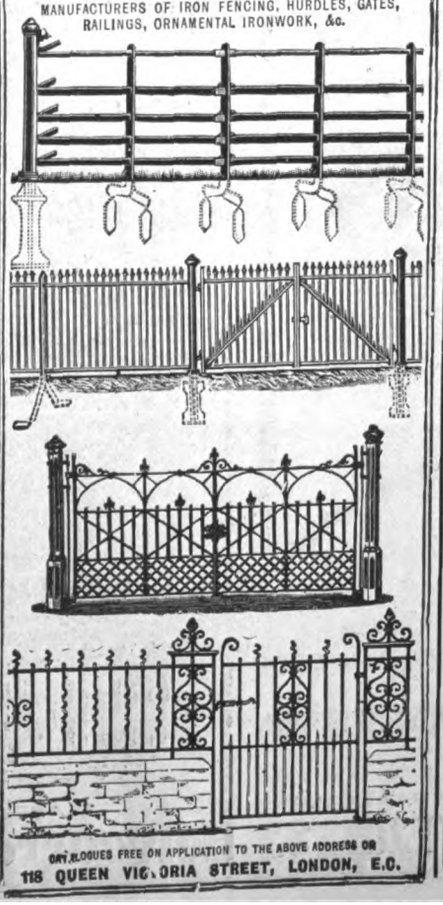
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HOLLOW CONCRETE BLOCKS.

ALTHOUGH solid concrete blocks were made by machines as much as thirty years ago, it is only within about the last seven that hollow blocks made their entry into the world of construction. The *début* could not strictly be called a triumphal one, for the hollow block did not at first find much wider favour than was accorded to its parent. One potent reason was that the pioneers relied too much on the structural advantages and ignored the æsthetic possibilities. It was granted by all that the ordinary concrete block was eminently adapted to buildings in which strength and fireproof qualities were most desirable; but something more than this was expected of a private residence. This demand was scarcely answered when the concrete outer walls were covered in with a shingle roof and rendered "tasty" by wooden "trimmings," for the new fireproof character of the house was at once stultified. Of course, it was not long before various efforts were successfully made to meet the wishes of possible patrons, and now the prejudice against this type of construction is gradually dying down. It was inevitable that the effects of stone and bricks should be imparted to so plastic a material by a manipulation of the moulds or by tooling the face of the blocks.

Among the companies dealing in this system is the Building and Estates Development Company, Ltd., Bristol. By their machines the walls are built *in situ* section by section and course by course from 6 inches to 2 feet in thickness at one operation. In an ordinary 9-inch wall there is one cavity, in a 14-inch wall two cavities, in a 19-inch wall three, and in a 24-inch wall four cavities. The process of construction may be described in the company's own words:—"Our machine commences at the bottom of the building and works its way round and round until it reaches the top, leaving the walls in one mass." The Building and Estates Development Company, Ltd., are prepared to carry out orders for any description of building both great and small.

MR. ERNEST OCTAVIUS LARKE, of Bromley, Kent, and of Tenter Street, Moorfields, London, E.C., builder, who died on May 10 last, left estate of the gross value of 31,904*l.* 17*s.* 7*d.*

VARIETIES.

PENMAENMAWR, in Wales, is to be advertised at the Imperial International Exhibition by means of a model of the town and surroundings at a cost of 75*l.*

A FIRE broke out in the scutching-room at the Heron Mill, Hollinwood, on Wednesday, and was speedily extinguished by the "Titan" sprinklers with which the mill is fitted up. The fire brigade were not required.

THE Pontefract Town Council have resolved to erect a school, which will be the first Council school in the borough, for the accommodation of 400 boys and girls and 200 infants, on a site to be selected in the western portion of the town.

THE Local Government Board have given sanction to the Bacup Corporation to borrow 27,770*l.* for the purposes of electrification and reconstruction of the tramways in the borough. The work of relaying the tramway permanent line is to be pushed on with all possible speed.

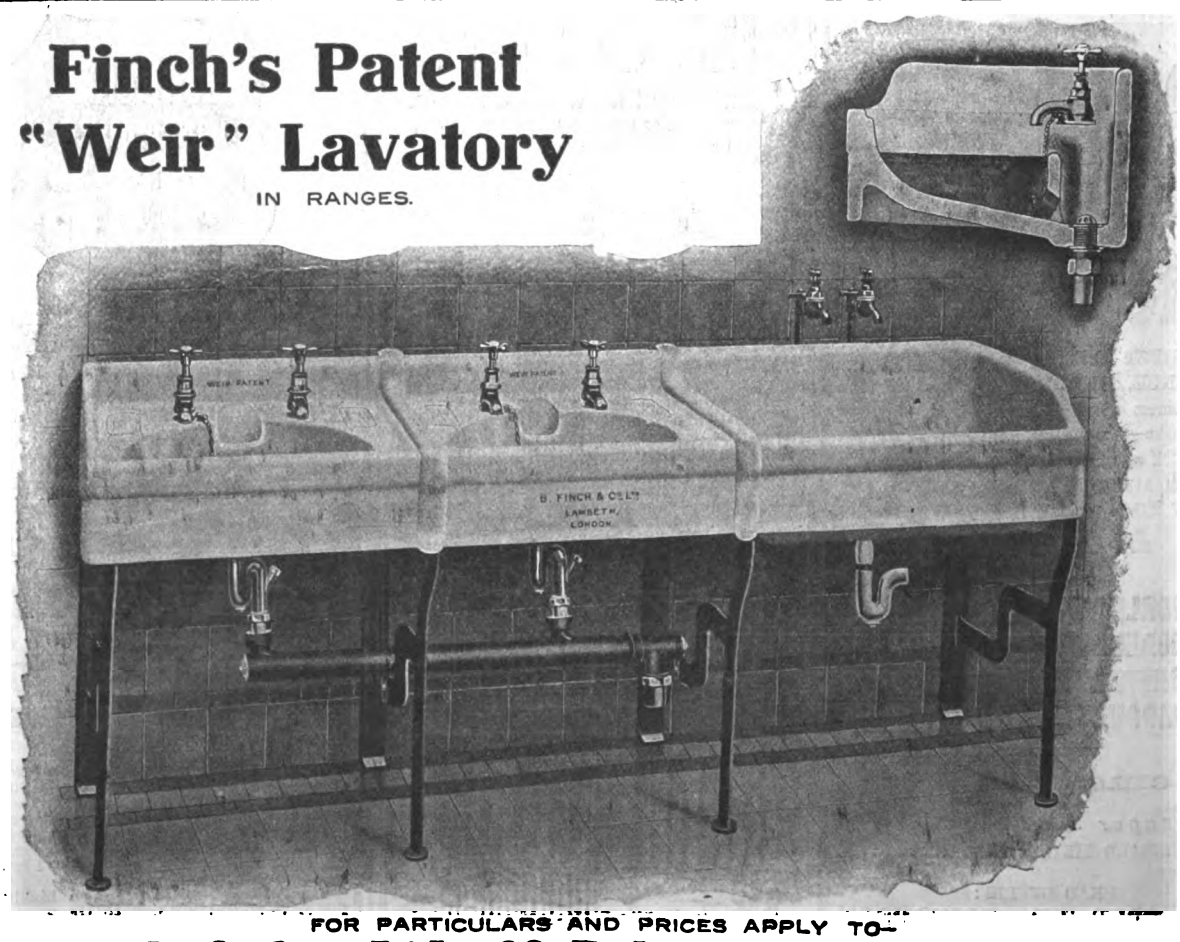
THE Local Government Board has sanctioned the Wallasey District Council's application to borrow 15,750*l.* for the purchase of the New Brighton golf links. The purchase of the links is a step towards the extension of the Wallasey promenade in the direction of Wallasey village.

A PURIFICATION scheme costing about 7,000*l.* has been adopted by Johnstone Town Council. The new scheme is intended to focus all drainage in Johnstone and eliminate all impure matter so as to save the Cart from contamination as a contributory to the Clyde. This scheme has been before the Council for a considerable time, and the action now taken will remove all complaint.

MR. A. B. M'DONALD, the Glasgow city engineer, at the request of the committee on congestion of population in New York, has prepared two large maps of Glasgow, the one indicating the property of the Corporation, and the other showing topographically the great development of the city since the twelfth century until the present day. The maps are drawn to the scale of 12 inches to the mile.

AN examination for certificates of qualification for appointment of sanitary inspector or inspector of nuisances, under the Public Health (London) Act, 1891, will be held in London on May 4 and the four following days. An examination will also be held at Birmingham in June next, if a suffi-

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cient number of candidates apply for examination. Particulars will be forwarded on application to the Hon. Secretary, the Sanitary Inspectors' Examination Board, 1 Adelaide Buildings, London Bridge, E.C.

Professor Henry Adams, M.Inst.C.E., &c., of 60 Queen Victoria Street, London, E.C., has taken his eldest son, Mr. Henry Charles Adams, A.M.I.C.E., A.M.I.M.E., A.M.I.E.E., &c., into partnership in his practice as a consulting engineer and surveyor, under the style of Henry Adams & Son. The Birmingham office is at 1 Waterloo Street. After serving articles to his father some eighteen years ago, Mr. Henry C. Adams acted as a special senior engineering assistant to the Birmingham Corporation and in other public and private appointments.

The foundation-stones of the Saltburn-by-the-Sea P.M. church and schools, which are in the centre of the town, were laid on April 12. The block is designed in late Gothic freely treated, a square tower forming a prominent feature at the corner. The facings are in Huncoat pressed red bricks, and the dressings in grey terra-cotta with dragged face. The accommodation in the church is for 500 persons. The contract has been let to Mr. J. G. Porteous, of Guisborough, and amounts to 4,300*l*. The architects are Messrs. G. Baines & Son, 5 Clement's Inn, W.C.

The Gloucestershire County Council on Monday agreed to pay Mr. Robert Phillips, consulting county surveyor, 250*l*. in respect of his work in preparing plans for the extension of the Shire Hall and for superintending the erection of the new buildings. This sum is in addition to the annual 200*l*. a year voted to him for a period of five years in respect of works in hand at the time of resigning the county surveyorship. When informed of the decision, Mr. Phillips remarked it was a very small sum, but he supposed he must accept it. He could not say they had been very generous. At the same meeting tenders varying between 13,857*l*. and 17,370*l*. were received for carrying out the work.

At the last meeting of the London County Council the establishment committee submitted a report with regard to the design of the new county hall. An improved design, which mainly concerned the roof line of the centre block, had been made, and a drawing showing the addition of a turret was exhibited in the lobby. The committee asked the approval of the Council to the alteration. The Rev. F. Hastings moved an amendment calling on the Council to make a model. He criticised the design, and called for something more imposing. This attitude was adopted by various other speakers, but eventually the alteration was adopted.

The Richmond Town Council last week considered plans for the erection of a block of four-storey flats, 58 feet high, upon the site occupied by Ancaster House, next to the entrance to Richmond Park, and opposite to the Star and Garter Hotel. The highway committee recommended the approval of the plans on the ground that they complied with the by-laws. Alderman Sir Charles Burt said that the Council should not approve of this, as it would be very disfiguring to the entrance to the park and detrimental to the town. They had prevented other flats from being built in the neighbourhood. Upon a division the plans were approved.

In July next a party of about 100 Germans interested in garden cities are coming to England, under the guidance of the Garden City Association. The party will be joined by a number of French delegates and an English party. The journey will last from July 7 to 17 inclusive, the last four days being devoted to visits around London. It is proposed to visit the model mining village of Woodlands, the cities of Manchester, Liverpool and Birmingham, the garden villages of Port Sunlight and Bournville, Letchworth (garden city), the garden suburbs of Hampstead and Ealing, the housing work of various municipal and private housing experiments, and social work generally.

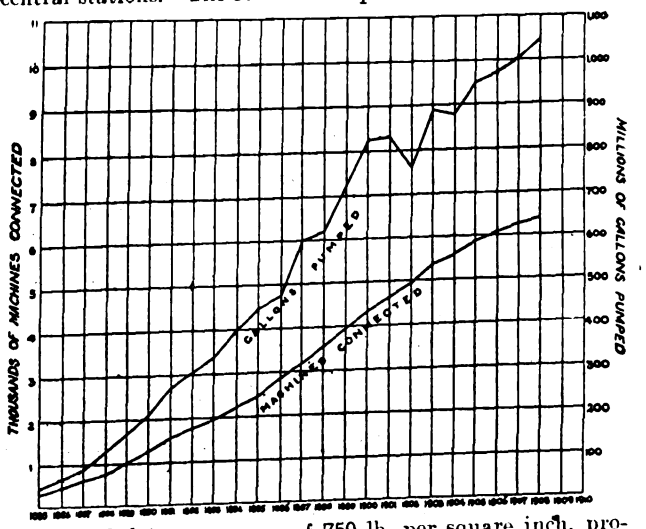
HYDRAULIC POWER IN LONDON.

The diagram here shown clearly indicates the remarkable development of the London Hydraulic Power Company's business during the last twenty-three years. In 1886 there were 364 machines served, and the number of gallons delivered per week was 1,271,000; in 1898 the machines had increased to 3,240, and the number of gallons to 11,989,000. During the past ten years this rapid progress has been steadily maintained, until in 1908 there were 6,368 machines in public use, while the water delivered weekly through the

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160 odd miles of hydraulic main averaged 19,798,000 gallons. The power available night and day throughout the year is 700 lb. per square inch, and it is employed for hydraulic motors, injector fire hydrants, automatic pumping gear, ejectors, and a vacuum-cleaning system. There are five central stations. The reservoir of power consists of accumu-



lators, loaded to a pressure of 750 lb. per square inch, producing the same effect as if supply tanks were placed at 1,700 feet above the street level. The water is taken from the Thames, the Regent's Canal, and from wells; and all sediment is removed therefrom by filtration before delivery into the mains.

The street mains are laid at the company's expense. The service pipes are charged to the consumer unless a three-years' agreement is entered into. Special mains are laid at the company's own cost if the use of power is guaranteed of sufficient amount. The quantity of water is measured through a meter. All these particulars are given with a view to indicating the ability and readiness of the London Hydraulic Power Company to meet the wishes and requirements of possible customers.

THE UNITED STATES TARIFF BILL.

In the House of Representatives, Washington, Mr. Payne introduced a Bill "to provide revenue, equalise duties and encourage the industries of the United States, and for other purposes." The Bill was referred to the committee on ways and means and has been considered by them, and it is hoped will be finally voted upon this week. The Payne Bill is a minimum and a maximum one.

The committee have transferred some articles from the free list to the dutiable, and have increased duties on others, for the sole purpose of increasing the revenue. Most of these articles on which duties have been increased are luxuries. Other articles have been increased because the committee found that there was not sufficient protection under the present law. The tariff on others has been reduced.

Schedule A.

On Paints.

All paints, colours, pigments, including oxide of iron pigment and oxide of iron polishing powder, stains, lakes, crayons or fusains, smalts and frostings, whether crude or dry or mixed, or ground with water or oil or with solutions other than oil, not otherwise specially provided for in sections 1 or 2 of this Act, 30 per cent. ad valorem; all paints, colours and pigments, commonly known as artists' paints or colours, whether in tubes, pans, cakes or other forms, 30 per cent. ad valorem.

Schedule B.—Earths, Earthenware and Glassware.

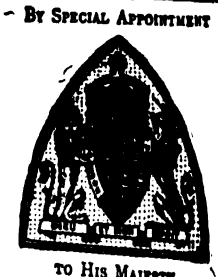
Brick and Tile.

Firebrick, weighing not more than 10 lb. each, not glazed, enamelled, ornamented or decorated in any manner, 1 dollar 25 cents per ton; glazed, enamelled, ornamented or decorated, 35 per cent. ad valorem; weighing more than 10 lb. each and not specially provided for in sections 1 or 2 of this Act, not glazed, enamelled, ornamented or decorated in any manner, 30 per cent. ad valorem; glazed, enamelled, ornamented or decorated, 35 per cent. ad valorem; brick, other than firebrick, not glazed, enamelled, painted, vitrified, ornamented or decorated in any manner, 25 per cent. ad valorem; if glazed, enamelled, painted, vitrified, ornamented or decorated in any manner, 35 per cent. ad valorem.

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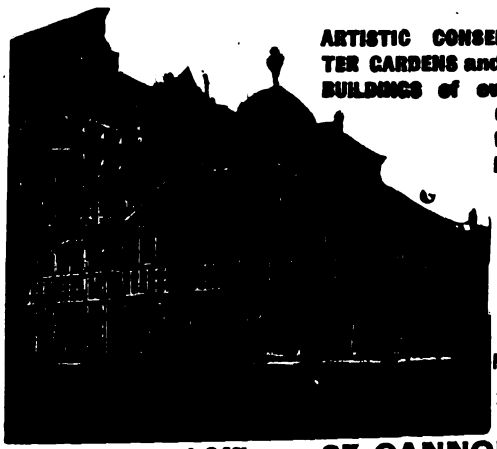
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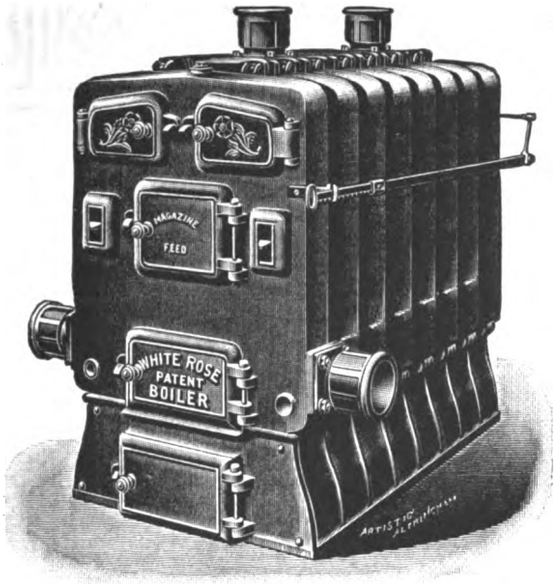
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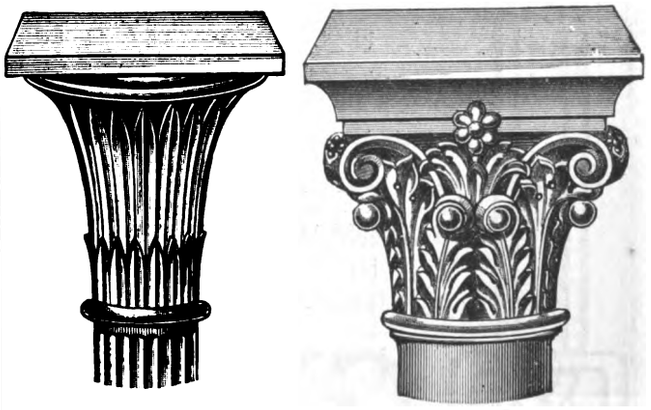
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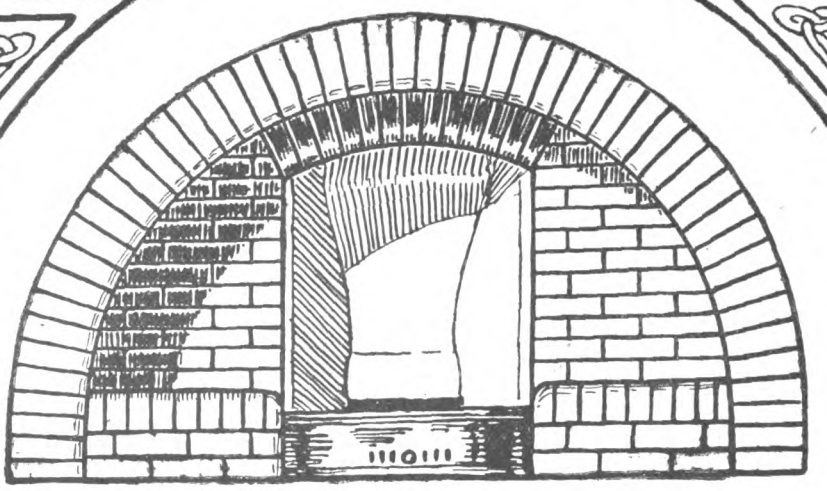


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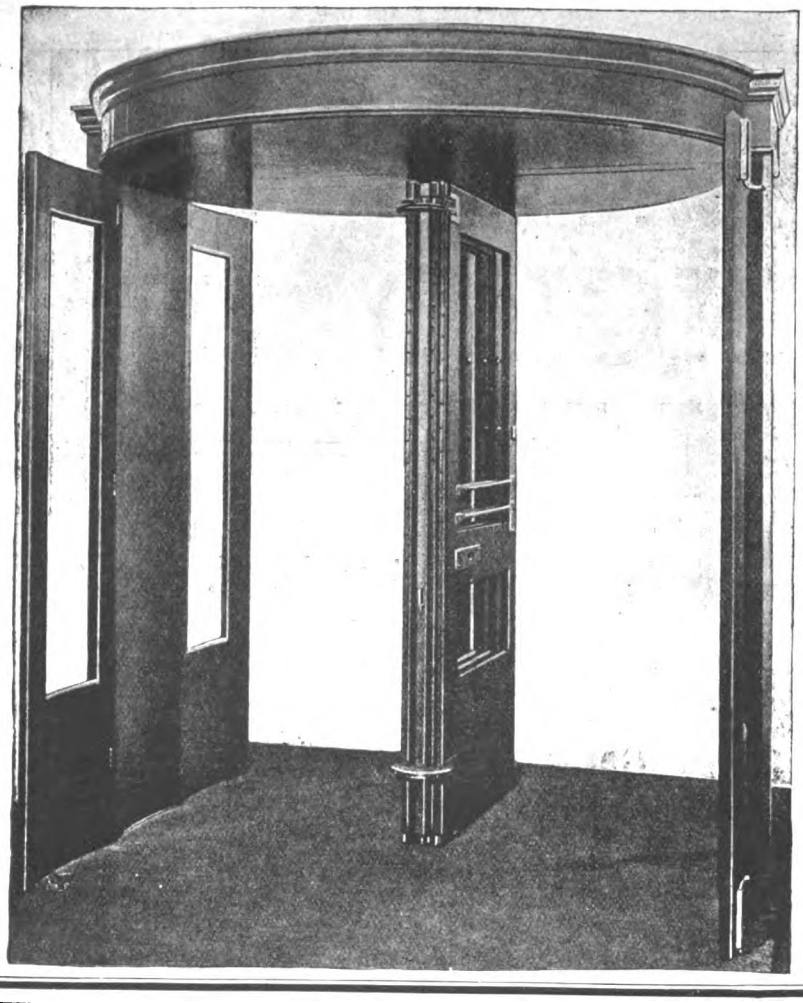
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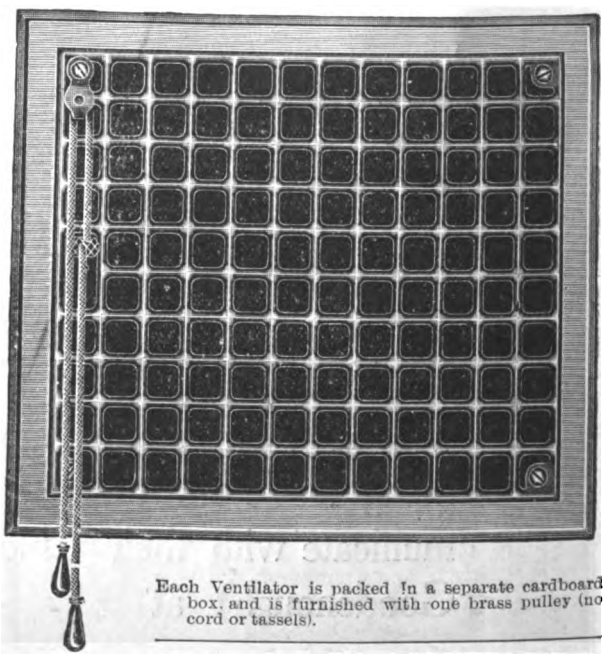
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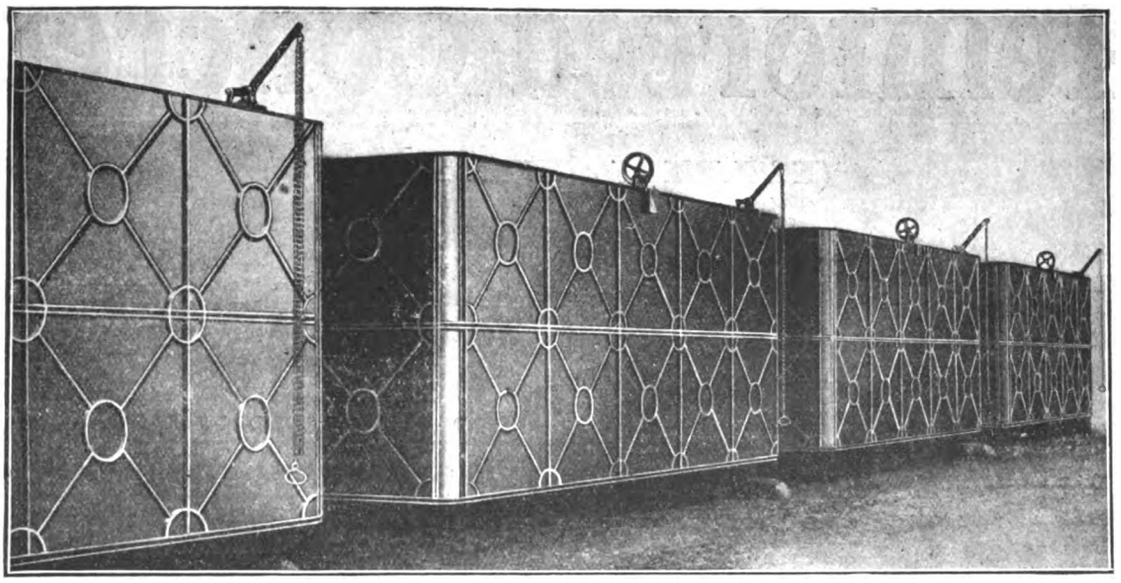
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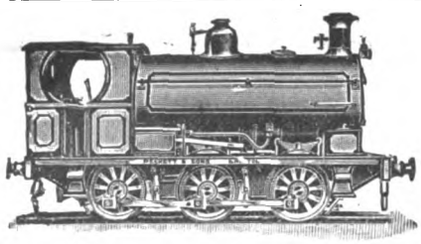
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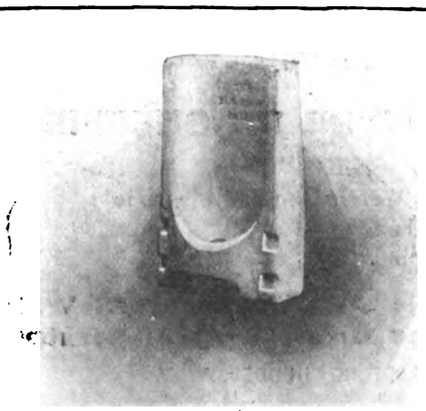
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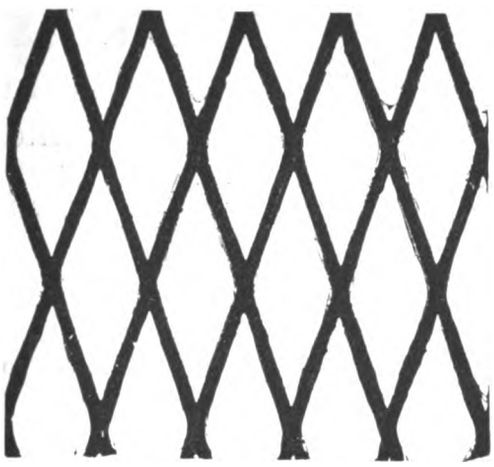
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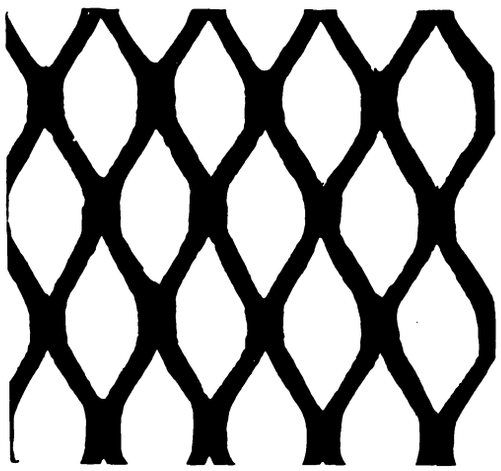
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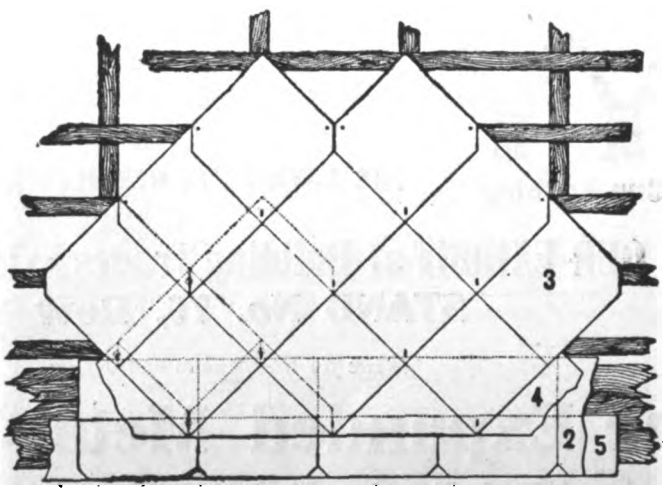
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FRIDAY, APRIL 23, 1909.

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EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of the difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

**** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITIONS OPEN.

GLASGOW.—July 31.—The patrons of the Royal Incorporation of Hutchesons' Hospital invite designs for laying out for feuing and building about 195 acres of their lands of Thornliebank, Eastwood. Premiums of 100*l.*, 75*l.*, 50*l.* and 25*l.* will be awarded. Deposit 3*l.* 3*s.* Messrs. Hill & Hoggan, 194 Ingram Street, Glasgow.

GRIMSBY.—July 30.—For the extension of the town hall, at an estimated cost of 26,000*l.* Premiums of 250*l.*, 150*l.* and 100*l.* will be awarded. An eminent architect will act as assessor in conjunction with the borough engineer. Deposit 2*l.* Apply to Mr. H. Gilbert Whyatt, A.M.I.C.E., borough engineer, Town Hall, Grimsby.

MOSSLEY.—May 24.—For the erection of a mixed elementary school to accommodate 550 children, and an infant school for 300 infants, on land adjoining Mill Lane. Premiums 15*l.* 15*s.* and 5*l.* 5*s.* Borough Surveyor, Town Hall, Mossley, Lancs.

READING.—June 15.—The Berkshire County Council invite designs for offices, committee rooms, &c., on the Forbury, Reading. Mr. Mervyn Macartney, F.R.I.B.A., assessor. Premiums of 100*l.*, 75*l.*, and 50*l.* Deposit 1*l.* 1*s.* Apply to Mr. J. Fred Hawkins, county surveyor, Bank Chambers, Cross Street, Reading.

WALLASEY.—The Urban District Council invite competitive designs from architects practising in Lancashire and Cheshire for a Public Library at Liscard, Cheshire. Deposit 2*l.* Mr. W. H. Travers, A.M.I.C.E., Public Offices, Egremont, Cheshire.

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Amble.—April 28.—For additions and alterations to the Central Hall, Amble. Mr. S. Pedelty, Broomhill Colliery, Acklington.

Amlwch (Anglesey).—April 24.—For erection of new schoolroom and the rebuilding of Wesleyan chapel, Amlwch, Anglesey. Mr. W. F. Brindle, architect, surveyor, &c., Mona Street, Amlwch, and High Street, Llangefni.

Bakewell.—April 27.—For various works required in erection of the Men's Institute, Bakewell. Deposit 5*s*. Mr. E. M. Longsdon, F.S.I., architect, Bakewell.

Barnsley.—April 23.—For the following work to be carried out at Royston Provided school, near Barnsley. Trades: Mason, bricklayer, joiner. New concrete roof to girls' cloakroom, breaking out windows in boys' department, &c., for the Royston district sub-committee. Mr. T. Graham, Obelisk Chambers, Barnsley.

Barnsley.—April 26.—For the various works required in erection and completion of business premises, Eldon Street, Barnsley. Messrs. Crawshaw & Wilkinson, architects, 13 Regent Street, Barnsley.

Belfast.—May 10.—For erection of additional buildings on their Purdysburn estate, for the asylum committee. Deposit 4*l*. 4*s*. Messrs. Graeme-Watt & Tulloch, architects, 77A Victoria Street, Belfast.

Braeside.—April 27.—For the mason, slater, plaster and carpenter's work of new dwelling house, East Haybogs, and of new barn, Braeside. Messrs. Hunter & Gordon, advocates, 80 Union Street, Aberdeen.

Bridgend.—April 29.—For erection of three houses at Coychurch, Bridgend. Mr. W. Y. Davies, architect, Coity Road, Bridgend.

Bristol.—May 3.—For repairs to the main roof of the Bristol Joint Station, for the Great Western and Midland Railways joint committee. The Engineer, Paddington Station.

Bromley (Middlesex).—April 27.—For proposed alterations and sanitary work in connection with new bath-rooms, &c., at the District Sick Asylum, Devons Road, Bromley, E. Deposit 3*l*. 3*s*. Messrs. J. & W. Clarkson, architects, 136 High Street, Poplar, E.

Broughty Ferry, near Dundee.—May 5.—For the reconstruction and enlargement of the lifeboat house and the construction of a slipway at Broughty Ferry, near Dundee, in the county of Forfar, N.B., upon the foreshore of the River Tay and land adjoining, for the Committee of Management of the Royal National Lifeboat Institution. Mr. Jas. Hunter, junior, 63 Reform Street, Dundee, or at the office of the engineer and architect to the Royal National Lifeboat Institution, Mr. W. T. Douglas, M.Inst.C.E., 15 Victoria Street, Westminster, London, S.W.

Buckley (Flints.).—April 27.—For building a heating chamber in connection with a low pressure hot water heating apparatus. County Surveyor, County Buildings, Mold.

Camborne (Cornwall).—May 8.—For proposed addition to the Basset Road, Camborne, Council school. Mr. Sampson Hill, architect, Green Lane, Redruth.

Cardigan.—May 1.—For erection of two additional classrooms at the County school, Cardigan. Mr. James Stephens, clerk to the managers, 3 Green Street, Cardigan.

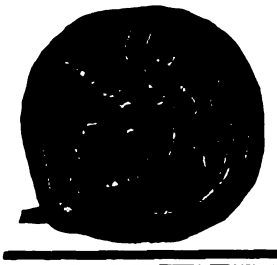
Carnkie.—April 24.—For renovation of the Primitive Methodist Church, Carnkie, near Redruth, including reseating, erection of boundary walls and other works. Mr. Sampson Hill, architect, Green Lane, Redruth.

Chartham Downs.—April 29.—For the erection of recreation-rooms and other works at the Kent County Lunatic Asylum. Deposit 5*l*. Mr. W. J. Jennings, architect, 4 St. Margaret's Street, Canterbury.

Dartmouth.—April 24.—For construction of additions to store. Mr. W. Percy Marr, A.R.I.B.A., architect and surveyor, Dartmouth.

Derby.—April 26.—For erection of extensions to the borough asylum to accommodate 126 patients, and for new workshops and bakehouse. Deposit 1*l*. 1*s*. Mr. B. S. Jacobs, F.R.I.B.A., architect and surveyor, Lincoln's Inn Buildings, Bowlalley Lane, Hull; or Messrs. Thorpe & Fryer, architects and surveyors, 23 St. James's Street, Derby.

Devizes.—April 30.—For erection of an engineer's house at the County Asylum. Deposit 1*l*. 1*s*. Mr. J. George Powell, county surveyor, County Offices, Trowbridge.



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The English oak screen for Isfield church, near Bexhill-on-Sea, on the Stand of *Elliots' Moulding and Joinery Company, Ltd.*, of Newbury, has brought to a standstill many wondering visitors. It was carved from the designs of Mr. J. Rawlinson, A.R.I.B.A., diocesan architect, by the company, who make a speciality of executed architects' designs. On the other side is a handsomely carved double entrance door in mahogany. In the centre of the Stand is a revolving door (Buckingham's patent).

"Adamantine" clinkers in various shapes are shown by *Towers' Adamantine Clinker, Fire and Roofing Tile, Company* (A. W. Squires). It is offered as an extremely durable, clean and effective sanitary paving, suitable for markets, stables, lairs, abbatoirs and similar situations. It is made in two colours, buff and red. As a sand-faced roofing tile the buff becomes considerably darker with exposure. This clay is also manufactured into fire-bricks and fire-tiles.

The *Empire Stone Company, Ltd.*, have in the gallery an extensive display of paving slabs, combined kerb and channel dressings, a moulded spandril, and other examples of this well known stone. The company also carry out extensive ferro-concrete work such as that at the Stadium at the Franco-British Exhibition, where indented steel bars were used in the 2-inch platforms, of which there were some 17 miles, and a Leicester boot factory, where similar bars were used. On their Stand is shown the Siegwart fireproof floor, in which ferro-concrete beams are placed side by side and grouted with cement.

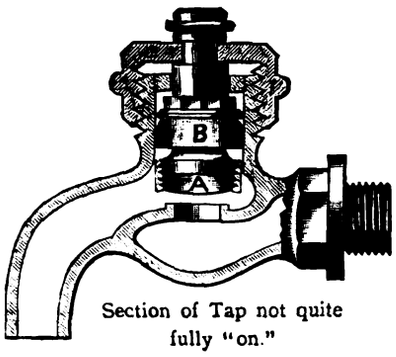
The *Willesden Paper and Canvas Works* (Row C, Stand 25), have for nearly forty years been turning out the Willesden paper and canvas, and between 1878 and 1888 were awarded twelve medals. The paper is made of the best material, and then receives a metal filling of copper treated with ammonia, thereby becoming practically thin sheets of metal, being waterproof and rotproof. It is much employed for underlining slates, tiles and other roofing. But it has a wider range; entire frame buildings such as bungalows, cycle and other sheds, huts, &c., may be made of it; drain pipes formed of it have been in use after thirty years; 4-ply paper replaced decayed iron guttering; the leading polo clubs in the country have their posts of it; petroleum joints; insulation chambers. Their canvas is likewise of the best material, and treated with Willesden dressing, which is guaranteed to give three years' extra life. Willesden tents have, we may say, seen service all over the globe, they can be rolled up wet and yet take no harm. Their vermin-proof quality has been often proved. At home it is used as awnings, portmanteaus, golf-caddies, flags, water buckets, van sheets, and so on.

Smoke Consumption, Ltd., fit the "Caloriser" apparatus to any boiler, furnace, &c., in one or two days, at a very small cost, and guarantee a saving in fuel. It enables low-grade fuels to be burnt under smokeless conditions without employing machinery, gas, forced draught, or special grates, or any alteration to the boilers. A letter received last month from a London factory records that after seven weeks' use they calculate a saving of 32 per cent. by the substitution of Midland slack for best smokeless Welsh steam coal. The Cowper-Coles' patents include a smokeless grate.

George Jennings, Ltd., on one series of Stalls, show three bathrooms with sumptuous suites. On a separate Stall is their patent self-contained sewage disposal apparatus, intended for country houses and isolated buildings, which should receive attention from architects. One obvious feature is its compactness and simplicity. There are many other specialities connected with sewage disposal, as well as urinals, closets, lavatories, sinks, &c.

In the Gallery, Bay 23, the *Leeds Pottery and Middleton Fireclay Works* have an exhibit which gives ample promise of the importance which will be attained by these works. The door-frame of "Ceramo" ware in semi-glaze offers architects something that is certain to become more and more in demand, especially for use in cities. There has been an awakening interest in wall materials which will withstand the grime and acid-laden atmosphere that occurs where men do congregate. English manufacturers are ready to supply that demand. "Ceramo" is here shown to lend itself to decoration. Prominent on the Stand are the bricks in hard and soft glazes, hand-made by the plastic process. The glaze is applied before the bricks are burnt, consequently the colour becomes part of the brick and will not chip or peel off, or discolour. The clay used is the finest quality "Better Bed" fireclay. The red facing bricks and bricks for engineering purposes are confidently put forward by the makers. Tests on the latter sort showed an absorption of only 2 per cent. with a crushing strain of 460 tons per square foot. Sanitary ware is represented by closets, lavatories, urinals, &c.

The new tap shown on Stand 69, Row D, is introduced by *Garratt's Patent Screw-down Valve Company*. The feature of it is the smooth piston which does not turn, but is raised or lowered by the strong coarse screw of the cap, which takes and resists the whole of the pressure. It can never fail to open even where there is no water pressure. It does away with the leather washer, it cannot be unscrewed at the wrong place, overstrained or injured. The piston only rises $\frac{1}{8}$ inch, and the total frictional travel between the packing ring B and the surface of the cylinder in which it slides is merely $\frac{1}{4}$ inch,



Section of Tap not quite fully "on."

"A" Rubber or other Seating encased in brass ring.

"B" Sliding Packing of Piston.

a vast improvement on the ordinary screw down valve. The washer A is encased in a flanged brass ring instead of the usual nut in the middle. This gives a clear way for the water directly turning on begins, and affords as much flow with the $\frac{1}{8}$ inch rise as an ordinary screw-down does with $\frac{1}{4}$ inch. It has a non-splash delivery. The tap has been approved and stamped by the Metropolitan Water Board. On the same Stand *Mr. F. H. Brook* shows the bricks of the three companies in Middlesex, Hampshire and Northants for which he acts as London agent, viz. the West End Brick Company, the Bursledon Brick Company, and the Blisworth and Stowe Brick Company.

Messrs. Cornes & Haighton may fairly claim to be housing specialists, for some thousands of model cottages have been fitted and specified with their specialities. Foremost is the "Model Cottager," combining range, copper and bath. It has been in use for some few years, and during that time the initial type has been gradually improved upon; it has now a lifting fire, a renewable oven, while the general appearance has been altered by the addition of a majolica surround. Among the successes of the "Model Cottager" was the highest award given at the Sanitary Institute Congress at Cardiff last year. Two new housing combinations are called the "Artizan," and the "Municipal." In both, the auxiliary fire is in the scullery and not in the kitchen, and the "Artizan" fits into a smaller fire opening. Messrs. Cornes & Haighton are substituting the use of porcelain enamelled baths for the metallic finished baths. One result of the efforts of Mr. Cornes and other enthusiasts for housing reform is the greatly increased number of workmen's dwellings in which baths are fitted and, we have reason to believe, used.

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Messrs. Phillips & Son represent, and worthily represent, at this Exhibition, the safe-making industry. Architects and builders have as much, or more need for safes as any other class. They will find safes at Stand 22, Row B, capable of protecting the utmost wealth that they are ever likely to possess. We would recommend anyone who feels any anxiety as to the custody of valuables, to inspect one 3-ton safe, which stands 42 inches high. The door is 2 inches of solid undrillable steel, the body is of the same material of lesser thickness. The lock is an all-over lock, more familiar as the "Channel" bolt. This it will be remembered consists of a rolled steel channel section around the edge of the door, which, on the handle being turned closes into a similar channel in the frame of the safe. This same "Channel" bolt is used for strong room doors (of which one is shown), &c. A lady's jewel safe is fitted into a very ornamental inlaid wood cabinet. Party walls are also shown. One of this firm's recent contracts was for strong rooms at the Anglo-South American Bank in Old Broad Street.

The *Nautilus Fire Co., Ltd.*, are one of the firms who give a practical demonstration of the virtues claimed for their exhibits. The "Nautilus One Fire, Three Warm Rooms," at Wall Space 172, is an ingenious arrangement by which the ordinarily wasted heat of an open fireplace is utilised for warming two or three radiators placed in different rooms. The simple and cheap "Bush" fire is designed with a view to small dwellings. The Nautilus range has a new idea in the patented "Asbest" high-pressure boiler of wrought iron with a central flue. It is cased in asbestos so as to prevent the customary waste of heat by radiation, and it also insures a quick and hot circulation. The Stand offers a big choice in mantelpieces, grates and tiles.

Alexander Ritchie & Co., Ltd., ironfounders and hardware merchants, show various types of fires, kitcheners, sanitary fittings, &c., at Stand No. 153, Wall Space. Two of the grates are the "Drawwell," supplied by J. & R. Corker, Ltd., who deal only through builders' merchants, &c. The "Drawwell" was bracketed first in the 1906 tests conducted by the Office of Works and the Smoke Abatement Society. It is fitted with an adjustable canopy and solid brick back sloping inwards. The bottom forms a dish or basin with a loose grate which can be lifted out. There is a ventilating fret with pan attached. The official figures of an additional test with the "Drawwell" were as follows:—(*a*) Amount of coal, less cinders, plus half wood, 26 lb.; (*b*) ashes, 1.3 lb.; (*c*) stoking, 4.0; (*d*) temperature in passage, 43.9 degrees Fahr.; temperature in room, 52.75 degrees Fahr.; difference, 8.8 degrees Fahr.; radiation, 70.3 degrees Fahr.; smoke, 0.70. Messrs. J. & R. Corker's London showrooms are Saracen's Head Building, Snow Hill, E.C

Messrs. Walter Carson & Sons show at Stand 130, Row H. their japolite, La Belle enamel, muraline, vitrolite and a wood preservative. Japolite is an English-made japan white of three shades—white, ivory white, and blue white. It is very easy flowing, has considerable covering power, and will not crack or bloom. La Belle enamel in thirty-two shades is recommended as a high-class finishing coat. Muraline is a washable water-paint prepared in a dry powder, which is ready for immediate use by the addition of cold water in equal quantities. Vitrolite is used chiefly for horticultural work, like conservatories and greenhouses. One gallon covers about 100 square yards; two coats are advised for old work, and three coats over the priming for new. The wood preservative is a combined stain and protective agent.

Bay No. 1 in the Gallery is occupied by *Messrs. Norton & Gregory*. Specimen copies of plans made by "Velography" on several materials are shown, as well as such aids to successful work as drawing-tables, cabinets with roller drawers, surveying instruments, &c. "Velography" is recommended for the direct reproduction of plans and drawings for its speed, accuracy, permanence and prices, which range from 1*s.* 9*d.* per imperial copy. The Arcus sun-printing frame is another of their excellent aids to architects and engineers.

The *Forest of Dean Stone Firms, Ltd.*, show in the Main Hall Extension grey and blue Forest of Dean stone, Red Wilderness stone, Mountcharles stone, Bristol Pennant stone, Keinton stone, Shamrock stone, Nailsworth stone and Porthgain granite. We hope to give a more extended notice of this and other Stands in our issue of next week.

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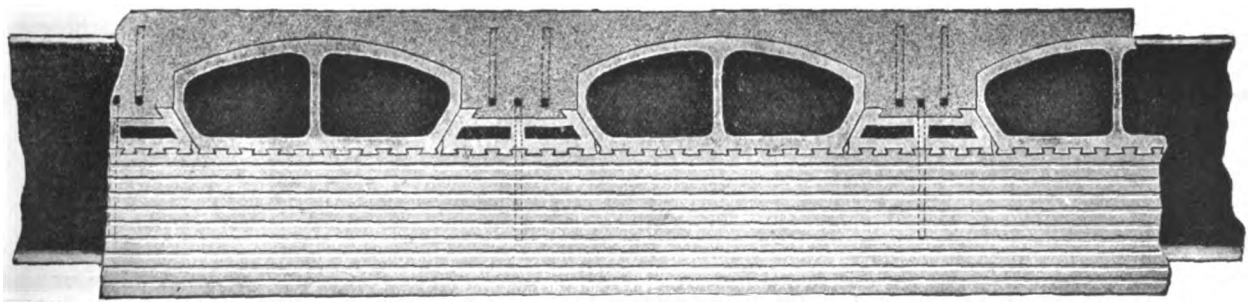
STAND 90, ROW F.

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TELEPHONE: 3228 VICTORIA.

WORKS ALPERTON, WEMBLEY.
KYLE ST., GLASGOW.

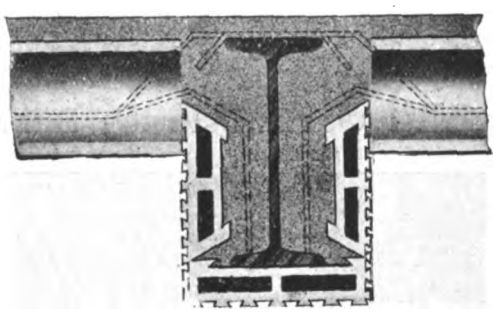
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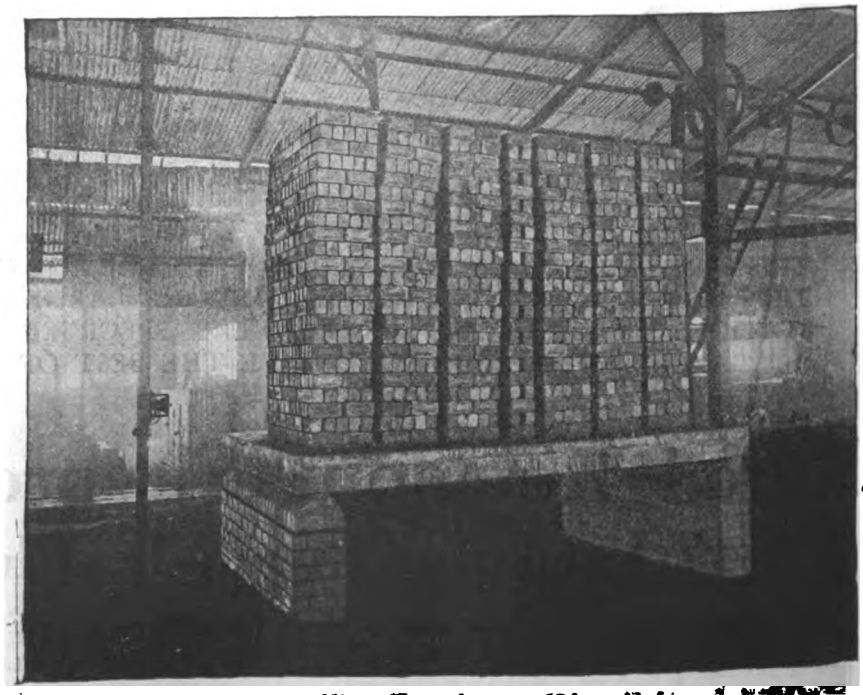
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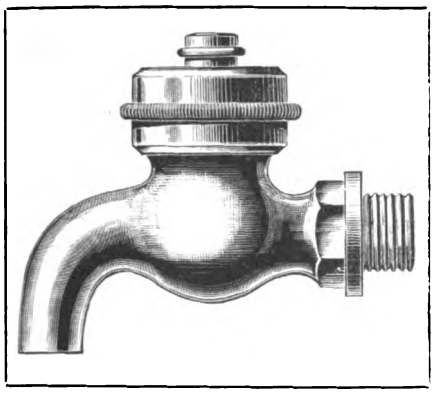
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Garratt's "IDEAL" Screwdown.

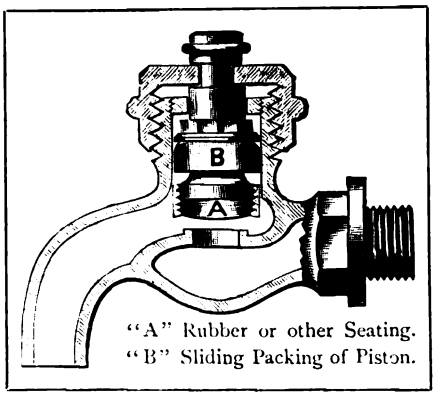
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Subject to discounts, to the trade only, according to quantities. Full List of Prices for Hot and Cold Lavatory and Bath Taps, Fountain Valves, and other varieties, will be forwarded on application; or a Sample Tap sent free on receipt of P.O. at the above rates.

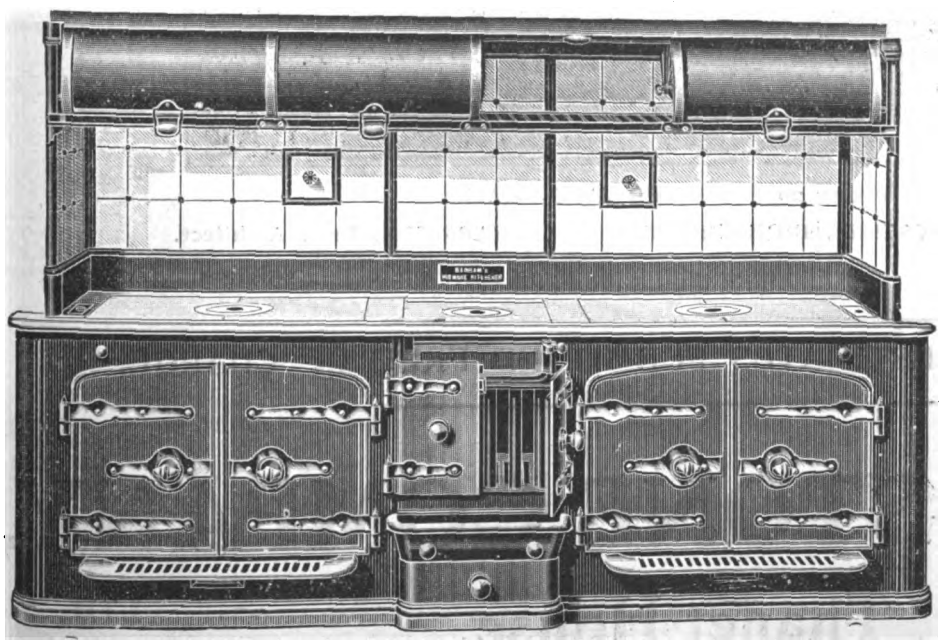
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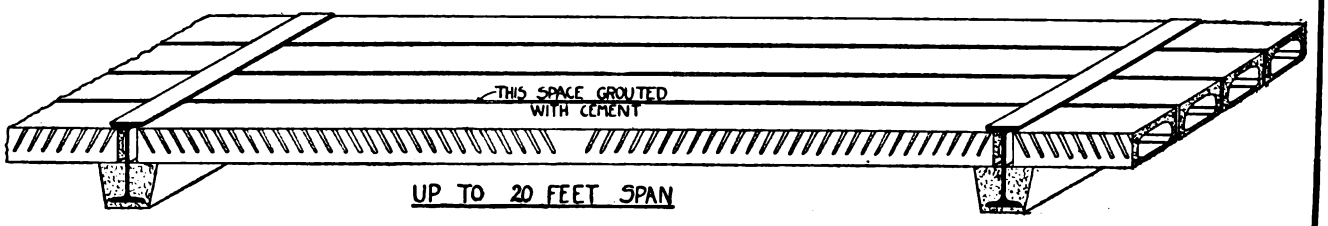
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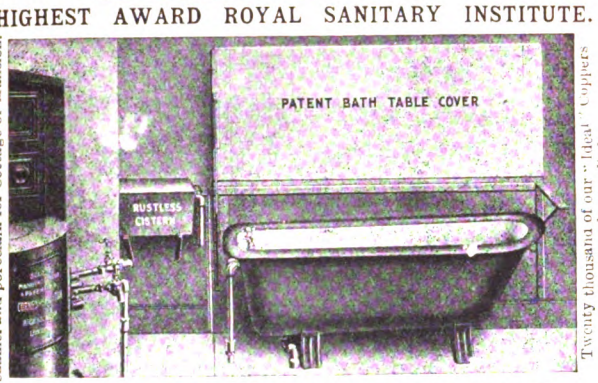
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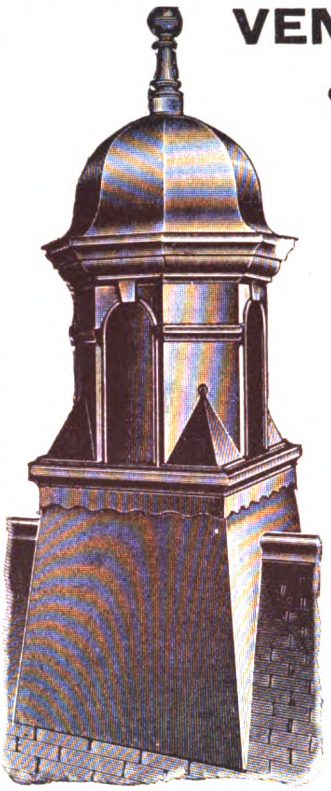
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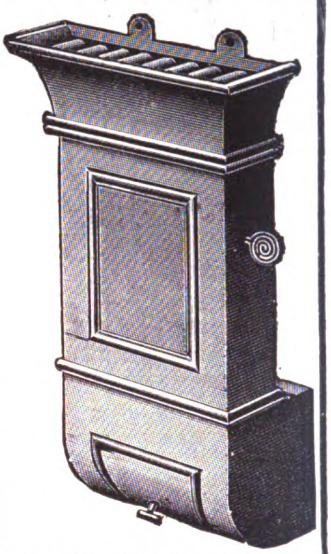
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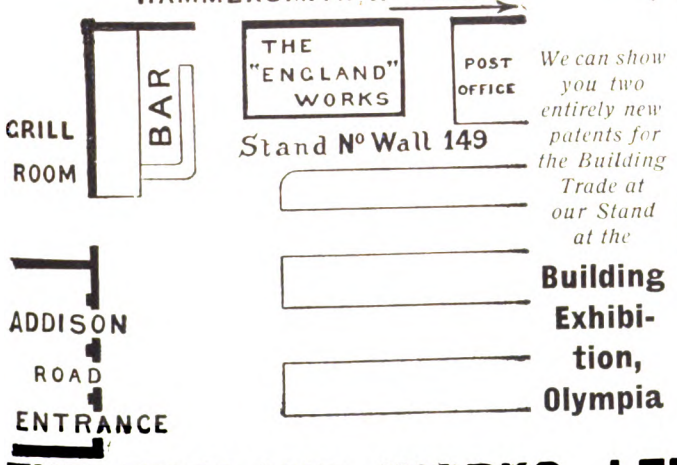
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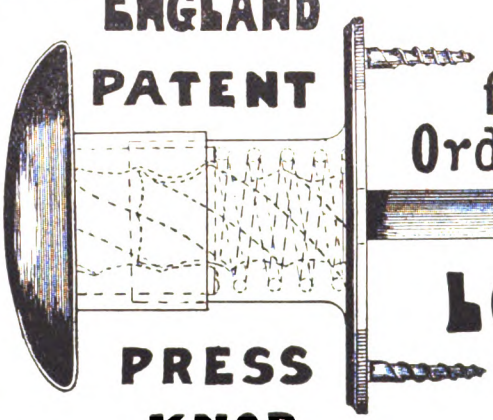
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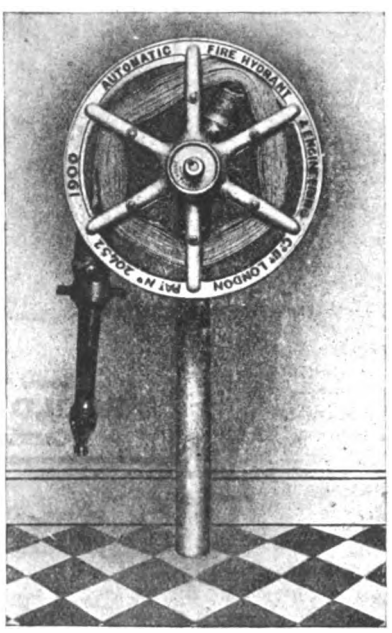
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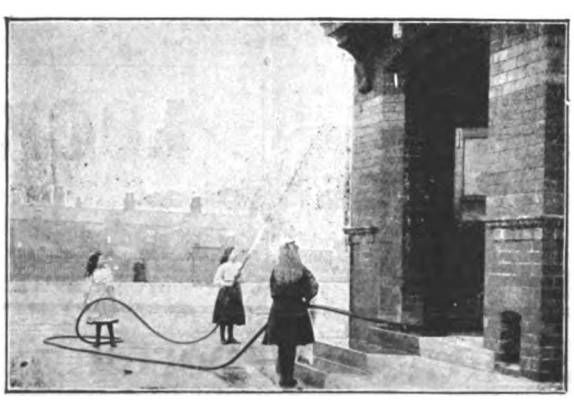


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Broadstairs ...	16/0	12/0	8/0	Paris	58/4	37/6	30/0
Calais	31/6	26/6	20/6	Ramsgate ...	16/0	12/0	8/0
Canterbury ...	14/0	10/6	8/0	St. Leonard's ...	14/0	10/6	8/0
Deal	18/6	12/6	9/0	Sandgate ...	17/6	12/6	9/0
Dover	17/6	12/6	9/0	Sandwich ...	18/6	12/6	9/0
Flushing... ...	30/5	18/10	—	Shornoliffe ...	17/6	12/6	9/0
Folkestone ...	17/6	12/6	9/0	Tun. Wells ...	8/6	5/6	4/6
Hastings ...	14/0	10/6	8/0	Walmer	18/6	12/6	9/0
Herne Bay ...	14/0	10/0	7/0	Westgate ...	16/0	12/0	8/0
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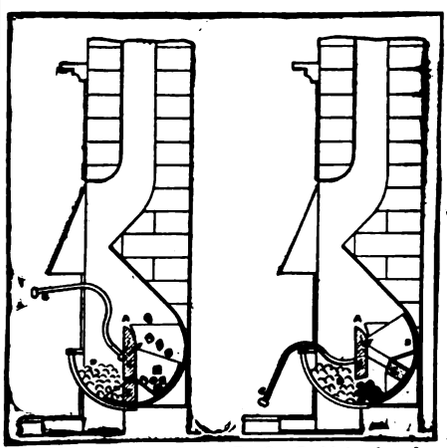


Fig. 1.—Feeding Coal. Fig. 2.—Coal being charged.

FIG. 1.
Shows coal being fed behind false back.

FIG. 2.
Shows coal falling into bottom of grate. When lever is returned to normal position, coal is forced underneath fire.

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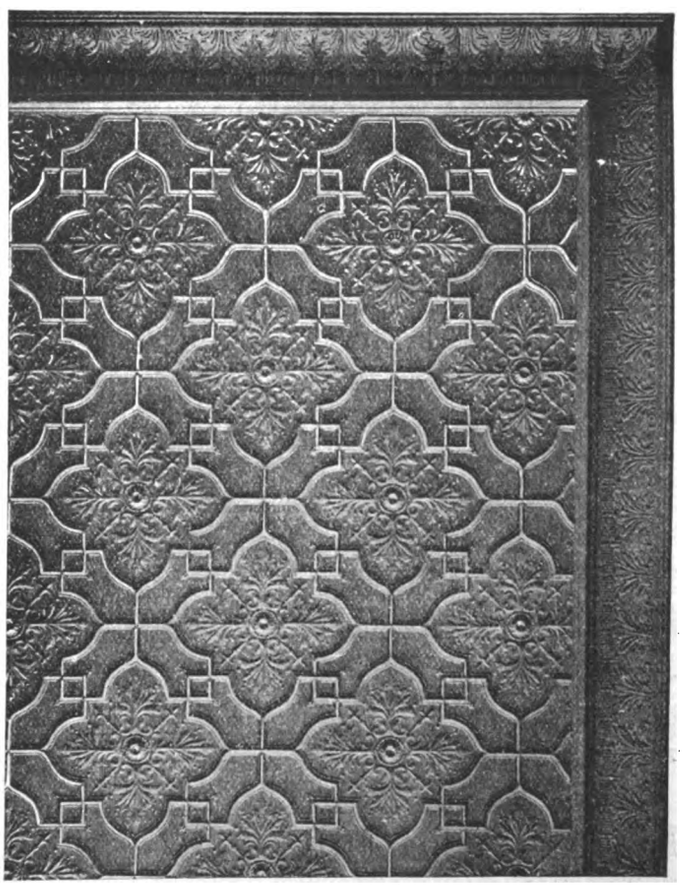
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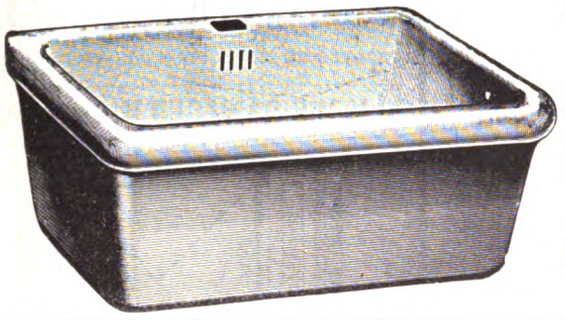
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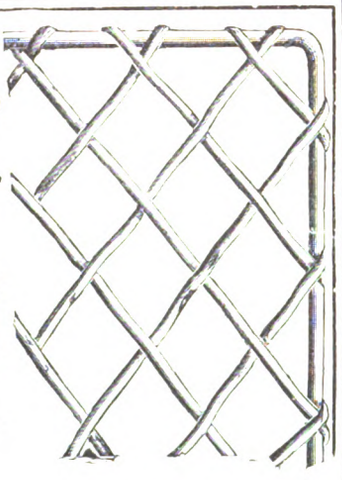
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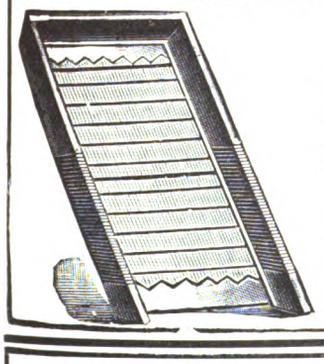
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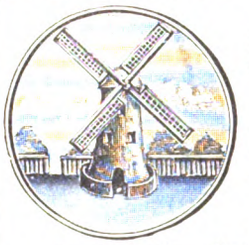
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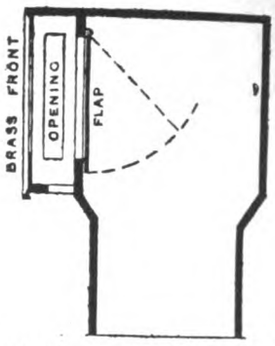
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EDINBURGH.—April 24.—For the mason, joiner, plumber, plasterer, slater, tiler, and glazier's work in connection with the new offices for the United Free Church of Scotland in George Street, Edinburgh. Messrs. Sydney Mitchell & Wilson, architects, 13 Young Street, Edinburgh.

EPPERSTONE (NOTTS).—For erection of four cottages at Epperstone, Notts. Deposit 1*l.* 1*s.* Mr. R. E. Ridgway, architect, Long Eaton.

EVENWOOD.—April 27.—For erection of a billiard room at Evenwood, Durham, for the Workmen's Club and Institute, Ltd. Mr. C. Johnston, architect and surveyor, Victoria Street Chambers, Bishop Auckland.

FALMOUTH.—May 8.—For proposed additions and alterations at the Falmouth County High School. Mr. Sampson Hill, architect, Green Lane, Redruth.

HODNET.—April 27.—For erection of a house for the station master at Hodnet, Salop, for the Great Western Railway Company. The Engineer at Wolverhampton Station.

HONEYBOURNE.—April 27.—For additions to station buildings and other works at Honeybourne, Glos., for the Great Western Railway Co. The Resident Engineer, Birmingham Station.

IRELAND.—April 26.—For erection of shop and dwelling-house at Hillsbrough, co. Down. Mr. Thomas Houston, architect and civil engineer, Kingscourt, Wellington Place, Belfast.

IRELAND.—April 28.—For erection of a bank house at Rathfriland. Messrs. Graeme-Watt & Tulloch, architects, 77A Victoria Street, Belfast.

IRELAND.—April 29.—For erection of a school (mixed) at Doagh. The Boys' N. School, Doagh.

IRELAND.—May 1.—For erecting four dwelling houses and stabling at Doagh. Mr. W. D. R. Taggart, architect, 2 Wellington Place, Belfast.

KING'S LYNN.—April 24.—For erection of two houses on the Chase Estate. Mr. R. Scott Cockrill, A.R.I.B.A., Lowestoft.

LEADGATE.—April 24.—For building a five-roomed house, with all outbuildings, also laying of all drains in Watling Road, Leadgate, Durham. Mr. W. R. Stockdale, Elm Park Cottage Farm, Medomsley.

GLANWYDDEN, NEAR CONWAY.—April 26.—For erection of Council school at Glanwydden, near Conway. Mr. Evan Evans, Tan Dderwen, Glanwydden.

HALIFAX.—May 8.—For the mason, carpenter and joiner, ironfounder, and slater's work required in alterations at Raglan Street Dyeworks. Messrs. Chas. F. L. Horsfall & Son, architects, Lord Street Chambers, Halifax.

HARPENDEN (HERTS).—April 24.—For erection of a grand stand at Rothamsted Park, for the forthcoming show of the Harpenden Agricultural and Fanciers' Association on Whit-Monday next. Messrs. William Young & J. W. Wilkinson, hon. secs., Station Road, Harpenden, or at 4 St. Peter's Street, St. Albans.

HATCH BEAUCHAMP, &C. (SOMERSET).—May 3.—For the taking down and rebuilding of the following two small bridges: Bottle bridge, Hatch Beauchamp—new reinforced concrete arch, 23 feet span, and abutments, masonry walls, &c.; Donyatt bridge, near Ilminster—new masonry abutments, walls, &c., and reinforced concrete beams and floor, 12 feet span. Mr. H. T. Chapman, county surveyor, 1 Chapel Row, Bath.

LITTLE COATES.—April 29.—For building an elementary school at Little Coates, Lincs. Send names by April 13 to Messrs. Scorer & Gamble, architects, Bank Street Chambers, Lincoln.

LONDON, W.—April 29.—For external repairs at the Workhouse, Marloes Road, Kensington. Mr. W. R. Stephens, clerk, Marloes Road, Kensington, W.

LONDON.—May 1.—For erection of a permanent school to accommodate 1,420 children on the Crowland Road site, for the Tottenham education committee. Mr. G. E. T. Laurence, architect, 22 Buckingham Street, Adelphi, W.C.

LYNTON.—For the erection of a Wesleyan church and school. Deposit 1*l.* 1*s.* Messrs. Latrobe & Weston, F.R.I.B.A., 44 Corn Street, Bristol.

MERTHYR.—April 28.—For proposed new Y.M.C.E. buildings, Merthyr. Messrs. Ivor Jones & Percy Thomas, architects and surveyors, 18 St. Mary Street, Cardiff.

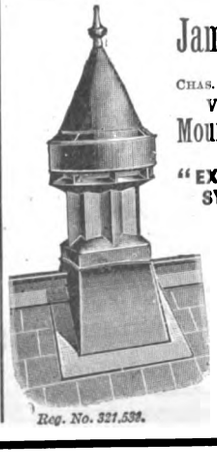
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Mickley (Northumberland).—April 29.—For the whole of the work required in erection of a United Methodist church at Mickley Riding, for the trustees. Messrs. Badenoch & Bruce, architects, Emerson Chambers, Blackett Street, Newcastle-on-Tyne.

Midgham (Newbury).—April 26.—For the reconstruction of a bridge culvert on the Brimpton Road, Midgham, for the Newbury Rural District Council. Mr. E. H. Horncastle, highway surveyor, 2 Edinburgh Terrace, Newbury.

Migvie (Scotland).—April 24.—For the mason, carpenter, slater, and plaster works of new dwelling house at Smiddyhill, Migvie, Tarland. Messrs. Cochran & Macpherson, advocates, 152 Union Street, Aberdeen.

Mulben (Scotland).—April 30.—For the mason, carpenter, slater, plumber, painter and glazier, and iron works of warehouses to be built at the Glentauchers-Glenlivet Distillery, Mulben. Mr. Charles C. Doig, architect, Elgin.

New Delaval.—April 29.—For erection of premises for Messrs. Walter Willson, Ltd. Deposit 1*l.* 1*s.* Messrs. Joseph Potts & Son, architects and surveyors, 57 John Street, Sunderland.

Newquay (Cornwall).—May 8.—For erecting County school at Newquay, for the Cornwall education committee. Mr. B. C. Andrew, architect.

Newton Abbot.—April 28.—For the erection of a Sunday school and offices at Keyberry Park. Messrs. J. W. Rowell, Sons & Locke, architects, 2 St. Paul's Road, Newton Abbot.

Portsmouth.—April 26.—For the construction of a ladies' lavatory and alterations to the ladies' cloak room at the town hall, Portsmouth, for the Corporation. Mr. Alexander Hellard, town clerk, Town Hall, Portsmouth.

Radcliffe.—April 24.—For erection and completion of Council offices at Radcliffe, Lancs. Deposit 2*l.* 2*s.* Mr. W. M. Gillow, 66 Deansgate, Manchester, and Mr. R. Holt, 8 Victoria Street, Liverpool, architects.

Ravensthorpe (Yorks).—April 23.—For the various works required in erection of two houses in Huddersfield Road, Ravensthorpe. Messrs. Kirk, Sons & Ridgway, F.R.I.B.A., architects, &c., Market Place, Dewsbury.

Scotland.—April 24.—For erection of proposed new town hall and other works in connection at Girvan (either as a whole or for the separate trades). Messrs. Jennings & Gray, architects, Canterbury.

Scotland.—April 27.—For the mason, plaster, and carpenter work of new dwelling house, East Haybogs, and of New Barn, Braeside. Mr. Alexander Dow, ground officer, or with Messrs. Hunter & Gordon, advocates, 80 Union Street, Aberdeen.

Scotland.—April 30.—For building a Baptist church, Port Ellen, Islay. Mr. James Quenton, Charlotte Street, Port Ellen, Islay, N.B.

Sheffield.—April 29.—For the construction of weighbridge office, steel roof to tipping dock, 60 feet by 39 feet, entrance gates, wall, fences, and other contingent works at the Olive Grove Depot, Myrtle Road, Sheffield, for the health committee. The City Engineer, Town Hall, Sheffield.

Sheffield.—April 29.—For the extension of the male sanatorium at the Union Hospital, Firvale. Mr. G. D. Baxter, clerk of works, Firvale Workhouse.

Stockport.—April 27.—For alterations to branch premises, Love Lane, for the Stockport Industrial and Equitable Co-operative Society, Ltd. Tenders to be sealed and endorsed "Tender for alterations, Love Lane Branch," addressed to the Chairman, and delivered by noon on April 27. Messrs. Wrathmell & Blackshaw, architects, Queen's Buildings, St. Peter's Square, Stockport.

Surbiton.—April 26.—For erection and completion of extensions to the Electricity works in Ewell Road. Mr. John Armitage, architect, Sanctuary House, Westminster. Send names and 5*l.* deposit by April 14 to Mr. F. J. Bell, deputy clerk, Ewell Road, Surbiton.

Wales.—April 28.—For reconstruction of the upper floors with fireproof staircases, new bath houses, &c., at the Monmouthshire Asylum, Abergavenny. Deposit 5*l.* 5*s.* Mr. E. A. Johnson, F.R.I.B.A., Abergavenny.

Wales.—April 24.—For erecting retaining wall, iron work, and concrete floor at Avondale Hotel, Cymmer. Also tenders for alterations and additions to above hotel. The Secretary, Rhondda Valley Breweries Company, Ltd., Pontypridd.

Wales.—April 24.—For providing and erecting a four-stall public urinal, including the necessary masonry, &c.,

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complete, at New Tredegar, Mon. Mr. J. H. Lewis, A.M.I.C.E., Blackwood, Mon.

Wales.—April 24.—For erection of school to accommodate 260 infants, Risca, Mon., and for alterations to the existing school buildings. Deposit 3*l.* 3*s.* Mr. John Bain, architect, County Council Offices, Newport.

Wales.—April 24.—For carrying out the proposed extensions of Porth Hotel, Porth, Rhondda Valley. Mr. W. D. Morgan, M.S.A., architect, 194 Ystrad Road, Pentre.

Wales.—April 24.—For erection of schoolroom and the rebuilding of Wesleyan Chapel, Amlwch, Anglesey. Mr. W. F. Brindle, architect and surveyor, &c., Mona Street, Amlwch, and High Street, Llangefni.

Wales.—April 26.—For erection of twenty houses at Ynysddu. Mr. D. J. Thomas, architect, High Street, Blackwood, Mon.

Wales.—April 28.—For erection and completion of vestry and class rooms, and other works on chapel, for the Saron Welsh Congregational Church, Williamstown, Rhondda. Mr. W. D. Thomas, architect and surveyor, Tydvil House, Porth, Glam.

Wales.—April 29.—For three houses to be erected at Coychurch, Bridgend. Mr. W. Y. Davies, architect, Coity Road, Bridgend.

Wales.—May 1.—For erection of three shops for Mr. T. P. White, Hill View, Maesycwmmer.

Wales.—May 3.—For erection of a manager's house at Oakdale, Mon., for the Oakdale Navigation Colliery Company, Ltd. Mr. A. F. Webb, architect, High Street, Blackwood.

Wales.—May 3.—For erection of a porter's lodge at the isolation hospital, near Tonteg, Llanwit Fardre, for the Pontypridd Urban District Council. Mr. W. E. Lowe, surveyor to the Council, Municipal Buildings, Pontypridd.

Walsall.—For alterations to boys' school, consisting of the erection of four new class-rooms, enlargement of heating chamber, and widening of staircase, for the governors of Queen Mary's school. Messrs. Thacker & Jeffries, architects, 24 Bridge Street, Walsall.

West Bromwich.—April 24.—For erection at the Union Workhouse, West Bromwich, of a galvanised iron office, and of one, two, or three outdoor labour test sheds, as may be ordered by the Guardians. Mr. John W. Allen, architect, 298 High Street, West Bromwich.

Wrexham.—May 5.—For the completion of the erection of the Alexandra schools for the education committee. Messrs. Burrell & Willey, architects, Market Place Chambers, Durham.

Wrexham.—April 27.—For alterations and additions to goods shed for the Great Western Railway Company. The Resident Engineer, Birmingham Station.

It is reported that 1909 will be a "banner" year for builders in Winnipeg, Manitoba. An American consul reports that the offices of all the architects of the city are crowded with work preparatory for one of the busiest building seasons in Winnipeg's history. It is doubtful if ever before has there been so much work in sight at this period of the year, and the majority of the buildings are of a substantial and costly type. Large office buildings, two large hotels, and numerous residences of substantial character are planned, and conservative estimates give the probable cost of building operations as from 1,600,000*l.* to 2,400,000*l.*

"The Cat in History, Legend and Art," written and illustrated by Miss Anne Marks, will be published shortly by Mr. Elliot Stock, of 62 Paternoster Row, E.C. The book will be copiously illustrated, and deals with the subject in a chatty way. It is being issued by subscription at 5*s.* per copy, but the price will be raised after publication. We note on the list of subscribers the following, amongst many others:—The Marquis of Bute (nine copies), Right Hon. A. J. Balfour, M.P., Mrs. Herbert Samuel, Lady Alexander, Sir B. L. Cohen, Bart., Sir G. Faudel-Phillips, Bart., G.C.I.E., Sir W. T. Lewis, Bart., K.C.V.O., Sir E. Letchworth (two copies), Sir Philip Magnus, M.P., Lady Nelson, Sir Isidore Spielmann, C.M.G., Sir T. Marchant Williams, Very Rev. Dr. Hermann Adler, Very Rev. Dr. M. Gaster, Rev. Dr. Oliver, D.D., C. G. Montefiore, Esq., M.A. (twelve copies), &c. Intending subscribers for this interesting book may send their subscriptions either to the publisher or to the author, at 10 Matheson Road, West Kensington.

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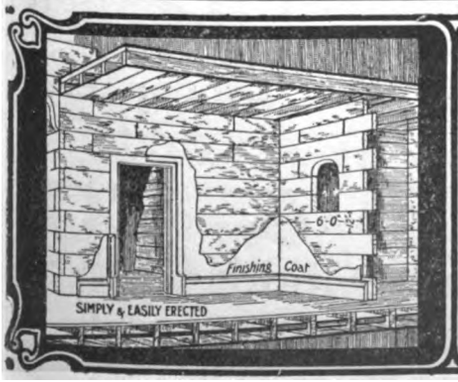
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BERMONDSEY.

For removal of a sewer and repairing the carriage-way in Grange Road. Mr. R. J. Angel, M.I.C.E., borough surveyor, Spa Road, S.E. Quantities by Mr. A. F. Wrightson, F.S.I., 26 Budge Row, E.C.

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For laying out and forming a new road between Old Chester Road and Bebington Road. Mr. C. Brownridge, M.I.C.E., borough engineer and surveyor.

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For erection of twenty-two double tenement dwellings on land bounded by Egerton Street, Getley Street and Tunnel Road. Mr. C. Brownridge, M.I.C.E., borough engineer and surveyor.

Rothwell, Birkenhead (*accepted*)	£6,886 0 0

For erection of extensions to the Infectious Diseases Hospital, Flaybrick Hill. Mr. C. Brownridge, M.I.C.E., borough engineer and surveyor.

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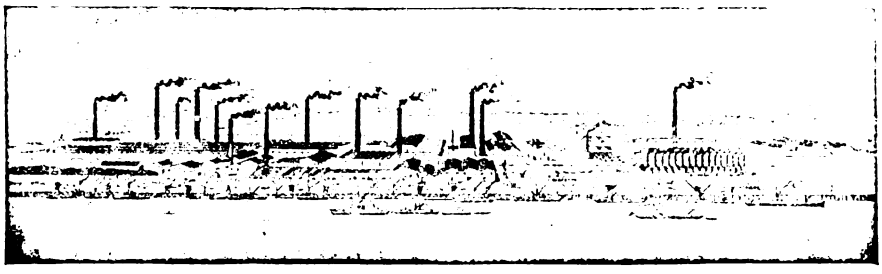
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Riley	16,809 0 0
Carrick	16,785 0 0
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Henderson	13,751	0	0
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Faulks	2,569	12	6
Kelley & Sons	2,562	4	9
Dallow & Sons	2,532	4	9
Flavell	2,424	12	0
Jewell	2,413	7	6
Sharpe	2,409	17	7
Goodman & Sons	2,392	17	9
Hickman	2,388	17	6
Chaplin	2,377	0	0
Rowley	2,365	17	2
GREAVES, Hinckley (*recommended*)	2,348	11	0
Fox	2,324	7	10

LEYTON.

For partitions with Havelock's patent plaster slabs, and for stoves, &c., for the Urban District Council. Mr. F. H. LEWIS, electrical engineer, Leytonstone.

Partitions.

Congdon & Son	£320	15	0
Smith	196	16	0
HAVELOCK PATENT PARTITION CO., Finsbury Pavement (*accepted*)	169	14	0

Stoves, &c.

Estler Bros.	225	14	0
Congdon & Son	152	13	0
Havelock Patent Partition Co.	118	5	0
SMITH, Leytonstone (*accepted*)	94	9	6

LONDON.

For river embankments, settling tanks, chamber and sub-aqueous pipe works at Blyth's Wharf, for Stepney Council. Mr. M. W. JAMESON, borough engineer, Whitechapel, E.

Mowlem & Co.	£12,901	0	0
Docwra & Son	12,496	0	0
Pedrette & Co.	11,900	0	0
Rigby	10,500	0	0
Nott	8,953	17	4
T. W. Pedrette	8,900	0	0
Muirhead & Co.	8,419	19	6
Webb & Co.	8,307	17	9
Cochrane & Sons	8,219	0	0
Perry & Co. (Bow), Ltd.	7,890	0	0
Aird & Sons	7,726	0	0
JACKSON, Barking (*accepted*)	6,900	0	0
Handman & Co.	5,500	0	0
Borough Engineer's estimate	9,000	0	0

For new street works in Castlewood Road, Hackney.

Norwegian granite.

Bloomfield	£1,195	0	0
Griffiths & Co.	1,187	17	7
Adams	1,186	6	2
Dykes	1,179	3	5
Porter	1,149	10	2
Catley	1,135	15	2

Cornish.

Bloomfield	1,295	0	0
Griffiths & Co.	1,167	10	7
Adams	1,196	6	2
Dykes	1,179	3	5
Porter	1,159	13	8
Catley	1,115	15	2

Irish.

Bloomfield	1.295	0	0
Griffiths & Co.	1,177	14	1
Adams	1.196	6	2
Porter	1.129	3	2
Catley	1.135	15	2

BOX GROUND TRADE MARK
THE BATH STONE FIRMS LTD
MONK'S PARK TRADE MARK
BATH·&·PORTLAND·QUARRY·OWNERS
QUARRIES
MONK'S PARK, CORSHAM DOWN, CORNGRIT, FARLEIGH DOWN, BRADFORD,
FOR HARDENING & PRESERVING Fluate, WATERPROOFING, BUILDING MATERIALS
QUARRIES
BOX GROUND, COMBE DOWN, STOKE GROUND, WESTWOOD GROUND, HARTHAM PARK, AND THE PRINCIPAL QUARRIES, PORTLAND.
LONDON DEPÔTS
G.W.R. Westbourne Park.
L. & S.W.R. Nine Elms.
132, Grosvenor Road, Pimlico.
HEAD OFFICES:- ABBEY YARD, BATH.
LIVERPOOL — IMPERIAL BUILDINGS, EXCHANGE ST. EAST,
MANCHESTER — TRAFFORD PARK.
SUMMER DRIED SEASONED STONE FOR WINTER USE.

STEEL ROLLING SHUTTERS
(KINNEAR PATENT).
ARTHUR L. GIBSON & COMPANY,
19, 20 and 21 TOWER STREET,
Upper Saint Martin's Lane, London, W.C.

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LONDON—*continued.*

Guernsey.

Bloomfield	1,300	0	0
Griffiths & Co.	1,156	9	11
Adams	1,236	6	2
Dykes	1,249	3	5
Porter	1,159	0	0
Catley (*recommended*)	1,115	15	2

Leicestershire.

Bloomfield	1,290	0	0
Griffiths & Co.	1,183	19	11
Adams	1,186	6	2
Dykes	1,170	3	5
Porter	1,159	13	8
Catley	1,165	15	2

MACCLESFIELD.

For constructing sewers in the Buxton Old Road and Blakelow Road. Mr. C. W. STUBBS, borough engineer, Macclesfield.

Roylance & Co.	£410	18	2
Gorton & Wilson	388	1	0
Berry & Sons	365	14	10
SIMPSON & SON, Macclesfield (*accepted*)	362	9	3
Barrick	356	6	0
Worthington	350	19	6

MIDSOMER NORTON (SOMERSET).

For supplying and laying about 3,300 yards of 9-inch, 8-inch and 7-inch stoneware pipe sewers, with manholes, &c. Mr. W. F. BIRD, engineer, Midsomer Norton.

Isley & Son	£2,141	17	0
Ambrose	2,114	0	0
Mitchell & Son	1,903	3	1
Merryweather & Son	1,893	0	0
Pomeroy & Co.	1,882	16	6
Macdonald	1,877	6	0
Shaddock	1,837	0	0
Ireland	1,820	0	0
Brown & Hiscott	1,707	6	7
Wright & Son	1,670	0	0
Riley	1,661	3	6
Bird & Son	1,585	0	0
STEER & PEARCE, Plymouth (*accepted*)	1,507	18	0

PENZANCE.

For the erection of a house. Messrs. HOMER & LUCAS, architects, 35 Bucklersbury, London, E.C., and Penzance.

Pidwell	£920	0	0
Nicholas	918	9	0
Hosking	735	0	0
BROWN, London (*accepted*)	520	0	0

WALES.

For erection of three shops, with offices over, at Mill Street, Pontypridd. Messrs. A. O. EVANS, WILLIAMS & EVANS, architects, Pontypridd.

Knox & Wells	£2,477	0	0
Shail	2,390	0	0
Williams	2,290	0	0
Griffiths	2,255	0	0
Colborne	2,143	0	0
Thomas & Co.	2,099	0	0
E. Jones	2,098	0	0
Davies	2,059	0	0
Williams & James	2,050	0	0
Niblett & Davies	2,050	0	0
Evans & Bros. (*accepted*)	2,018	0	0
R. Jones	2,005	0	0

For additions to and altering the Ynysybwl mixed school, for the Mountain Ash education committee. Mr. W. H. WILLIAMS, architect, Mountain Ash.

Williams Bros.	£1,074	15	0
John	1,050	0	0
Griffiths	969	17	7
DAVIES, Mountain Ash (*accepted*)	935	0	0

WOTTON-UNDER-EDGE.

For water-supply works for Dursley Rural District Council. Mr. H. J. WEAVER, C.E., Northgate Mansions, Gloucester.

Contract No. 1.—Mains.

BEAVEN & SONS, Gloucester (*accepted*)	£875	18	3

Contract No. 2.—Engine-house and gas-producer house.

DOLMAN, Gloucester (*accepted*)	£231	13	6

TWO POPULAR HOTELS IN CENTRAL LONDON.

The BUILDING TRADES EXHIBITION, at OLYMPIA, can be reached by Electric Railway within 25 minutes.

OPPOSITE THE BRITISH MUSEUM.

THACKERAY HOTEL

Great Russell Street, London.

NEAR THE BRITISH MUSEUM.

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These Hotels have Passenger Lifts, Electric Light throughout, Bathrooms on every Floor, Lounges and Spacious Dining, Drawing, Writing, Reading, Billiard and Smoking Rooms, and are heated throughout. FIREPROOF FLOORS, PERFECT SANITATION, TELEPHONES, NIGHT PORTERS. BEDROOMS, including Attendance, from 3/6 to 6/-. Full Tariff and Testimonials on application.

Inclusive charge for Bedroom, Attendance, Table d'hote Breakfast and Dinner from 8/6 to 10/6 per day.

TELEGRAPHIC ADDRESSES ... { Thackeray Hotel: "THACKERAY, LONDON." Kingsley Hotel: "BOOKCRAFT, LONDON."

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WYMONDHAM.

For erecting a Baptist church. Mr. A. F. SCOTT, architect and surveyor, Norwich.

Spalding, Sons & Co., Ltd.	£1,554 0 0
Bowden	1,465 0 0
Jeffries	1,435 0 0
Youngs & Son	1,389 0 0
J. S. Smith	1,387 0 0
Scarles Bros.	1,386 0 0
Spencer, Santo & Co.	1,315 0 0
E. J. Smith	1,300 0 0
BLAZEY, Wymondham (*accepted*)	1,265 15 0

Received too late for Classification.

BIGGLESWADE (BEDFORDSHIRE.)

For the erection of grocer's shop and premises, High Street. Mr. THOMAS COCKRILL, A.M.I.C.E., architect, Biggleswade.

Wright	£590 0 0
Wrycroft & Sons	582 10 0
BARTLE & SON, Potton (*accepted*)	577 0 0

TRADE NOTES.

ADDITIONS to Donhead House, Salisbury, are now being carried out for Sir James Pender. Chilmark stone is being used and worked at the quarries by the proprietors, Messrs. T. T. Gething & Co.

MESSRS. WARING & GILLOW, as will be seen from our advertising columns, are conducting an exhibition for the householder of every requisite for renovation and decoration of the home. A stroll through their salons will be time well spent by the visitor.

THE Dannevirke Hospital, New Zealand, is being warmed and ventilated by means of Shorland's double-fronted patent Manchester stoves with descending smoke flues, supplied by Messrs. E. H. Shorland & Brother, of Manchester.

THE electric supply committee of the Borough of Marylebone have recommended to the Council the appointment of Mr. A. H. Seabrook, M.I.E.E., as engineer and manager of the electric lighting and supply undertaking.

THE extension to Annan Academy, erected from the plans of Mr. H. E. Clifford, F.R.I.B.A., Glasgow, has been ventilated by means of Mackay's patent direct-acting ventilators, supplied by Cousland & Mackay, Glasgow, the sole makers.

ST. CUTHBERT'S parish church, Darlington, the finest in the county of Durham, was erected by Bishop Carilef, of Durham, 1080, and remodelled by Bishop Hugh Pudsey, of Durham, 1154. The church is going to be provided with a clock and chimes by Messrs. Wm. Potts & Sons, Ltd., of Leeds and Newcastle-on-Tyne. The late Mr. Wm. Potts, principal of the firm, was a native of Darlington, and both he and his father served their apprenticeship with Messrs. Thompson, clock makers, of High Row, Darlington.

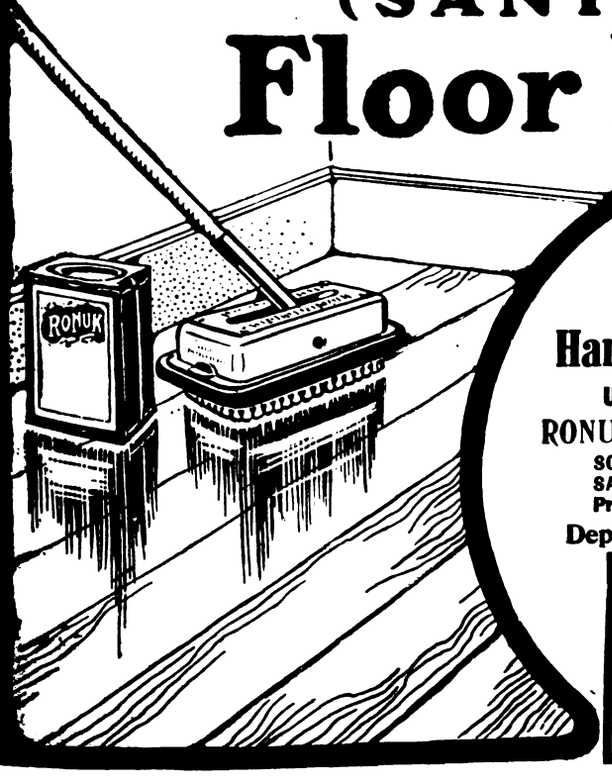
A FIRE broke out at the Belfield mill of the Birch Mills, Ltd., Rochdale, but was promptly extinguished by the "Titan" sprinklers with which the mill is fitted throughout.

THE London and Lancashire Fire Insurance Company, 45 Dale Street, Liverpool, has had a prosperous year. The total premiums now amount to 2,062,599*l.*, and the total invested funds to 2,230,580*l.* In the fire account the premiums are 1,456,291*l.*, and there is carried to profit and loss account a credit balance of 196,515*l.* In the accident account the premiums are 504,409*l.*, and there is carried to profit and loss account the sum of 30,634*l.* The net result of the year's operations is that after (*a*) increasing the accident fund from 170,000*l.* to 200,000*l.*, (*b*) paying the same dividend as for last year, viz. 84,520*l.*, being at the rate of 16*s.* per share, the balance carried forward is increased from 107,756*l.* to 252,662*l.*

THE Great Eastern Railway Company have given orders for the whole of their steamers on the Harwich-Hook of Holland and Harwich-Antwerp services to be fitted with submarine signalling.

THE total value of "stones, slabs, and marble, rough, hewn, or manufactured (other than works of art)," imported into Scottish ports during each of the last ten years was as follows:—1889, 56,538*l.*; 1900, 64,884*l.*; 1901, 113,438*l.*; 1902, 78,717*l.*; 1903, 64,582*l.*; 1904, 87,734*l.*; 1905, 77,973*l.*; 1906, 83,209*l.*; 1907, 72,252*l.*; 1908, 70,931*l.*

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(SANITARY)
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By Royal Warrant to H.M. the King.

Prevents the Harbouring of Germs.

USED IN THE PRINCIPAL HOSPITALS.

RONUK, Ltd., PORTSLADE, near BRIGHTON

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Visitors to the BUILDING TRADES EXHIBITION should see our EXHIBIT, STAND No. 43, Row B, Gallery.

"THE LANCET," October 17th, 1908, says:—

"The manufacturers of RONUK have devoted special attention to the sanitary treatment of floors. Composed largely of antiseptic materials which possess the same germicidal properties as common disinfectants, but are without their disagreeable characters of smell and corrosive qualities, RONUK is an excellent floor polish, preserving a sanitary condition of the floor, sealing up all germ harbours, and presenting a surface which pleasingly evidences an appreciation of sanitary principles.

It serves as an excellent application for polished wood block, parquet, and stained floors."

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BUILDING TRADES EXHIBITION.

Mr. Ernest George, in opening the Building Exhibition at Olympia on Saturday last, congratulated Mr. Greville Montgomery on the thoroughly representative character of the display, which he considered finer than anything that had been done before, and he expressed a hope that it would act as a stimulus to the prevailing slackness in trade. Sir Henry Tanner, D.S.O., also said that in his opinion the present exhibition eclipsed all its predecessors both in arrangement and in the painstaking finish of the different exhibits. Sir W. B. Richmond, R.A., expressed delighted surprise at the large proportion of the exhibits that were to be credited to English enterprise.

Last week we were able to make allusion to some few of the Stands. This week we continue these notices. There are about 350 firms exhibiting. Space and time prevent an individual account being given of each one, but we hope next week to include all that are likely to have special importance to our readers.

One of the artistic exhibits is that of the *Coatostone Decoration Company* in the gallery. The principal room is in a pale green; the walls are panelled out with moulded slats (flat enamelled with Parsons's "Endelline" enamel), and the panels filled in with "Coatostone" in a delicate green tint. The outside shows an oriel window of a stone detail made in wood and coated with "Coatostone," giving a perfect effect of natural stone. The facia and dentil cornice are in plaster coated with "Coatostone." The exterior walls are treated with a special waterproof rough-cast composition, which is applied to brickwork, plaster or cement. It is sold mixed ready for use in any tint. The hall has Greek fluted columns, with carved caps and bases of "Coatostone Stuc," which can be cast and moulded to architects' choice. The walls show an interior treated with "Coatostone Stuc"; while the overdoor is carved in the same material. On one part of the walls "Coatostone" is lined out to represent masons' joint. The example of oak panelling has the advantage of being removable and designed as a tenant's fixture. The woodwork has been treated with Parsons's "Endelline" enamel.

T. L. B. rubbers and T. L. B. facing-bricks have long been familiar to the building trades; of more recent date is the "W. K." facing-brick and the T. L. B. roofing tiles, the latter being introduced two years ago. *Messrs. Thomas Lawrence & Sons* have put up an entrance doorway of cut and rubbed brickwork, which explains—if explanation was necessary—how this firm's output from their three works has achieved its wide popularity. Another feature is the small roof exhibiting their "old" hand-made house tile with continuous nib and holed in which stained sand, forced on to the surface by a patent process, gives a well-roughened surface. They are made in dark colour or in various shades of red; both of these weather delightfully, as is shown by specimens taken from a roof at their works. The matured look is continued by the bricks, which are burnt in a special manner to harmonise with or suggest old work. The "W. K." machine-pressed facing-bricks are of a splendid colour and are sold in several qualities. They are recommended for brickwork carrying very heavy weights and where a low-priced brick is needed.

The *Cornwall Granite Company, Ltd.*, own the Gunnislake Quarries on the banks of the Tamar, and have a railway siding to Plymouth. At Bay 7 in the gallery they exhibit specimens of granite, polished, dressed, rough and broken. Their material from the Gunnislake Quarries has been used for a hundred years for docks and harbours, piers, bridges, public buildings, churches, monuments and tramways. Granite is unfortunately not a substance that lends itself to exhibition, otherwise the company would not have confined their architecturally treated granite to a single large two-light window with a quatrefoil over, though that is enough to suggest that the quarry is equipped with up-to-date machinery for obtaining the granite, and then for preparing it for use. In a Kirkaldy test a 3-inch cube withstood a crushing strain of no less than 1,049.6 tons per square foot, which is equivalent to 16,321 lb. per square inch. The Government have been much criticised in connection with the selection of Scandinavian granite for the Rosyth contract. In this connection it is worth mentioning that the Cornwall Granite Company have supplied 200,000 tons to our Admiralty alone, and can still say "the supply is practically unlimited." Municipal engineers all over the country know its value for roads.

THE "DRAWWELL" GRATE



WAS PLACED

First in the Final Tests

at the recent test with Firegrates at the New Government Offices in Whitehall, under the direction of a sub-committee of the Coal Smoke Abatement Society, in conjunction with Sir Henry Tanner and a committee of experts, for smoke abatement, heating power, fuel economy, and suitability for public and private buildings.

BUILDING TRADES EXHIBITION, OLYMPIA,
APRIL 17 to MAY 1.

To be seen at STAND No. 153, Wall Space.

Supplied through Builders' Merchants, Ironmongers, &c., only.

J. & R. CORKER, Ltd.,
GENERAL IRONFOUNDERS, Ferham Works, ROTHERHAM.
London Showrooms, Saracen's Head Buildings, Snow Hill, City, W. B. CLARKE, AGENT, where the "Drawwell" can be seen in action.

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ILLUSTRATIONS.

CONKWELL GRANGE, WILTSHIRE.—FORECOURT AND MAIN ENTRANCE—KITCHEN COURTYARD AND SIDE ENTRANCE—THE GARDEN ENTRANCE TO SOUTH FRONT—ENTRANCE DOOR AND VESTIBULE, &C.—THE HALL—THE DINING-ROOM.

Hand-power lifts for different purposes are shown by *Messrs. Hammond & Champness*, engineers, Alfreton Street, E.C. Type C is a dinner lift fitted with a self-sustaining gear by which the cage is automatically locked in any position directly the hauling rope is released. The lock is released when the rope is again pulled. No brake is required. Swivel and roller bearings prevent the shaft binding in the event of the overhead timbers becoming warped. Type E is another self-sustaining dinner lift, but it is constructed to serve under a hall table or other position when the ordinary enclosure is not desired. The floor opening through which the lift passes is automatically shut when the cage is lowered from below. In type F the lift is enclosed in an ornate cabinet and can be worked from both floors by means of a handle. This lift is fitted with a foot-brake on both floors also. The stand enables a closer acquaintance to be made with the gearing and fittings.

Chance Bros. & Co., Ltd., Glass Works, near Birmingham, prominently show "Venturene" opal tiles, and lay particular emphasis on the lustrous surface, clean cut edges and uniform sizes. Rounded internal and external angles are produced for such contracts as hospitals, where for hygienic or other purposes it is particularly desirable to escape forming a sharp angle. The cement used for setting these tiles must be of the class of Keene's or Parian; for walls where there is no likelihood of damp Messrs. Chance recommend the use of their special cement, which sets quickly and does not give off any efflorescence. The tile surface may be purchased plain or figured, and of varying tints. An extra thick opal tile is shown for use in such buildings as hospitals, subways or railway stations. Some of the vitreous tiles are prettily decorated and are suitable for rooms like nurseries or hospital wards. The firm are makers of window glass of every description, and a few samples of this department of their work are on the Stand.

"Duresco, the King of Water Paints," took the field thirty years ago. The manufacturers, the *Silicate Paint Company* (*J. B. Orr & Co., Ltd.*), have arranged Stand 50 Row C, as two rooms. The wood framing is treated with "Charlton White" flat (non-poisonous), while the panels show the charming effects of "Duresco," of which the base is a non-poisonous zinc-white pigment of a permanent character and of remarkable body and density. Its first use was for the treatment of new plaster, but now it has a much wider range though it is still warmly recommended for damp plaster where oil paint, distemper or paper would be waste of money. This characteristic is due to the admixture of silicate petrifying liquid in the proportion of 1 cwt. of paint to 1½ or 2 gallons of liquid, to reduce the "Duresco" paste to a working consistency. The liquid has been very successfully used by itself as a stone preservative. "Duresco" is stocked in three whites and about fifty tints; intermediate tints may be obtained by intermixture. Washing with cold water may be carried out after a few months when the distemper has thoroughly hardened. A sound surface can be washed down and painted with an additional "Duresco" coat of the same colour at a very small cost. Success in applying "Duresco" depends essentially on (1) using the correct proportion of thinners, too much being fatal to good work; (2) obtaining uniform suction over the whole surface; (3) selecting colours suited to the conditions to which they will be exposed; (4) not attempting to finish with two coats of "Duresco" work that would require four, at least, of paint.

Sharp, Jones & Co. are showing their rock-concrete roofing tiles. These were originally manufactured about eight years ago for export, but are now firmly establishing themselves on the home market as a cheap roof covering. Each tile interlocks with its four neighbours, and about 111 tiles equal a square of which the weight is 7 cwt. The tile is hung on the battens, set to a gauge of barely 8½ inches, with a nib. The projecting ridges on the lower part of the back of the tile interlock on the upper half of the face of the adjacent tiles. The materials employed are carefully selected to insure a very dense and hard concrete free from porosity. Any colour may be obtained.

Reconstructed Stone

can be produced in any thickness, from ¾ inch up, moulded to any section; it contains nothing that is not present in the natural stone, all varieties of which it exactly resembles in composition and appearance; it can be supplied in varying density to suit the strains of different parts of a building; and has no lamination or :: :: :: :: :: bedding planes :: :: :: :: ::

Reconstructed Marble

can be produced with an entire freedom from flaws and vents, no cramping or stopping is required. The structure, colouring, and markings are true to nature, but may be varied as desired. No flaws, vents, or stopped veins. Composition, Density, Appearance :: :: :: :: :: equal to Nature's best :: :: :: ::

We are showing at the

Building Exhibition, Stand No. 43, Row C

The British Stone & Marble Co., Ltd., 11 & 12 Finsbury Square, London, E.C.

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One of the large contracts recently completed by the *Seyssel and Metallic Lava Asphalte Company* was in connection with the Mersey Dock and Harbour Board offices, in Liverpool. Here there were required 11,000 yards of Seyssel asphalte to roofs, cornices and tops of pediments and spheres, and gutters to dome and lantern 220 feet high. Metallic lava asphalte was employed as damp course to wall and site and pipe trenches, and to vertical backs of vaults. The forecourt is in Seyssel asphalte. The work was completed in 520 days by their men. The company are ready to guarantee to architects direct all contracts carried out by them, provided they are consulted as to the construction affecting their work. The analysis of the natural product, called Seyssel Asphalte, is 84.32 per cent. carbonate of lime and 14.20 bitumen. It is laid in situ in mastic form. The minimum thicknesses are, damp-courses ½ inch, floors and roofs ¾ inch to 1 inch, and paving 1 inch thick. The Metallic Lava Asphalte is not a natural product, but a manufactured article, which is especially recommended for use as a site damp course over the whole area.

Bellman, Ivey & Carter, Ltd., have been manufacturing Scagliola marble for the past eighty-five years. Their Stand includes four large slabs which were awarded a prize medal in the International Exhibition of 1851, and Sienna columns which received a medal in the '62 Exhibition. But the material was brought over from Italy more than 150 years ago. One of its most modern applications is for masking iron or brick cores. The columns are made entire and prepared ready for polishing; on their arrival they are cut vertically, placed round the centre, cramped and made good. The column on the Stand which surrounds an iron stanchion shows the impossibility of detecting any joint. Another development is the company's special process for bronzing plaster and other capitals, enrichments, &c., by hand. Scagliola is suitable for use as columns, pilasters, wall lining, architraves, pedestals; but it should be borne in mind that it is not a mere surface decoration. The cost varies according to marble selected, but may be estimated at from one-third to one-half the price of marble; the more rare the marble the greater the difference in price. The weight being much less, the cost for transit is proportionately reduced. It can be turned, moulded, or cast to any shape or design.

Benham & Sons, Ltd., are opposed to the domestic hot-water supply coming from a boiler fixed behind the kitchen range wherever the constant demands of a big establishment have to be provided for. In these cases they recommend their "Wigmore" independent hot water boiler and cylinder; for small houses and flats their own kitcheners are fixed with the customary boiler. Messrs. Benham are prepared to show that in a large house where there is frequent and great need for hot water it is cheaper to have a second fire in the independent boiler than it is to have a single fire at perpetual high pressure in the range. The "Wigmore" kitchener is fitted with folding screen-doors with inner plate to prevent the knob becoming too hot; a plate rack, which is convertible into a hot closet; and perforated cheeks to the fire to decrease the coal space when desired. A prominent object on Stands 107 and 108, Row G, is the central pattern cooking stove with underground flue, on the same principle as those provided for so many large kitchens.

The *Ruberoid Company, Ltd.*, on a full size model show its method of application on a flat-boarded roof, a flat concrete roof, and a pitched boarded roof. The growing use of concrete roofs has also witnessed a growing demand for Ruberoid as waterproof covering for it; its light weight of 2.5 lb. per yard super, its great elasticity and freedom from eventual cracks, and the durability which has enabled it to survive unhurt ten years' use on factory buildings have won the favour of architects. Another use is for insulating foundations, tunnels, bridges, &c., against ground water. The manufacturers have a large staff of skilled men ready to lay Ruberoid in any part of the kingdom, though on small roofs it is so easy to fix that a handy man can make a good job of it. This fact is one reason for its popularity among estate agents and others responsible for the upkeep of small country buildings. Once it is fixed it requires no further attention, not even a periodical painting or tarring. It should be noted that metal flashings are dispensed with, their place being taken by Ruberoid strips. It is now manufactured in three colours, grey, red and green, to give the effect of slates, tiles and green slates or old copper. During the past eighteen years all manner of buildings have been covered and otherwise protected with it. One recent success was for an order from the Italian Government for 10,000

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WILL CUT AND JOINT LIKE NATURAL STONE, AND HAVE SIMILAR APPEARANCE.

HARD and DURABLE.
For price, delivered at any Station, apply
B. WHITAKER & SONS, LTD.,
HORSFORTH, LEEDS.

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For Index of Advertisers, see page X.

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rolls, or 20,000 squares, for the relief barracks at Messina. The firm show also at their stall preservative paints, insulating papers, building papers, &c.

There are three things on the large Stand of *Carter & Co., Ltd.*, which deserve particular attention, viz. the "Ceramic Marble" (a new ware for constructional purposes), the garden terra-cotta pottery (particularly the handsome centrepiece arranged as a fountain), and the leadless glazes. Tiles are exhibited in numerous designs and in numerous finishes for numerous purposes; but these have long ago established themselves in public favour and stand in no need of an introduction—though visitors are all the same warmly invited to renew and improve their acquaintance with these goods. Messrs. Carter have three large works—the architectural pottery at Hamworthy, the Encaustic Tile Works at Poole, and the White Works at Hamworthy. A commendable example of leadless glaze is to be found in one of the larger fireplaces. As in most of this sort of work there are charming variations in the surfaces, which remove all tendency to monotony, and which naturally occur in the kilns. The marble and ceramic mosaics are an important feature of Messrs. Carter's business, and are included at Stand 75, Row E.

Nearly twenty gold medals are in the possession of the *Emdeca Metal Decoration Company, Ltd.*, as testifying to the appreciation meted out to their decoration during twenty years. The embossed and enamelled zinc sheets are offered as a very economical substitute for tiles. Care must be taken to ensure that the walls are thoroughly dry before applying the special paste. One great feature of this decoration is the almost infinite variety in which the patterns may be combined at the whim of the user—if desired a piece of wall might have as little monotony as a patchwork quilt, for the sheets can be cut up in the manner of a scrap-book. Of course this is not commended; most people would prefer the more orderly schemes usually adopted, choosing the pattern according to the position where the sheets will be exposed. Emdeca is in great demand, and its sale is over 500,000 square yards a year. The Stand is roofed in with a "Steleonite" steel ceiling, stamped in relief. It was from this Stand that Mr. Ernest George, P.R.I.B.A., opened the exhibition.

There is a substantiality about the Stand of No. 90, Row F, belonging to the *United Kingdom Fireproofing Co. Ltd.*, that augurs well for the strength of their system. A choice of eight types of floors is offered to the architect, and four of these have been utilised in the construction of the Stand. The bottom floor, raised 4 feet from the ground, is made up in one-half of No. 1 system and in the other of No. 5 system. No. 1 system consists briefly of hollow concrete tubes about 3 feet wide supported on ferro-concrete beams, the whole being covered with concrete. No centering is required. Spans of 30 feet capable of bearing heavy loads may be obtained without the introduction of steel joists. In No. 5 system the hollow tubes are of terra-cotta instead of concrete, and are usually protected on the underside with terra-cotta soffit tiles; this floor is particularly recommended where fireproofing is the first consideration. The Stand is roofed in with a second floor combining systems No. 6 and 7. No. 6 is a solid concrete floor with square rods resting on the top flange of rolled-steel joists or on wall bearings. System No. 7 is the cheapest of the hollow floors, and utilises terra-cotta blocks 12 inches by 12 inches between the reinforced beams. Partitions of breeze, concrete, plaster, pumice and terra-cotta and a patent expansion block of terra-cotta are on the Stand. In conclusion, we would like to commend their catalogue, entitled "Reinforced Concrete and Fireproof Construction by U. K.," as being a departure from the familiar type.

The Stand of *D. G. Somerville & Co.* represents on a reduced scale the superstructure of the Paddington Telephone Exchange (Mr. Leonard Stokes, architect), which was erected by them. The roof consists of arched steel principals; the actual span of truss was 35 feet, no tie being required. The floor is the D.G.S. hollow reinforced sound and fire-resisting floor, which has a guaranteed safe load of 3 cwt. per square foot, and a total weight, including the rolled-steel joists, of 35 lb. per square foot. At Paddington there was in some parts of the Exchange a live load of 6 cwt. per square foot. The total weight of the structural steelwork was 350 tons. Specimens of reinforced-concrete piles as used at Brighton and Norwich and as stocked at the works are exhibited, together with sections of steel girders, &c., and photographs of the firm's many contracts.

. . THE . .
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The *Zeta Wood Flooring Co., Ltd.*, have covered the floor of Stand No. 85, Row E, with oak, jarrah, teak and pitch pine blocks; and the effect is excellent. A suggestive fact as to the quality of the company's work is that for two years they have been awarded the sole contract for the supply of this kind of flooring on the Zeta dowelled system to the London County Council schools, as well as being contractors to the Admiralty and the War Office. The display of parquetry is especially attractive; the designs are eminently suitable to the material and are executed in admirable taste. The whole Stand shows what high-class work can be done at reasonable prices.

Softwoods and hardwoods of all varieties are exhibited by *Ingram, Perkins & Co.*, as well as compo-board, three-ply veneers, mouldings, and as representative a general collection as can be made in so limited a space from the stock of an important firm of importers and merchants. It is, of course, difficult to bring together for a fortnight the eighty-one varieties of planed quarterings, fifty-five varieties of planed boards, 119 varieties of flooring and matching, and specimens of woods from every quarter of the globe that are ready for purchase by customers.

The "Eureka" sash balance (Neren's patent) is shown by *Messrs. Allen & Norris*, who have the sole rights for Great Britain. The patent dispenses with weights, pulleys and cords, without altering the external appearance of the window. The customary rattle and jarring of the weights is therefore obviated, even if old frames are fitted with the balance. Should by chance any readjustment be necessary, it is easily effected, for the parts are few and simple.

The *Medway's Safety Lift Company* are able to accommodate their electric passenger-lift gear on a small corner of the stand. It is self-contained, very compact, and can be fixed either on top, underneath, or at the side of the lift. The Scott-Medway safety automatic control removes all danger to life or limb in the event of a breakdown. The push-button electric lift is here represented on a small scale suitable for dinner lifts. There is also on the Stand a Medway's silent self-sustaining dinner lift, worked by a hand rope, of which the principal points are its silent and easy working and its sustaining power.

There must be a large number of the visitors to Olympia who have often specified or used Monk's Park Bath stone, but who have never known how it is obtained. For all such an instructive exhibit has been arranged by the *Bath Stone Firms, Ltd.*, in the shape of a representation of one of the tunnels, 80 feet below ground, in their mine, with the plant necessary for sawing and removing the blocks. There is an admirable collection of masonry in the various stones quarried by the company. It includes pierced terrace walling in St. Aldhelm Box Ground; corn-grit column base and cap; two-light Gothic window in Monk's Park stone, with sill string and label in Box Ground; sundial pedestal in Box Ground; Farleigh stone range-work. Among the Portland specimens are the following:—Balustrading, cornice with medallions, twin column with base, cap and four-way springer. Extremely interesting is a sample stone marked by Sir Christopher Wren when selecting stone from the Wakeham district (now worked by the Bath Stone Firms, Ltd.) for St. Paul's Cathedral.

The brilliance of the display by the *Brilliant Sign Company* (1907), *Ltd.*, fully justifies their right to the trading title. Competition between the businesses carried on in shops has rendered the exterior sign of enormous importance, and one on which the gross receipts are sure to depend to a lesser or greater extent. The above company are in a position to meet any possible demands, for at the Paragon Works, Shepherd's Bush, W. (which cover nearly two acres) they employ more than 500 workmen. The brilliant letters are stamped in stout sheet copper from steel dies, and then gilt under a secret process. Gilt wood letters are also made.

The Windmill Roofing Tiles are manufactured by *Watson, Nelson, Ltd.*, in dark and medium red shades, at Napton, near Rugby, and are fixed by nails or nibs. Notable characteristics are their rich colour, the clear ringing sound when two are struck together, and their strength. The tiles may be purchased hand or machine made, smooth or sand faced. Messrs. Watson, Nelson, Ltd., have a patent fluting in which the channels are carried about 2 inches above the bottom edge of the upper tile to enable them to withstand the severest weather. In addition to tiles the manufacturers produce finials, ridges, and all tile fittings, bricks, adamantine flooring, &c.



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The "Edwardian" chimney-pots and the "Mon'lithcrete" fire-resisting floors of *Messrs. Mark Fawcett & Co.* have in the past few months received detailed notice in our columns. An indubitable testimony of the efficacy of the pots is afforded in a letter received within the past week from Messrs. Joseph & Smithem, architects, stating that after using 1,000 of the "Edwardian" chimney-pots and having found them satisfactory, they are going to use an additional 1,000. The "Mon'lithcrete floor" consists of lattice girders (from which the compression members have been removed) in combination with concrete. In a recent test a span of 16 feet was loaded up to 17 tons, and the deflection was 1 inch; the load was then increased up to 14 cwt. per foot super, when the deflection became 2¼ inches. On the load being removed, the total deflection was 1⅜ inch. These results could not fail to give the greatest satisfaction and confidence in Mr. Mark Fawcett's invention.

Messrs. Bristowe & Co. show a number of sanitary specialties known as H.H. series, which mark a departure in the direction of common-sense principles as applied to the design and construction of sanitary apparatus. The H.H. gulley is automatic and efficient in its action, being cleaned by each flush. The H.H. lavatory is designed and constructed to prevent any accumulation of filth on or about the basin or overflow. The soap trays are made sufficiently sloping so that the soap is always dry. The H.H. closet possesses two perfect mechanical joints at the outgo and flush-pipe connections made with metal clips, dispensing entirely with the accustomed uses of putty and paint. The capacity and large water area of basin are points also of advantage. The H.H. seat is anatomically formed, and prevents much of the discomfort of the old type. The H.H. grease trap is in metal for use under scullery sinks for arresting grease, instead of allowing it to contaminate waste pipes. The H.H. bath is a combination of children's bath, foot bath and a bath for adults, which effects its purpose with the minimum quantity of water and, being upright, occupies the smallest possible space. It is eminently suitable for artisans' dwellings, cottages, public institutions, barracks, &c. The main feature is an overhead tank with showers, into which the hot and cold water supply are taken either together or separately.

One of the biggest displays is that made by the *Standard Sanitary Range and Foundry Co., Ltd.*, at Stands 137 and 138, Row H, with an overflow on wall space 176 opposite. A prominent feature is the large selection of chimney-pieces, which must surely contain something to suit everybody's taste. The majority are equipped with a "Burkone" interior. The "Burkone," it will be remembered, is a fire standing above the floor level and with a sloping bottom in the centre of which is a perforated iron cone on which the coals drop as they burn away by their own weight, thus insuring a bright fire to the last without any poking. The fire can be adapted to any other kind of surround and to any design. Among those who have made stock designs are Mr. C. V. Voysey and Mr. Arnold Mitchell. Another department is the Standard combination gas and coal range as supplied to the Office of Works. In it the large oven is adapted for heating with coal or gas, and when the gas hot-plate is not in use it can be swung back, leaving the hob clear. It is fitted with the latest higher-pressure boiler heated by gas, which costs a penny an hour. The gas coil can be employed in conjunction with or independently of the ordinary bath boiler. Yet another department is brass-foundry, ironmongery and rainwater castings; in both there is ample recognition of the welcome public demand for good designs. The Stands include sanitary ware, like baths, flushing cistern, pedestals, lavatories, &c.

The latest addition to the many patent and unpatented tiles manufactured by *Colthurst, Symons & Co., Ltd.*, at Bridgwater, is the "Paragon," which has for its main object the absolute exclusion of all rain-drift. The "Acme" tile has been on sale for over two years, is made by "machine process" and has a patent interlocking surface. Their ridge tiles, finials, &c., are also represented.

The genuine Portmadoc slate may be seen and admired at the Stand in the Annexe of the *Maenofferen Slate Quarry Co., Ltd.*, who have extensive quarries at Blaenau Festiniog, North Wales. The slates are of blue-grey colour, very uniform and free from defects. An unusual "sample" is the cut-slate fan, which folds up in the same manner as one of silk. During the day interesting demonstrations are given of splitting slates from the rock and dressing them ready for roofing.

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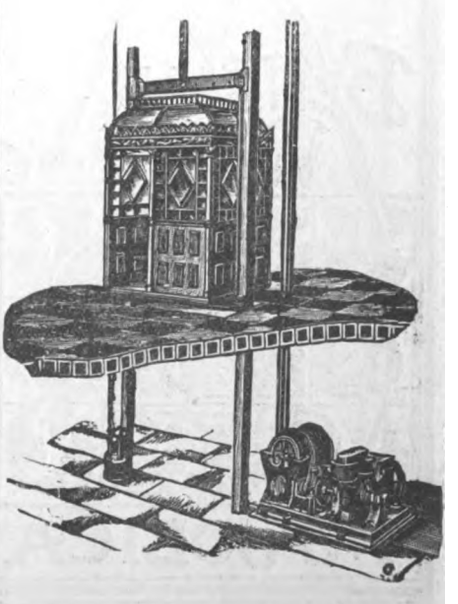
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If the present Building Trades Exhibition has any right to be called "The House Beautiful," it must be mainly through the presence of such firms as *Ripolin, Ltd.*, who play so important a part in house decoration. Stand 102, Row F, is effectively arranged as four interiors to demonstrate the effects procurable with this enamel in gloss and flat finishes, or with the two in combination. The third side, showing a bathroom (with bath fittings supplied by the Standard Sanitary Manufacturing Company), is particularly pleasing. But the whole Stand will give delight to visitors.

Doulton & Co., Ltd., are inseparably connected with sanitary appliances, and of these a selection is shown on their large Stands in the Main Hall Extension. To avoid bewilderment the comprehensive exhibit is divided into sections or rooms. The principal room is a luxurious bathroom completely fitted up with marble-faced walls and floor. There are three other bathrooms on varying lines; one is typical of what might be carried out in a house of moderate rent. It includes a porcelain enamelled cast-iron bath on wheels, so arranged that the tub can be pivoted on to the waste end, thus making it possible to clean the walls and floor—a highly desirable advance on the old fixed bath. Then follow rooms with different lavatory appliances, and one with fittings required for the hydro-therapeutic treatment. The general exhibit is a collective display of the company's manufactures. Then there are tile linings, pipes and fireplaces. Architects will be especially attracted by the Carrara exhibit, a ceramic ware that has enjoyed a comparatively short but highly successful career on large city buildings.

The *Japanol Enamel Company* offer their bath enamel in the confident knowledge that if their directions are carried out entire satisfaction will result after three thin coats have been applied. "Japanol" is a slow-drying enamel, and it is advised that from two to three days should elapse between each coat. It is almost superfluous to mention that the enamel is also made for use on wood, metal, or stone in glossy or flat quality for inside or outside work. A strip of tin coated with "Japanol" may be twisted and bent without producing any sign of a crack. Its wearing powers have gained it a place on the woodwork of ocean liners. The surface presented is admirable to look at and feel.

Messrs. J. A. King & Co. exhibit their well-known "Mack" fire, sound, and vermin proof plaster partitions, showing the slabs keyed for plastering, as well as the smooth faced blocks which require no plastering. The "Mack" slabs, 2¾ inches thick, have been tested to 2,250 degrees Fahr. by the British Fire Prevention Committee. They are also exhibiting the "King" fireproof pumice concrete partitions, and the "Mack" fire-resisting ceiling slabs, which are nailed to wooden joists with large-headed galvanised nails, and then plastered over. The "Mack" fireproof pugging blocks and slabs for wooden floors are made in from 1 inch to 6 inches in thickness, and in any width. They are usually laid on fillets spiked to the joists. The "Mack" fireproof floor-steel construction shown is of "Mack" slabs laid on the lower flanges of the joists, the space above being filled in with concrete or other materials. The space is often left open, and the slabs are laid on the top of the joists. A speciality this year is the "Mack" fire-resisting roof construction, the "Mack" fireproof lathing for encasing columns, girders and stanchions, forming coves, &c. It is made with their plaster in strips applied to canvas; it can be bent to any curve. The steel corner plate for protecting plastered corners is a galvanised steel rail, fixed with metal clips to brickwork. It saves a great amount of labour in plastering, but no plaster screeds are required when the corner plate is used.

The *Clee Hill Granite Co., Ltd.*, show a small selection of setts, macadam and chippings. The setts have been taken up after twenty-five years' use and relaid on the reverse side. The macadam was favourably commented on in the inquiry by the Royal Commission on Motor-cars, and the screenings are much used for footpaths, drives and concrete work. Two months ago the company opened an aerial ropeway three and a half miles long to connect an important extension on the eastern side of Clee Hill with the local light railway. The present output is 125,000 tons a year, and the plant at the Catherton extension is capable of turning out an additional 200,000 tons. The ropeway is one of the longest in the kingdom, and is remarkable for the fact that it was impossible to run it in a straight line between the terminals, necessitating an angle station. The company are now in a position to cope with unlimited orders.



***MAW & CO.** will forward their Pattern Books, or Special Designs, with Estimates for every kind of Wall and Floor Tiling on application. Patterns can also be seen and particulars obtained at the Showrooms of their appointed Agents,*

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"Water Temple and Fountain in the Style of the Eighteenth-century Renaissance" is the official description of the Stand of the *British Stone and Marble Company*, Row C, No. 43. It is entirely of reconstructed stone. By this process quarry *débris* is calcined in closed retorts, the carbonic acid gas generated being collected and liquefied. The lime so obtained is mixed with a proportion of the stone to be reconstructed after it has been reduced to its original grains. The material is then thoroughly mixed in a rotary drum and hydrated. The mass is pressed, and a density can be given to it equal to, or higher than, that of the best quality stone. The product is fashioned whilst in a soft state; after being worked it is placed in a cylinder, a vacuum created, and the carbonic acid gas previously extracted is fed thereto. This permeates the entire block, making the whole crystalline throughout. Building stone of every description can be obtained in this manner at a substantial reduction on the cost of the quarry-wrought product. More than one kind has been introduced on the sculpturesque Stand. Very favourable expert reports have been made concerning the chemical nature and resisting powers of the stone. The British Stone and Marble Company, the sole owners of the process, wish to emphasise that their reconstructed stone is different to an artificial product, for it contains no other cementing medium than that found in the quarried material, and that nothing is added that is not present in the natural stone.

On one corner of *W. Oliver & Sons', Ltd.*, Stand, No. 47, Row L, is a very handsome solid Cuba mahogany door, cut in the solid. It has six panels with an open fanlight. The figuring on the wood is handsome, and the polisher has worked the wood up to a rich dark colour. The combination of man's and nature's work is most admirable.

The half-timbered pavilion of *Messrs. Machin & Koenig* shows the different uses of Speaker's "Eternit" asbestos slabs, which are applicable for roofing slates and for ceilings, inside walls and partitions, as well as for fire doors, railway-carriage and motor-box linings. There are also illustrated the employment of compo-board and laminated panels.

The *Well Fire and Foundry Company* have a striking series of fireplaces which at once arrest the attention by their artistic appearance even of those who are not able to appreciate at a glance the scientific principles involved in their patented Well and Pyramid fires. It is enormously true of fireplaces that those who buy in haste will repent at leisure. It is comparatively simple to cover up mistakes made in the selection of wall papers, paint, carpets and other household accessories; but once a fireplace is installed it is likely to be a permanency. Therefore it is advisable to get a general idea of what the best firms offer before deciding. Such an inquirer cannot fail to derive pleasure from the products of this firm. Their designs are conspicuous for their studied simplicity, whether the fireplaces are in steel or tiles, marble or faïence, and show genuine craftsmanship. The same remark applies to the mantlepieces. Stand 100, Row F, has some of its finest articles in the inner aisle or inside.

"Corketa" is a new departure of the *British Cork Asphalte, Ltd.* In the past their exhibit has been more conspicuous for utility than decoration; this year the material assumes a really ornamental appearance. "Corketa" are tiles made in various colours, having the effect of marble or terra-cotta while retaining all the same advantages of cork asphalte. "Corkite No. 1" is intended for pedestrian indoor work where silence is the first consideration; "Corkite No. 2" is a cheaper material. Another novelty is asphaltine, a cheap and enduring paint for metals. Cork asphalte, the parent of all these, still maintains its position as paving for the most trying situations.

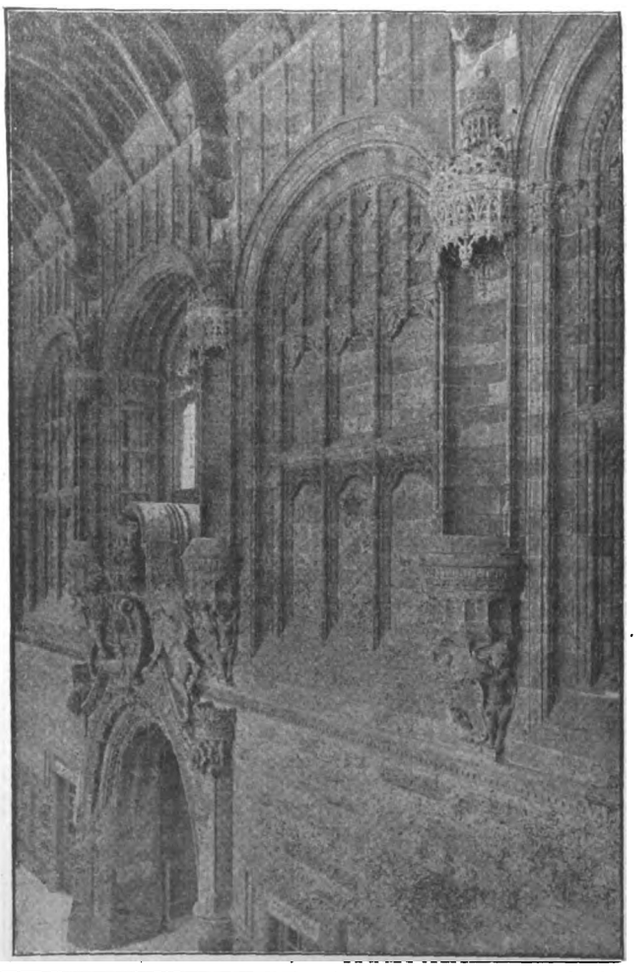
The "H. B." system of reinforced brickwork is shown by *Messrs. Richard Johnson, Clapham & Morris*. The reinforcement, consisting of a galvanised steel wire-netting band from 2 inches to 2½ inches wide, is inserted in the mortar joints. In a recent test an "H. B." reinforced 5-foot cantilever wall, 3 feet in height with a 4½-inch out wall, a 1½-inch cavity and a 3-inch inner wall, did not break until a load of 10,640 lb. had been imposed. The 7½-inch partition wall consists of two "H. B." brick-on-edge walls, with a 1½-inch cavity. Johnson's reinforced concrete system, on direct lines of tension, establishes a continuous bond in the concrete, so as to make a monolithic construction.

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"Sirapite" is a cement plaster manufactured from gypsum by the *Gypsum Mines, Ltd.*, at Mountfield, Robertsbridge, Sussex, and Kingston-on-Soar, near Derby, and of which about 254,000 tons have been sold. Their Stand in the Annexe consists of a pavilion architecturally designed in grey sirapite and sand on patent block partitions. The interior walls show the plaster finished in a variety of ways, such as polished and treated with different paints and enamels. One of their large contracts was for the London Hospital; another was for the King Edward VII. Sanatorium at Midhurst. The pieces of sculpture are in the company's Italian fine plaster. The office walls are finished in white Keene's cement.

The *Ajax Sanitary Co., Ltd.*, show a range of lavatories, sinks and baths fitted with an ingenious and simple form of shutter waste and overflow. This enables these fittings to be kept in a state of high and even surgical cleanliness. There is no concealed part whatever about those parts of the fittings so liable to accumulate filth and dangerous matter. The shutter is readily removed, and the whole overflow and waste are rendered easily accessible. The lavatory possesses a feature of having the taps at the corners of the basin, thereby giving ample head room and convenience. In the lavatories and sinks the shutter is kept in position merely by the pressure of water in the basin, and when removed the fitting empties itself silently and rapidly, leaving a perfectly clean basin. In all cases the traps of the fittings are all one piece with the fitting, so there is no joint on the top side of the trap to get filthy. As a fitting for cleanliness nothing more could be required. On the Stand is their patent "Concentric" door latch, designed to withstand specially hard wear. It is reversible, works smoothly, and the handle has no back lash no matter how hard the door is slammed.

The *Van Kannel Revolving Door Company, Ltd.*, are exhibiting at Stand 53, Row C, an entirely new form of revolving door, which has been designed to ensure the safety of the public in the event of a panic arising in large buildings. At the same time it retains all the advantages of the ordinary revolving door in preventing draughts, dust, smells, &c., entering through the doorway and thereby rendering halls, vestibules, &c., uninhabitable in cold weather. No knowledge of mechanism is necessary to collapse the new panic revolving door; the pressure of a rush of persons will do it, no matter in what position the wings of the revolving door may be. The wings all fold neatly together like a fan, and the sections of the circular casing can also be made to collapse outwards. From the collapsed position the door can be put back into its original position in a few seconds. One of these panic revolving doors has been inspected by the fire brigade and the London County Council, and many orders have already been received, including two for the new Victoria and Albert Museum.

"Minerva" Paint is prominent in the temple to Minerva erected by *Pinchin, Johnson & Co., Ltd.* Several panels show the paint from priming to finish. The actual Stand is enamelled in "Satinette," with dazzling effect. Some of the doors have been painted with "Minerva" and finished with Venus copal varnish.

C. A. Peters, Ltd., supply the well-known wood preservative "Carbolineum," which has been used for a quarter of a century. A good many years ago the manager of the signal department of the Midland Railway buried two blocks of deal. After three years they were dug up, and it was found that the piece untreated was half decayed away, while the piece done with "Carbolineum" was perfectly preserved. "Okin-Vash" is a new paint-cleaner, which instantaneously removes all dirt, without the least injury to the surface. Also shown are the portable all-metal stoves, which require no chimney or flue, and consume the patent "Carbotron." The fire will burn twelve hours without attention. The fuel is all enclosed, and cannot possibly cause a fire. The stoves are recommended by insurance companies.

Exhibits like that of *Messrs. Campbell & Christmas*, St. Oswald's Studios, West Brompton, make a welcome change to the very utilitarian character of most of the Stands at Olympia. It certainly should revive any visitors who get rather overwhelmed by technicalities concerning bricks, sanitary ware, fires, floor construction, and so on. There is always a pleasure in seeing well-designed stained and leaded glass. One interesting use is for the glass dome in the ceiling. Iron casements and mosaic work give additional interest, not to mention the cartoons and sketches required for studio use.

On Stand 83, Row E, *Messrs. Hofler, Ltd.*, are exhibiting (in the same position occupied by them as at the last Exhibition) a fine Georgian mantelpiece carved in Austrian oak, with swags and drops round the centre frame, forming a very effective contrast to the oak. The centre panel is filled up by a replica of the portrait of Lord Chesterfield. To display the art metal work from their Chiswick forge they have erected a small staircase and platform, having on one side a length of balustrading of French design in polished steel and bronze of the Louis XVI. period, whilst on the other is a wrought-iron balustrading in the Georgian style. For this class of work the firm have earned a well-merited distinction. The whole of the metalwork has been executed at their works, the Chiswick Forges, Young's Corner, Hammersmith, where clients are cordially invited to inspect their orders during progress. Their exhibit also comprises a collection of Austrian oak panelling and chimneypieces, of superior execution and finish, at prices which compare very favourably with any on the market for the same class of work. On Stand 84, in the same row, the firm exhibit their Sheet Lead Damp Course, which has been very extensively used by His Majesty's Government, one large contract being for the new Admiralty dockyards at Malta.

The Lock Woven Mesh System of reinforcement shown by *James H. Tozer & Son, Ltd.*, is conspicuous by the fact that the wire mesh is locked or knotted at the intersection of the tension and transverse wires, making them immovable and establishing a mechanical bond. The material is manufactured of drawn steel wire with elaborate care. Messrs. Tozer & Son lay stress on the fact that they do not claim to construct heavy beams, cantilevers or columns with the mesh; but they do claim that it effects great economy if used for roofs, floors, walls, sewers and the like. In practice it has been found that the labour cost in handling and laying the lock woven mesh varies between one-eighth and one-half penny per square yard. The Stand has four Doric columns, with pedestals and entablature; a short length of egg-shape sewer, 60 inches by 40 inches; and a length of retaining wall, 5 feet 6 inches high—all of which are reinforced with lock woven mesh. The structure, raised some 5 feet above ground, may almost be called homogeneous, for the mesh of the floor and roof are joined by a lighter mesh, plastered over to form the walls. Messrs. Tozer have prepared their calculations on lines identical with the recommendations of the Institute, although they consider the factor of safety in their material is higher than that provided for in the R.I.B.A.

The *Patent Indented Steel Bar Company, Ltd.*, have been prospering since the previous Building Exhibition, and now possess offices at Manchester, Birmingham, Leeds and Glasgow, and have erected many important structures with the Indented Bar reinforcement, some of them according to designs made by the company. A unique work was the Cleethorpes circular water-tower, 174 feet high and holding 250,000 gallons; the bars were used for the vertical and horizontal reinforcement throughout. A recent work was the Selfridge Stores, which was completed in record time despite serious initial difficulties.

The *Armoured Tubular Flooring Company* exhibit at Stand No. 41, Row C, a strip of reinforced concrete fireproof flooring constructed in their armoured tubular system. The floor is erected without the aid of centring, and constructed of concrete webs reinforced with a steel bar and of concrete tubes fitted between webs. The whole is finished with a thin layer of concrete. An opening has been left to demonstrate how this flooring can be trimmed for stairs, lifts, skylights, &c. The upper side of the floor shows some finishes that may be applied; a small area left altogether uncovered exposes the webs and tubes.

Any exhibit of the *England Works, Leeds*, may be safely counted upon to present some entire novelty, or at the least, an improvement on a previous patent. For 1909 they have two new ideas (1) the "England" steel skylight and casement frames; and (2) the "England" emergency bolt for double-action doors. Their balanced self-opening skylight is operated by a thin blind-cord, the weight of the frame being counterpoised by an adjustable balance weight. It automatically locks in any position when the cord is released. The contrivance must commend itself to all who know the trouble of working the ordinary skylight. Another fitting of interest is a folding wire partition, suitable for any cloakroom or lavatory that has sometimes to be partly screened off. They hang on transom, or run on a bottom track. The panic bolt is a knob which releases the lock if struck smartly.

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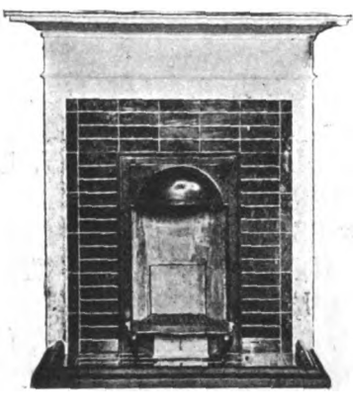
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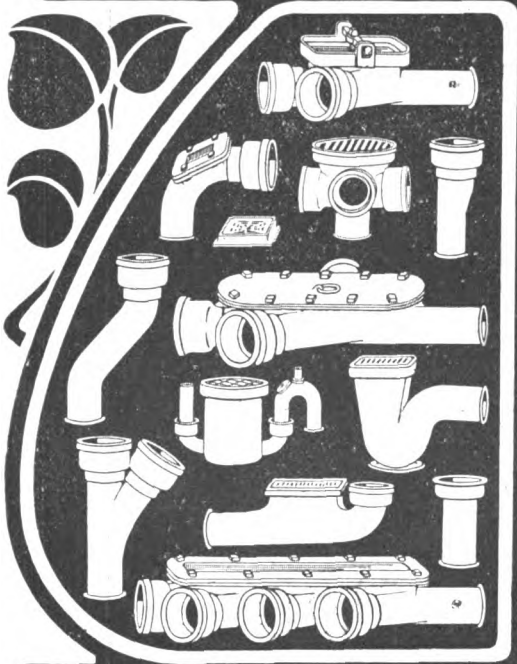
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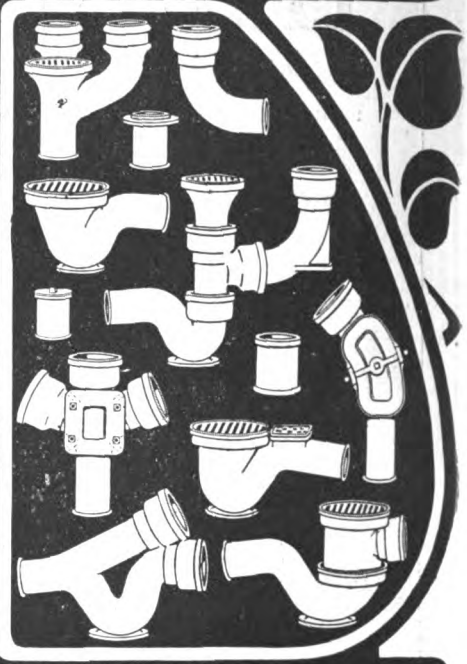
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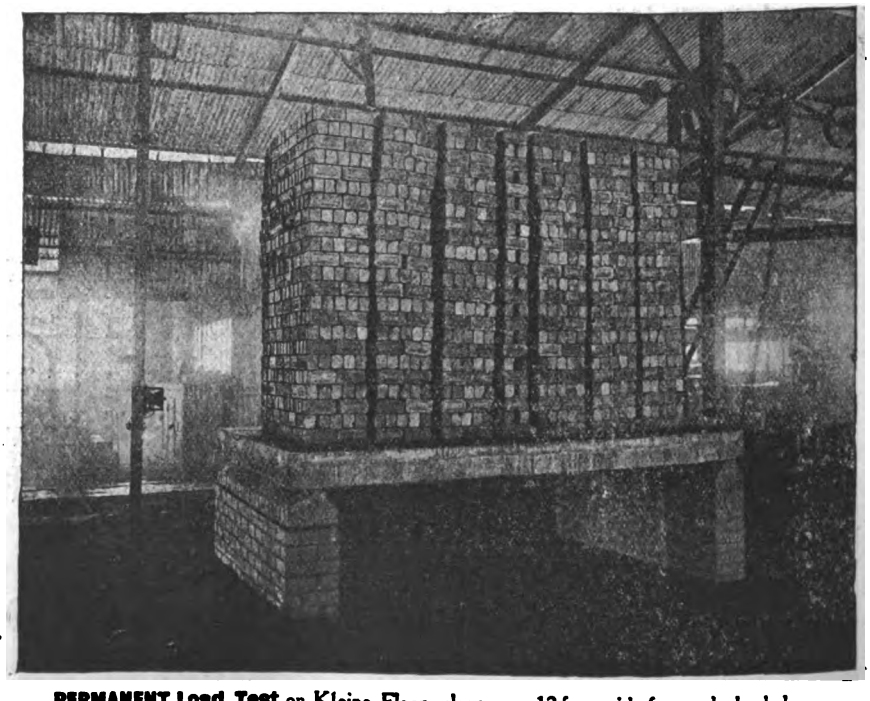
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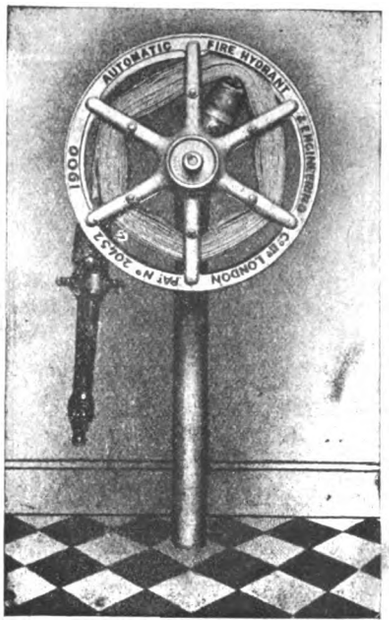
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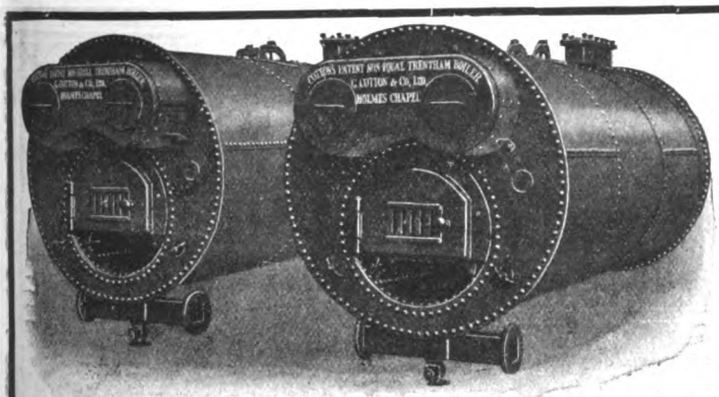
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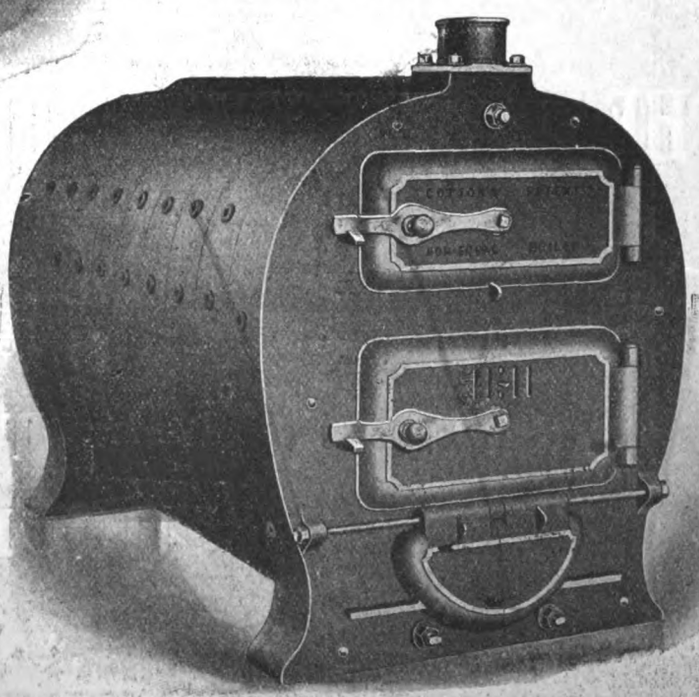


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Under no circumstances whatever can the Proprietors of this Journal guarantee alteration of copy if received after the first post on Tuesday mornings, and no proofs can be submitted if copy arrives later than first post on Saturday mornings.

EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

TENDERS, ETC.

**** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITIONS OPEN.

GLASGOW.—July 31.—The patrons of the Royal Incorporation of Hutchesons' Hospital invite designs for laying out for feuing and building about 195 acres of their lands of Thornliebank, Eastwood. Premiums of 100*l.*, 75*l.*, 50*l.* and 25*l.* will be awarded. Deposit 3*l.* 3*s.* Messrs. Hill & Hoggan, 194 Ingram Street, Glasgow.

GRIMSBY.—July 30.—For the extension of the town hall, at an estimated cost of 26,000*l.* Premiums of 250*l.*, 150*l.* and 100*l.* will be awarded. An eminent architect will act as assessor in conjunction with the borough engineer. Deposit 2*l.* Apply to Mr. H. Gilbert Whyatt, A.M.I.C.E., borough engineer, Town Hall, Grimsby.

MOLESEY.—June 1.—The East and West Molesey Urban District Council invite plans, with specifications and estimates, for an isolation hospital. Mr. D. Cann, Clerk, Council Offices, East Molesey.

MOSSLEY.—May 24.—For the erection of a mixed elementary school to accommodate 550 children, and an infant school for 300 infants, on land adjoining Mill Lane. Premiums 15*l.* 15*s.* and 5*l.* 5*s.* Borough Surveyor, Town Hall, Mossley, Lancs.

READING.—June 15.—The Berkshire County Council invite designs for offices, committee rooms, &c., on the Forbury, Reading. Mr. Mervyn Macartney, F.R.I.B.A., assessor. Premiums of 100*l.*, 75*l.*, and 50*l.* Deposit 1*l.* 1*s.* Apply to Mr. J. Fred Hawkins, county surveyor, Bank Chambers, Cross Street, Reading.

WHITBY.—The North Riding of Yorkshire County Council education committee invite designs for a secondary school. Mr. Paul Waterhouse, assessor. Apply to the Secretary, Education Offices, County Hall, Northallerton.

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Belfast.—May 10.—For erection of additional buildings on their Purdysburn estate, for the asylum committee. Deposit 4*l.* 4*s.* Messrs. Graeme-Watt & Tulloch, architects, 77A Victoria Street, Belfast.

Birmingham.—May 6.—For erection of new cells, &c., at the police station, Ladywood Road. Deposit 3*l.* 3*s.* Mr. Henry E. Stilgoe, M.I.C.E., city engineer and surveyor, the Council House, Birmingham.

Bradford.—May 3.—For the various trades required in erection of a textile school and engine-house in connection with the technical college. Mr. Reginald G. Kirkby, A.R.I.B.A., F.S.I., city architect, Whitaker Buildings, Brewery Street, Bradford.

Bristol.—May 3.—For repairs to the main roof of the Bristol Joint Station, for the Great Western and Midland Railways joint committee. The Engineer, Paddington Station.

Broughty Ferry, near Dundee.—May 5.—For the reconstruction and enlargement of the lifeboat house and the construction of a slipway at Broughty Ferry, near Dundee, in the county of Forfar, N.B., upon the foreshore of the River Tay and land adjoining, for the Committee of Management of the Royal National Lifeboat Institution. Mr. Jas. Hunter, junior, 63 Reform Street, Dundee, or at the office of the engineer and architect to the Royal National Lifeboat Institution, Mr. W. T. Douglas, M.Inst.C.E., 15 Victoria Street, Westminster, London, S.W.

Camborne (Cornwall).—May 8.—For proposed addition to the Basset Road, Camborne, Council school. Mr. Sampson Hill, architect, Green Lane, Redruth.

Cardigan.—May 1.—For erection of two additional classrooms at the County school, Cardigan. Mr. James Stephens, clerk to the managers, 3 Green Street, Cardigan.

Carlisle.—May 7.—For the taking down of the whole of the erections at Devonshire Park Ground, Catholic Lane, and the re-erection of same at Brunton Park Ground, off Warwick Road, Carlisle. Mr. H. Foxall, architect, 54 Lowther Street, Carlisle.

Darwen (Lancs.).—May 3.—For erection of typhoid wards, discharging blocks, with offices, &c., in connection therewith. Mr. R. W. Smith-Saville, C.E., borough engineer.

Ditton.—May 22.—For the erection of an elementary school for 120 scholars at Ditton, near Widnes. Deposit 2*l.* Mr. Henry Littler, county architect, 16 Ribblesdale Place, Preston.

Durham.—May 18.—The County Council invite sole tenders for new Council school at Haverton Hill, for about 900 children. Mr. W. Rushworth, Shire Hall, Durham. For Council school at Dunston (Glebe Estate), for about 800 children. Messrs. J. Potts & Son, architects, 57 John Street, Sunderland. For alteration at Washington Biddick Council school. Plans and specification only, Mr. F. E. Coates, Shire Hall, Durham.

Enfield.—May 12.—For erection of a public library on land adjoining the Hertford Road, Enfield Highway. Deposit 2*l.* 2*s.* Mr. Richard Collins, surveyor, Public Offices, Enfield.

Falmouth.—May 8.—For proposed additions and alterations at the Falmouth County High School. Mr. Sampson Hill, architect, Green Lane, Redruth.

Halifax.—May 8.—For the mason, carpenter and joiner, ironfounder, and slater's work required in alterations at Raglan Street Dyeworks. Messrs. Chas. F. L. Horsfall & Son, architects, Lord Street Chambers, Halifax.

Hatch Beauchamp, &c. (Somerset).—May 3.—For the taking down and rebuilding of the following two small bridges: Bottle bridge, Hatch Beauchamp—new reinforced concrete arch, 23 feet span, and abutments, masonry walls, &c.; Donyatt bridge, near Ilminster—new masonry abutments, walls, &c., and reinforced concrete beams and floor, 12 feet span. Mr. H. T. Chapman, county surveyor, 1 Chapel Row, Bath.

Hetton-le-Hole.—May 6.—Whole or separate tenders are invited for erection of a house and business premises in

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Richard Street. Messrs. Wm. & T. R. Milburn, F.R.I.B.A., architects, 20 Fawcett Street, Sunderland.

IRELAND.—May 1.—For erecting four dwelling houses and stabling at Doagh. Mr. W. D. R. Taggart, architect, 2 Wellington Place, Belfast.

IRELAND.—May 8.—For building and fencing nineteen single labourers' cottages for the Milford Rural District Council. Mr. S. Watters, clerk, Milford, County Donegal.

IRELAND.—May 20.—For executing structural improvement, extensive repairs, and painting of Irvinestown Church, parish of Derryvullen North. Mr. Robert Wilson, hon. secretary, Castle Irvine N. School, Irvinestown.

KEIGHLEY.—May 6.—For the joiners' and carpenters' work required in erection of buildings at the proposed Holiday Camp at Humphrey's Head, near Kents Bank. Mr. David W. Weatherhead, architect and surveyor, Low Street, Keighley.

KING'S LYNN.—May 1.—For carrying out certain alterations to premises, Purfleet Street, Lynn. Messrs. William Jarvis & Son, architects, Paradise Parade, King's Lynn.

KNUTSFORD.—May 12.—For the work and materials in the excavating for and the erection of a brick retort-house, for the Light and Water Co. Deposit 1*l.* 1*s.* Mr. William Newbigging, engineer, 5 Norfolk Street, Manchester.

LONDON.—May 1.—For erection of a permanent school to accommodate 1,420 children on the Crowland Road site, for the Tottenham education committee. Mr. G. E. T. Laurence, architect, 22 Buckingham Street, Adelphi, W.C.

LONGDOWN.—May 6.—For erection of a house and buildings on the Cavendish Park Estate, Longdown, Devon. Messrs. E. H. Harbottle & Son, architects, County Chambers, Exeter.

MAIDENHEAD.—May 3.—For erection of dressing-boxes, dressing-sheds and offices at the new swimming-bath in East Street. Mr. Percy Johns, borough surveyor, Guildhall, Maidenhead.

MILFORD HAVEN.—May 15.—For erection of a Congregational church, schoolrooms, vestries and caretaker's cottage. Deposit 1*l.* 1*s.* Messrs. D. Edward Thomas & Son, architects, 17 Victoria Place, Haverfordwest.

NEWQUAY (CORNWALL).—May 8.—For erecting County school at Newquay, for the Cornwall education committee. Mr. B. C. Andrew, architect.

SCOTLAND.—May 3.—For the mason, carpenter, slater, plumber, plaster and painter works of additions to U.F. Church in Ellon, Aberdeen. Messrs. Wilsons & Walker, architects, 181A Union Street, Aberdeen.

SCOTLAND.—May 3.—For the heightening and pointing of the existing boundary wall at the District Asylum, Larbert, Stirling. The Clerk of Works.

SCOTLAND.—May 18.—For erection of a rocket life-saving apparatus house at St. Abbs, for the Board of Trade. The Coast Guard Station at Berwick.

STALYBRIDGE.—May 3.—For building a higher elementary and technical school at Waterloo Road (except plumbing, glazing and painting). Deposit 3*l.* 3*s.* Mr. George Rowbottom, architect, Portland Chambers, Stalybridge.

STANSFIELD.—May 6.—For the various works required in erection of a minister's house at Eastlee. Messrs. Sutcliffe & Sutcliffe, architects, Todmorden and Hebden Bridge.

THORNBURY (YORKS).—May 1.—For erection of a warehouse, &c., at Thornbury Street, Thornbury, Bradford. Mr. Benjn. Dobson, architect, 5 Charles Street, Bradford.

TODMORDEN.—May 4.—For the various works required in alterations and additions to joint-stock mill, Vale Street. Mr. T. H. Mitchell, architect, Strand, Todmorden.

WALES.—May 1.—For erection of three shops for Mr. T. P. White, Hill View, Maesycwmmer.

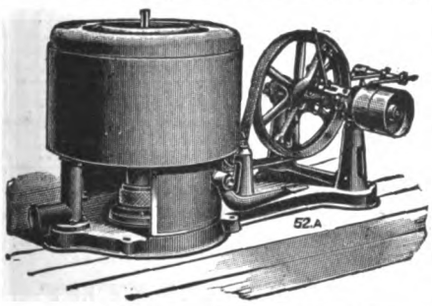
WALES.—May 3.—For erection of a manager's house at Oakdale, Mon., for the Oakdale Navigation Colliery Company, Ltd. Mr. A. F. Webb, architect, High Street, Blackwood.

WALES.—May 3.—For erection of a porter's lodge at the isolation hospital, near Tonteg, Llanwit Fardre, for the Pontypridd Urban District Council. Mr. W. E. Lowe, surveyor to the Council, Municipal Buildings, Pontypridd.

WALES.—May 4.—For erection of two covered playsheds at Abermorlais School, Merthyr. The Deputy Surveyor, Town Hall.

WALES.—May 4.—For erection of a grand stand in the Sophia Gardens Field, Cardiff, for the National Pageant of

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Wales. Deposit 1*l.* 1*s.* Messrs. William Ware & Williams, architects, 6 Pembroke Terrace, Cardiff.

Wales.—May 4.—For renovations to the parish church at Llanvapley, near Abergavenny. Mr. B. J. Francis, architect, Abergavenny.

Wales.—May 8.—For erection of a vicarage at Mydrim, near St. Clears. Mr. Hugh Thomas, architect and surveyor, 9 Victoria Place, Haverfordwest.

Wales.—May 8.—For erection of twenty-five houses at Edwardsville, Treharris. Mr. William Dowdeswell, architect, Treharris.

Wales.—May 10.—For erection of a Council school to accommodate 100 children, at Magor, near Newport. Deposit 2*l.* 2*s.* And for a new Council school to accommodate forty-eight children, at Whitebrook, in the parish of Llandogo, near Monmouth. Deposit 1*l.* 1*s.* Mr. C. Dauncey, secretary, County Council Offices, Newport, Mon.

Wales.—May 10.—For erecting a residence and stables at Pembrey, near Llanelly. Deposit 3*l.* 3*s.* Send names to Mr. Arthur S. Williams, M.A., architect, Llandilo.

Wales.—May 10.—For erection of thirty or more houses, together with boundary walls and drains, for the Turberville Building Club at Pont Rhondda, Llwynypia. Messrs. W. Morgan Lewis & T. Naunton Morgan, architects and surveyors, Dunraven Street, Tonypandy, and Dyffryn Chambers, Pontypridd.

Wales.—May 13.—For erection of a church at Caerau, near Maesteg, to seat 545 persons. Mr. George E. Halliday, F.R.I.B.A., 19 Castle Street, Cardiff.

Wealdstone.—May 4.—For taking down and removing from the Council's sewage farm a large framed and galvanised iron building and re-erecting the same as a pavilion in the Recreation Ground. Deposit 10*s.* Mr. H. Walker, surveyor, Council Offices, Wealdstone.

White-le-Head.—May 5.—For the several works required in alterations and additions to the Bird Inn, White-le-Head. Mr. T. H. Murray, architect and surveyor, Consett.

Winchester.—May 17.—For works in connection with new county offices. Persons desirous of tendering may inspect the specifications, conditions of contract and plans, and obtain copies of bill of quantities of contract No. 1; also obtain copies of plans, section and specification, and inspect the conditions of contract No. 2, and all other necessary information of Mr. W. J. Taylor, county surveyor, the Castle, Winchester. Contract No. 1, erection of a block of buildings, containing fifty-one office and store rooms, &c., mostly flint-faced with stone dressings. Deposit 10*l.* 10*s.* Contract No. 2, construction of about 2,000 square yards of Hennebique concrete flooring in the new building. Deposit 2*l.* 2*s.*

Windermere.—For erection of new building room and heating apparatus, Outgate, Hawkshead, Windermere. Mr. J. Stalker, M.S.A., architect, 57 Highgate, Kendal.

Withernsea.—For erection of a large skating rink and recreation hall, together with other buildings, at Withernsea, near Hull. Send names to Messrs. Freeman, Son & Gaskell, architects and surveyors, Albert Chambers, 11 Carr Lane, Hull.

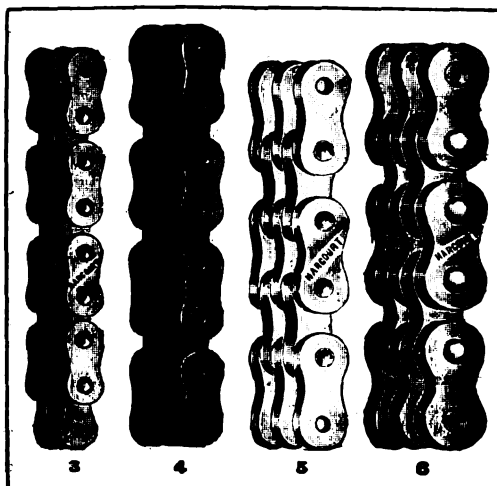
Wrexham.—May 5.—For the completion of the erection of the Alexandra schools for the education committee. Messrs. Burrell & Willey, architects, Market Place Chambers, Durham.

York.—May 1.—For certain works to be executed at the large hall of the Exhibition Buildings, York, for the Corporation. Mr. F. W. Spurr, city engineer, Guildhall, York.

The Leeds City Council have appointed a committee to wait upon members of Parliament in London with a view of the amendment of Clause 44 of the Housing and Town-Planning Bill relating to back-to-back houses. The town clerk has prepared a statement, in which it is pointed out that the type of back-to-back houses now erected is very different from the old type found to be objectionable. The working-classes are stated to have an aversion from tenement houses, which are the only alternative to back-to-back houses. From 1900 to 1908 as many as 17,539 dwelling-houses were erected in the city, and of these 9,826 were back-to-back houses. The Leeds Corporation consider that the prohibition of the erection of back-to-back houses would render the position of the working-classes worse than it is to-day so far as housing is concerned.

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The New Library, Pollokshields.
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For erecting new business premises. Mr. T. E. TAYLOR, architect and surveyor, Lanchester.

Ward	£980 0 0
Mordue	919 0 0
Collins	918 18 0
French	880 0 0
Duffy	860 0 0
BULMER, Annfield Plain (*accepted*)	850 0 0

ASHBORNE.

For sewerage and sewage disposal works, for the Urban District Council. Mr. W. H. RADFORD, C.E., engineer, Albion Chambers, King Street, Nottingham.

FIRTH & Co., 13 New Street, Leicester (*accepted*)	£11,200 0 0

ASTON MANOR.

For alterations for, and for outside staircases at, Albert Road, Alma Street, Upper Thomas Street and Vicarage Road Council schools, Aston Manor. Mr. J. W. MEREDITH, architect, Aston Manor.

Mackenzie & Cane	£798 0 0
Smith	748 0 0
Morris	724 0 0
Wood	713 3 5
Garfield	694 0 0
Hulbert & Cadbury	693 8 10
Trentham	686 0 0
Jordan	685 0 0
Fenwick	680 0 0
Bishop	659 0 0
COE & SON, Avenue Road (*accepted*)	655 0 0

BIGGLESWADE (BEDFORDSHIRE).

For erection of grocer's shop and premises, High Street. Mr. THOMAS COCKRILL, A.M.I.C.E., Biggleswade, Bedfordshire.

Wright	£590 0 0
Wrycroft & Sons	582 10 0
BARTLE & SON, Potton, Beds. (*accepted*)	577 0 0

BOXMOOR.

For the erection of stables at Feldenhurst. Mr. A. E. BULLOCK, 43 Chancery Lane, W.C.

Lear	270 0 0
Watermann	264 0 0
Robertson	258 0 0
How	238 15 4
Brown (*accepted*)	170 0 0

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Blichfeldt & Co.	£303 4 2
Griffiths & Co.	303 4 2
Brookes	299 5 5
A. & F. Manuelle	295 6 8
Jarrett	287 9 1
White & Co.	283 10 5
WHITE & Co., Bishopsgate Street Within, E.C. (alternative tender) (*accepted*)	251 15 10

For master's house and connecting bridge. Mr. CHAS. S. YATES, architect, Fenchurch Street, E.C.

	Master's House.	Bridge.
Mark & Watkins	£1,263 0 0	£104 14 0
Price Bros.	1,094 10 0	135 10 0
Jarvis	1,080 0 0	116 0 0
Fuggle	1,044 4 10	109 11 4
Mirriams	994 0 0	102 0 0
Goodburn	927 7 6	100 14 8
Rice & Son	899 0 0	92 6 0
Bloxham	897 0 0	90 15 0
Wood & Son	838 0 0	91 0 0
May	809 0 0	84 0 0

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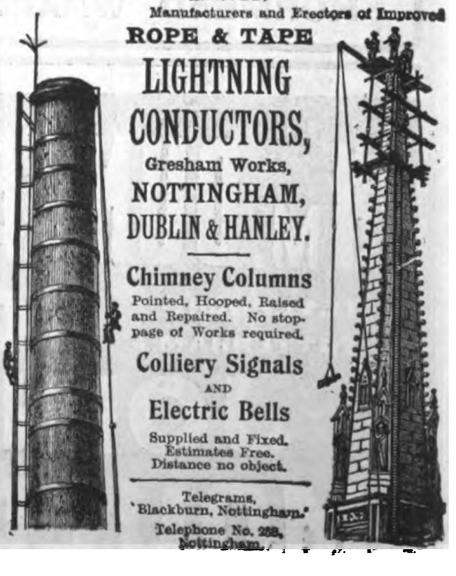
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Groves	£1,903 8 9
Fenwick & Co.	1,902 9 6
Craven	1,850 1 6
Whorley	1,831 8 10
George	1,820 0 0
Black	1,744 12 0
HENDERSON, Jarrow-on-Tyne (*accepted*)	1,736 0 0
Saint	1,579 8 0

CLARE (SUFFOLK).

For works in connection with a new sewer to be laid in the parish of Clare, for the Clare Rural District Council.

BATE & Co., Slough, Bucks (*accepted*)	£173 0 0

DARLINGTON.

For supply of a 500 k.w. electric generator driven by an exhaust steam turbine, for the Darlington Corporation Electricity Station.

Electrical Co.	£4,150 0 0
Richardsons, Westgarth & Co.	3,980 0 0
Mitchell	3,950 0 0
Musgrave & Sons	3,898 0 0
Siemens Bros. Dynamo Works	3,860 0 0
Willans & Robinson	3,800 0 0
British Thomson-Houston Co.	3,505 0 0
Electric Construction Co.	3,260 0 0
Do. (alternative)	3,320 0 0
Do. (alternative	3,375 0 0
Fraser & Chalmers	3,228 0 0
Howden & Co.	2,958 0 0
Bellis & Morcom	2,880 0 0
Parsons & Co.	2,850 0 0
British Westinghouse Electric and Manufacturing Co.	2,670 0 0
Brush Electrical Engineering Co.	2,000 0 0

HALTWHISTLE (NORTHUMBERLAND).

For the construction of about 2,500 yards of 9-inch and 6-inch glazed earthenware pipe sewers with manholes, &c., a cast-iron inverted syphon under the Irthing, and other works for the sewerage of Gilsland, together with sewage-disposal works. Mr. J. E. PARKER, A.M.I.C.E., Newcastle-on-Tyne.

Peart & Co.	£2,002 2 0
Laing	1,810 0 0
Marshall & Co.	1,745 18 6
Brebner	1,673 15 0
Nixon	1,434 15 7
Murray	1,348 1 0
Engineer's estimate	1,310 0 0
Kennedy, jun.	1,309 9 2
Lant	1,295 0 0
Henderson	1,196 10 0
ROBSON, Newcastle-on-Tyne (*accepted*)	1,176 9 0

HANDSWORTH (STAFFS.).

For making Barn Lane. Mr. H. RICHARDSON, A.M.I.C.E., surveyor.

Improved Wood Pavement Co.	£289 0 0
Wood	249 0 0
Thorpe	210 0 0
Tarmac, Ltd.	207 1 0
Currall, Lewis & Martin	198 0 0
Law	196 1 0
TRENTHAM, Birmingham (*accepted*)	168 3 6

LONDON.

For making-up and paving Old Oak Road (part of), for the Hammersmith Borough Council. Mr. H. MAIR, borough surveyor.

Adamant.

Boyer	503 0 0
Wilson	478 0 0
Woodham & Sons	455 0 0
Mowlem & Co.	420 0 0
Morecroft	409 0 0
Adams	398 0 0
Wimpey & Co.	379 0 0
Watson	300 0 0

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LONDON—*continued.*

Indurated.

Boyer	£508	0	0
Wilson	475	0	0
Woodham & Sons	459	0	0
Mears & Son	420	0	0
Mowlem & Co.	418	0	0
Adams	412	0	0
Morecroft	409	0	0
French & Co.	399	0	0
Wimpey & Co.	379	0	0
Watson, Southall (*accepted*)	300	0	0

MILFORD HAVEN.

For erection of a shop and alterations and additions to the Grimsby Stores on the Docks, Milford Haven. Mr. C. L. Blethyn, architect, Milford Haven.

Cole & Sons	£890	0	0
Adams	885	6	0
Scott	826	10	0
Lloyd & Co.	794	0	0
Heatherley & Co.	760	0	0
Hayward & Wooster, Bath (*accepted*)	697	0	0

MORLEY (YORKS.).

For the various works (except plumbers') in erection of additional premises, Prospect Mills, Morley. Mr. T. A. Buttery, F.I.A.S., Queen Street, Morley, and 1 Basinghall Square, Leeds.

Accepted tenders.

Mason.

Sykes, Morley	£418	5	5

Joiner.

Toothill & Balmforth, Bradford	420	0	0

Plasterer.

Wilson, Morley	115	0	0

Slater.

Rogerson, Morley	84	0	0

Ironfounder.

Las & Son, Gomersal	126	17	6

MIDDLESBROUGH.

For the erection of a transporter bridge across the Tees. The Cleveland Bridge Co., Ltd., engineers, Darlington.

Arrol & Co., Glasgow (*accepted*)	£69,126	2	11

NEWBOLD VERDON (LEICS.).

For erecting an elementary school, &c., for 140 children. Mr. E. G. Fowler, architect, County Education Office, Leicester.

Harding	£1,810	18	0
Martin	1,756	0	0
King & Ridley	1,748	0	0
Faulks	1,748	0	0
Wileman	1,738	0	0
Moss	1,732	15	0
H. H. Garlick	1,718	0	0
Shipman	1,717	17	0
Haycock & Sons	1,700	0	0
Rourke	1,685	0	0
Griffin Bros.	1,675	10	0
Chapman	1,649	0	0
Cole & Sons	1,640	1	6
Oldershaw	1,638	0	0
Potter	1,632	9	9
E. W. Garlick	1,628	10	0
Fox	1,618	10	0
Sleath, Rothley (*accepted*)	1,557	10	0

STEVENAGE (HERTS).

For erecting a dwelling-house, bakehouse, stables, mealhouse, &c. Mr. J. Shilcock, architect, Hitchin, Herts.

Reavall	£998	0	0
Newton	963	0	0
Launder	947	0	0
Willmott & Sons	939	0	0
Austin & Sons	929	5	0
Dearman	896	15	0
Bailey & Co.	859	0	0
Shrouder & Matthews	827	0	0

NOTTINGHAM.

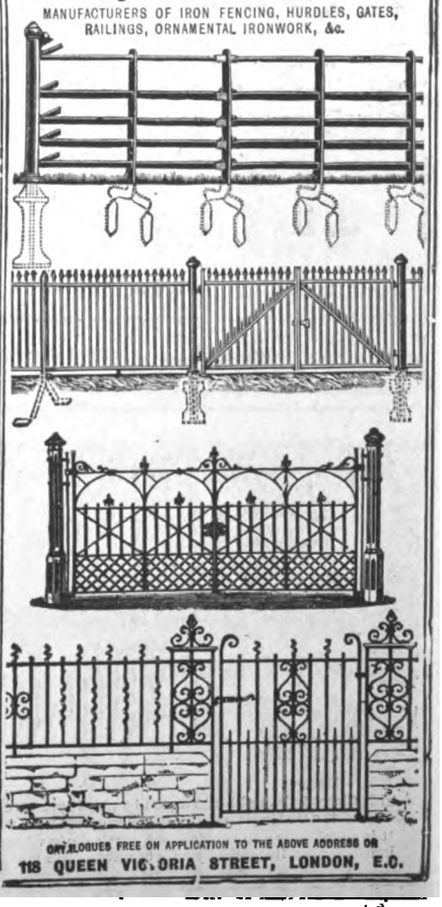
For the erection of a school in Stanley Road.

Crane (*accepted*)	£8,587	0	0

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NUNEATON.

For erecting public slaughter-houses in St. Mary's Road. Mr. F. C. COOK, borough surveyor, Nuneaton.

Contract No. 1.

Higgs	£1,544 0 0
Kelly & Sons	1,430 0 0
Bedingham	1,356 0 0
G. E. & W. Wincott	1,354 0 0
Jewell	1,342 0 0
HICKMAN, Market Harborough (*accepted*)	1,247 9 3

SCOTLAND.

For proposed road diversion at Valleyfield, Culross Parish, Fifeshire. Mr. R. HENDERSON, M.I.C.E., Edinburgh.

Robertson	£1,255 10 9
Fisher Bros.	1,083 11 1
Brebner & Co.	846 10 0
G. & R. Cousin	753 7 5
Cassey & Darragh	729 2 3
W. & J. R. Watson	722 8 0
Wilson	720 1 5
MARTIN, Dunfermline (*accepted*)	715 1 4
Blair	700 1 3
Marshall & Parrott	696 2 7

SOUTHEND-ON-SEA.

For the making-up of the following streets and parts of streets, for the Corporation, viz.:—Carisbrooke Road, Inverness Avenue (part of), and Wenham Drive (part of). Mr. E. J. ELFORD, M.I.M.E., borough surveyor.

Carisbrooke Road.

BUXTON (*accepted*)	£491 14 7
Borough Engineer's estimate	489 0 0

Wenham Drive (Section 2).

ILES (*accepted*)	610 0 0
Borough Engineer's estimate	568 0 0

Inverness Avenue.

PARSONS & PARSONS (*accepted*)	876 0 0
Borough Engineer's estimate	983 0 0

WALES.

For erecting new business premises, hall, bakehouse and stable, for the Co-operative Society, Ltd., Pontnewydd. Mr. A. E. SHEPPARD, architect and surveyor, Newport.

Powell Bros.	£2,657 12 6
Charles	2,300 0 0
Saunders	2,300 0 0
Phillips & Clarke	2,295 0 0
Greenway & Son	2,200 0 0
Leadbeter	2,175 0 0
Edwards	2,169 0 0
Reed	2,150 0 0
King & Co.	2,128 0 0
J. H. Williams	2,127 0 0
Jerrett	2,120 0 0
Case	2,118 0 0
Hill	2,110 0 0
H. Williams & Co.	2,102 8 10
A. S. Morgan	2,099 0 0
J. N. Morgan	2,070 0 0
Partridge	2,000 0 0
POULTON & WHITING, Pontnewydd (*accepted*)	1,946 0 0

For making-up several streets at North Seaton Links, near Newbiggin, for the Morpeth Rural District Council. Mr. J. W. MCKERROW, A.M.I.C.E., surveyor, Morpeth.

Usher & Co.	£1,841 5 1
J. W. Robson	1,032 3 6
Henderson	996 0 0
J. Robson	992 0 0
ARMSTRONG, Morpeth (*accepted*)	954 18 1
Shannon & Co.	865 18 10

For improving Wall Street and William Street, Ebbw Vale. Mr. T. J. THOMAS, town engineer and surveyor.

Watts	£1,129 17 9
Brown	989 2 8
Murray	949 0 0
Sutherland	921 12 8
Monks & Co.	908 7 0
Fudge	896 8 0
MILES, Ebbw Vale (*accepted*)	878 9 3



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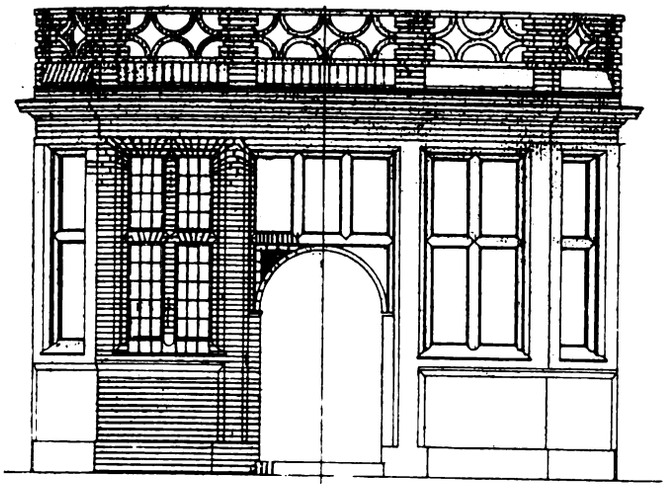
82 BELVEDERE ROAD, LAMBETH.

No. 330.

This Closet is brought into action by gentle pressure on the button, when the Cistern is immediately discharged with great velocity.
It is suitable for any position, but particularly where there is insufficient headroom for the ordinary type of water waste preventer with flush pipe.

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This pavilion was designed by Mr. E. L. Lutyens to display the bricks of the *Daneshill Brick and Tile Works*, Basingstoke, and was erected by Messrs. Higgs & Hill, Ltd.,



South Lambeth Road, S.E. The bricks are red, hand-made, sand-faced and moulded to the architect's design. The company make facing bricks, roofing tiles, hand-made quarries and garden bricks.

The *Gilmour Door Company, Ltd.*, show their built-up door, in which the hardwood veneers are of many varieties, each being guaranteed against winding, warping, shrinking, shaking or blistering. The novelty on the Stand is the Anti-Cyclone Door which has been made for the Strand Hotel, W.C. It has several departures from the usual revolving door, while it answers the same purposes. One remarkable feature about it is that the two doors divide in the middle on a very slight pressure, and the doors swing back into the sides, leaving a free passage. This makes it an admirable emergency exit. It is, moreover, a two-way door. When it is at rest the wings swing back into the circular sides, leaving only the two central doors.

R. Waygood & Co., Ltd., have again had the enterprise to instal a working passenger-lift, in an ornamental wrought-iron enclosure, for the conveyance of visitors to the Exhibition free of charge up to the gallery. On the Stand is a working model electric push-button lift, in which the car is fitted with as many buttons as there are floors. Upon entering the car the landing door should be shut, and the button pressed corresponding to the floor it is desired to stop at. Until the landing door is shut the lift is immovable. The car automatically stops at the proper floor. On each landing is a button, which, if pressed, will bring the lift, if not in use, to the door. This contrivance does away with the need for an attendant. Another working model is of a a suspended hydraulic lift suitable for large towns where high-pressure water mains are available. Messrs. Waygood have made a special study of safety appliances for the prevention of accidents, and have at least four appliances for locking the rope so as to avoid the risk of the lift being started while it is being loaded or unloaded at any floor. Their "Electric" Grip in addition prevents the lift being started unless all the doors are closed, or any door being opened except when the lift is opposite. There is a model of their patent wharf crane. Hand service lifts are also shown.

The *Carron Company* would require an exhibition to themselves if they attempted to display all the things they sell for use in houses. What they have selected for Olympia is a fine array of armour bright grates and interiors, two porcelain-enamelled baths, some wood mantelpieces and marble surrounds, and a few other fittings. The grates are from designs prepared in the eighteenth century for the Carron Company by William and Henry Haworth, who were, a placard tells us, students at the Royal Academy during the presidency of Sir Joshua Reynolds. It would be interesting to hear the comment of these designers when they saw the fire opening framed in marble. The grates are fine examples of ironfounding.

At Stand No. 177, Wall Space, will be found an exhibit of the Silbermann heating apparatus (agents, *Messrs. John C. Bonnin & Co.*). The fireplace consists of a closed metallic casing, which is so made as to give the utmost radiating surface and at the same time insure that the hot air is completely sterilised.

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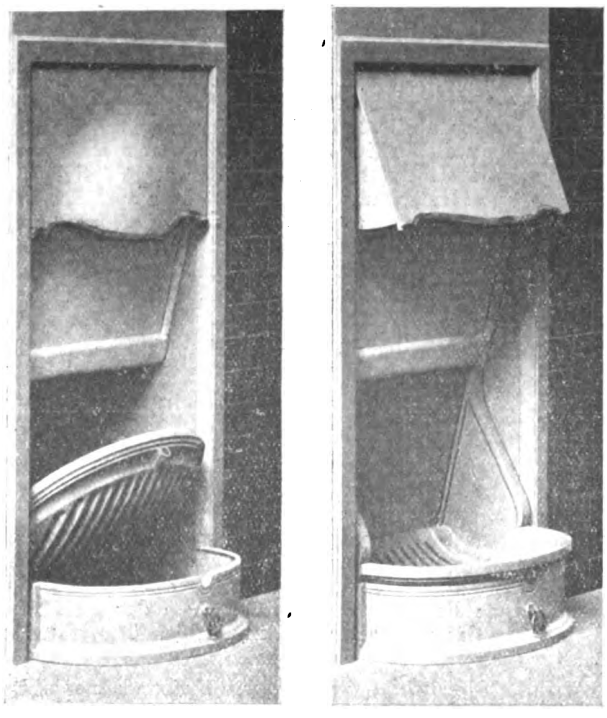
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FIRE — ACCIDENT — MARINE
This Company also issues Policies covering
LOSS OF PROFITS AND INCOME
occasioned by Fire.

SAVE 50% OF YOUR COAL BILL BY USING THE PATENT "Sine Qua Non" KITCHEN RANGE.
Recent Testimonial.
Palmers Green, N.
Gentlemen,—My wife pronounces the "Sine Qua Non" to be the best Range she ever had. It is clean, both bakes and roasts well, and consumes little fuel.
I have had many years' experience with Ranges, this being the fourth house I have built for my own occupation.
The "Bond" Fires are also highly satisfactory.—Yours truly, (Signed) George Jackson.
Sole Manufacturers: WILMER & SONS,
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The OLDEST OFFICE transacting LIFE ASSURANCE, ENDOWMENT, and ANNUITY Business alone—without Fire, Marine, or other risks—which affords the ADDITIONAL SECURITY of a Substantial Capital (£500,000) besides an ACCUMULATED ASSURANCE AND ANNUITY FUND which now exceeds
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HEAD OFFICE:
26 GEORGE ST., EDINBURGH.
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11 KING WILLIAM STREET, E.C.
West-End—166 PICCADILLY, W.

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The *Coalbrookdale Company, Ltd.*, at Wall Space 181 and 182, have an exhibit that is notable for three things—viz. the "Tilt" Fire, the "Thrift" Portable Range, and, what is perhaps more artistically interesting than either, the Damascene Work. The "Tilt" Fire, illustrated herewith, provides a remedy for an evil that has been a chronic one. We refer to the difficulty of getting the fire alight



and of getting warmth at once. The "Tilt" fire has come to remove that annoyance. The coal rests in a basket, with detachable firebrick sides and back. Before applying a match this basket is tilted up at an angle of 45 degrees and the canopy is pushed in, the result being that the upper fixed part, as shown in the illustration, acts like a newspaper while the air passes through the open bars of the bottom of the basket. In ten minutes the fire is bright, the cold air is driven out, the basket is lowered, the canopy drawn out, and the grate becomes a slow-burning one, which may be left for hours without any attention, and whose rate of combustion is regulated by the fret. A low fire is replenished and rendered bright again by tilting the basket for five minutes. By painful experience we have learnt that most fires show their resentment of lack of attention by refusing to come back to life. This petty spite is now escaped. All the parts are renewable. Although the fire is a comparative novelty, over 1,000 have already been sold. The "Thrift" Portable Range is a small one, on which the boiler and oven or ovens are heated by the same flue and at the same time with a small amount of the cheapest coal. In our opening sentence we alluded to the "Damascene" work as a pleasing and unique feature. This is something quite new in modern work, although our museums contain beautiful examples of it as applied to the inlay of armour, vases, swords, &c., with gold, silver and other metals. Within the last century grates were ornamented by the inlaying of metals in iron, but the process was elaborate and exceedingly expensive. Even then the work was confined solely to the inlaying of brass in an iron background. The Coalbrookdale Company, however, by a method (for which a patent has been applied) have succeeded in producing highly artistic results in the inlaying of iron and copper in a brass background, or vice versa, at a small cost. The brass is cast first and laid in a mould, then the iron is cast around it. The effect is equal to that of the old work, but is very much less expensive. The inlaid metals can be chased or engraved, thus enhancing the general effect. This might be called "Sheraton," for the inlay can be applied in a similar manner and with no less charming results. This "Damascene" work is therefore something new, with which the architect can render the house still more beautiful.

The *Forest of Dean Stone Firms, Limited* (Row S, 267-8), are preparing the way for an invasion of the London market with the product of quarries situated in different parts of the Kingdom. The Forest of Dean stone has long enjoyed

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(SANITARY)
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THE RUBEROID
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has stood the test of 17 years' actual use, and time has proved it the best, both on boards and concrete. RUBEROID is made in three colours: Grey, Red, and Green. It is suitable for the most permanent buildings, while its low cost makes it an economical covering for temporary structures.

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a very high reputation, but until very recently its cost has more than counterbalanced its merits. This, however, is altered now, and some interesting developments may be looked for. The company offers stone from many different quarries: the Forest of Dean, Ded Wilderness, and Nailsworth stones are from Gloucestershire, the Mount Charles from Co. Donegal, the Keinton from Somersetshire, the Shamrock from Co. Clare, and the Portgain granite from Pembrokeshire. In some cases, as the quarries at Nailsworth and Mount Charles, the amalgamated firms have taken over and entirely reorganised the plant and general working arrangements, so as to ensure any order being properly and promptly obeyed. The former is a cheap building stone which, like the Irish stone, has been little known outside the small radius ordinarily served by the quarries. The crushing strain of the Mount Charles is 772 tons to the square foot, the Kirkaldy test for the Shamrock stone was 2,214 tons to the square foot. In this case likewise the arrangements for supply have been greatly improved. The Forest of Dean Stone Firms, Limited, place all their resources at the service of customers. Their Stand does not show anything conspicuous in the way of architectural carving, but some of the stones have a very old connection with the profession.

The Stand of the *Hempstead Patent Brick Company* is constructed of "Hempstead" hollow porous terra-cotta partition blocks. Though they can be cut with a saw and pierced by nails, a 2½-inch partition wall sustained a distributed floor load of 640 lb. per foot super. The fire-resisting test was equally satisfactory, for a partition withstood uninjured a temperature of 2,786 degrees Fahrenheit—or the melting-point of steel; that is to say, they will absolutely protect any steelwork they cover. Among the buildings where the Hempstead blocks have been used are the Admiralty Buildings, Whitehall; King's College Hospital; Gaiety Restaurant, and Edmonton Infirmary. A sliding fire-proof door with a new protective casing forms one side of the Stand.

In our last week's issue we drew attention to the exhibits of the *Leeds Pottery and Middleton Fireclay Works, Leeds*, Bay 23, in the Gallery. We now give an illustration of a doorway entrance in the "Ceramo" ware, a matt glazed terra-cotta, manufactured by the company. This material is produced in a delicate pearly white, as well as many



shades of colour, and is a material which should commend itself to architects desirous of producing an effective permanent colour scheme. Mr. W. P. Corby, of 11 and 12 Finsbury Square, E.C., is the representative of the company for London and the South of England.

THE "DRAWWELL" GRATE



WAS PLACED

First in the Final Tests

at the recent test with Firegrates at the New Government Offices in Whitehall, under the direction of a sub-committee of the Coal Smoke Abatement Society, in conjunction with Sir Henry Tanner and a committee of experts, for smoke abatement, heating power, fuel economy, and suitability for public and private buildings.

BUILDING TRADES EXHIBITION, OLYMPIA,
APRIL 17 to MAY 1.

To be seen at STAND No. 153, Wall Space.

Supplied through Builders' Merchants, Ironmongers, &c., only.

J. & R. CORKER, Ltd.,
GENERAL IRONFOUNDERS, Ferham Works, ROTHERHAM.
London Showrooms, Saracen's Head Buildings, Snow Hill, City, W. B. CLARKE, AGENT, where the "Drawwell" can be seen in action.

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On the Stand of the *Atmospheric Steam Heating Company, Ltd.*, there is shown the Webster vacuum system, which is to be met with in many of the largest buildings in London, including the new War Office and L.G.B. offices in Whitehall, Imperial Institute, Victoria and Albert Museum and Royal College of Science, South Kensington, Caxton House, De Keyser's and other hotels, Debenham's, Ltd., four L.C.C. technical schools, Whiteley's, Ltd., University College Hospital and numerous others, not to speak of the factories, asylums, workhouses, &c., in the provinces. This system is called "atmospheric" because the pressure of steam generally employed does not exceed and may be less than atmospheric pressure. The company do not give tenders for installing their plant, but they put expert advice at the service of prospective clients.

The "Bell" Dog Grates, shown by the *Bell Range and Foundry Company, Ltd.*, are guaranteed not to smoke, and also to give double the heat with half the consumption of fuel by the ordinary dog grate. In addition they are of striking appearance. The "Bell" self-contained boiler is independent of the range. A small size is made for ordinary establishments, and is estimated to cost 3*d*. a day heating a boiler of 50 gallons capacity.

We here illustrate one of the most conspicuous objects on the Stand of *Messrs. Hofler, Ltd.*, No. 83, Row E. It consists of a small staircase and platform, having on one side a length of balustrading of French design in polished steel and bronze of the Louis XVI. period, and on the other wrought-iron balustrading in the Georgian style. At the back are a pair of polished iron gates with Wedgwood plaques. It is gratifying to know that the whole of these beautiful examples of the metal-workers' art have been executed by British craftsmen, at their company's Chiswick forges.



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The *Guild of Decorators' Syndicate* scarcely do justice at Stand 233, Row O, to the largeness of their scope, although what there is to be seen is of the best. The syndicate are ready to carry out any work in stained glass, metal, furniture designing, sculpture, mural painting, and the like. The interior of the Stand is decorated in the little-used Pompeian style, and would no doubt be about the same size as one of their apartments; but they undertake to decorate and furnish a house in any desired style or period. The coalbox illustrated above, and other metal-work from their own forge would win admiration anywhere. To guard against any mechanical spirit in the working, no two designs are exactly the same. The syndicate are, to use their own words, "a guild of artists and craftsmen who have individually gained a reputation for excellence in some branch of the decorative arts, and are banded together for the purpose of undertaking decorative work of every description in competition with the tradesman." The Associates, who form the "art" side, are Messrs. J. Dudley Forsyth, Henry Batley, E. Owen Clark, Wentworth Huyshe, A. R. Martin, Henry Poole, and W. J. Paulson Townsend. The syndicate have already carried out important work, and their scheme should be of general benefit.

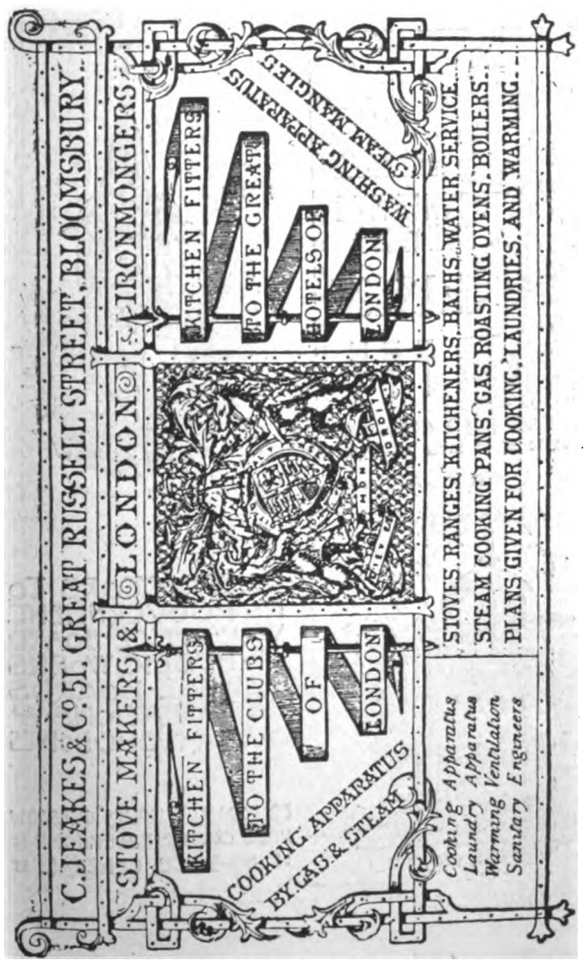


The *Crittal Manufacturing Company* have one end of their Stand closed in by metal shop fronts, and the effect is one that must commend this new departure to any architects who are harassed by the difficulty of conferring distinction on this important part of business premises. There are several kinds of metal casements, including the Fenestra system, which was introduced about three years ago, as something cheaper and yet stronger than its predecessors.

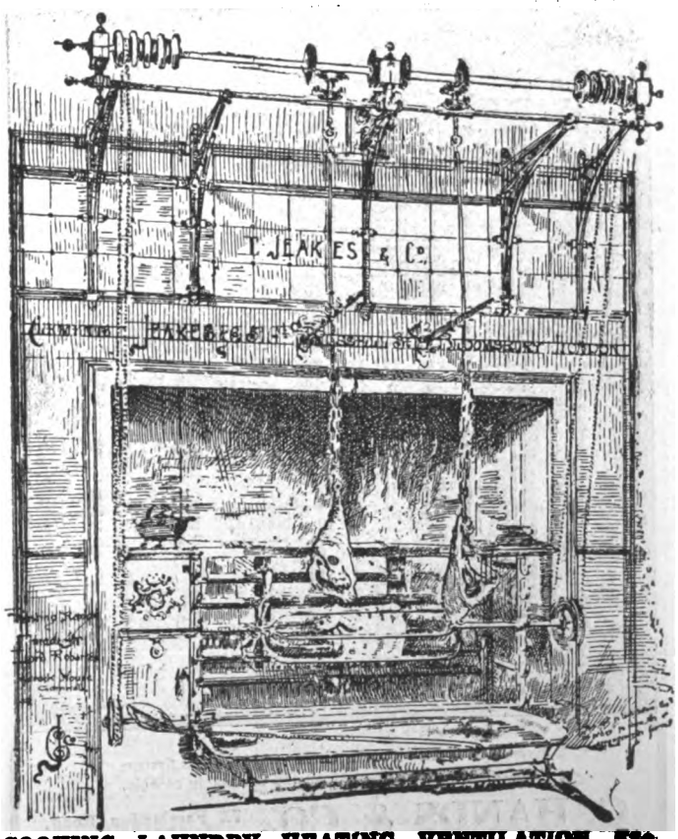
Last week we gave a notice to the exhibit of the Ruberoid Co., No. 101, Row F. Owing to press of matter, we were unable to find space for the view here given of their Stand. It will be seen that the pavilion illustrates the applicability of the material for variously shaped roofs.



The Taroads Syndicate, Limited, keep a large staff of men to execute contracts for the construction of bituminous bound roads and for tar-spraying. To meet cases where the local authority carry out their own work, they manufacture apparatus of simple types such as the Coleman patented tar-spreading machine, type G (price 12*l.* 10*s.*), or the large 1,000 gallon tar-spraying motor machine (price 800*l.*). During last season the Syndicate executed orders for over 150 Councils. One of their most recent contracts was for tarring the main roads, 22 miles long, from Crawley to Brighton. With the advent of warmer weather, the dust nuisance has already come to the front. The Taroads Syndicate are therefore meeting a need of the moment, and should be consulted by all authorities who control the public highways.



C. JEAKES & Co., ENGINEERS, 51, Gt. Russell St., LONDON



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One of the features of the Annexe is the display by the *India Rubber, Gutta Percha and Telegraph Works Company, Limited*, in Wall Spaces 278-9, of their mosaic india-rubber tiling. The Stand affords one of the encouraging proofs that what was until very recently considered solely from a utilitarian standpoint is now regarded as having artistic possibilities. Rubber flooring received many years ago the warm approval of the profession as being noiseless, sanitary and waterproof, and it has ever since been coming more strongly into favour. But this latest development should give it an impetus unlike anything it has received before. The design of the floor of the Stand and the designs on view put the material in the same category as real mosaic so far as effect goes. It harmonises admirably with a building of marble, granite or stone, and the tiling is adaptable to practically any scheme of decoration. Part of the Stand floor is laid as for a bath-room. In the centre are two large white lilies, with a surround of black and white rubber octagons and square tiles; the remainder of the floor is designed to suit a large entrance hall. The tiles are usually $\frac{3}{8}$ in. or $\frac{1}{2}$ in. thick, with the colour all the way through. They are laid in special cement. The mosaic, like the ordinary rubber tiling, can be laid on any surface. For instance, one of its most extensive uses is for men-of-war, liners, yachts and steamships generally. Among the battleships are *King Edward VII., Dreadnought, Inflexible*, and *Hindustan*; the liners include *Lusitania* and *Mauretania*. The company, however, do not by any means confine themselves to rubber tiling. Their display comprises stair nosing and such general rubber goods as w.c. plugs, closet cones, hose tubing, and steam packing. But the chief attraction for the many visitors is the "Mosaic" tiling.

A new chimney-pot and cowl is shown by the *Chimney Pot and Ventilator Company*, Ashford, Middlesex, on Messrs. Doulton's Stand in the Annexe. The circular pot is fitted with a cowl which is divided into four compartments, each of which is fitted with an aluminium door weighted in the centre. The wind automatically closes the shutter on the windward side so that it cannot make a downdraught. The smoke escapes by the other openings. The top has a removable cover. The Burmer pots and cowl are intended for use in bad situations.

The *Expanded Metal Company, Ltd.*, arranged Stand 76, Row E, to display expanded steel concrete fire-resisting flooring, roofing and walling. In the foreground are sections



of expanded steel concrete as applied to sewers and conduits. The exhibit gives a general idea of the multifarious uses to which expanded metal can be put.

C. H. Norris, Ltd., are to be congratulated on their thoroughness in setting up a charming pavilion to display their different kinds of bricks, and also in obtaining the

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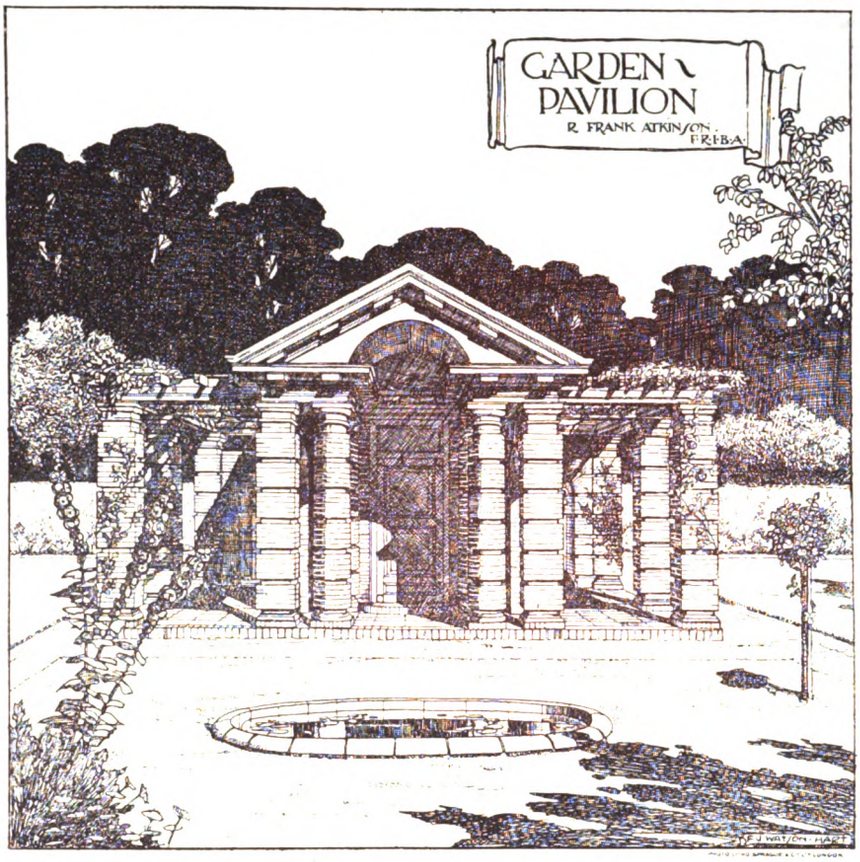


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design for it from a competent architect. Mr. R. Frank Atkinson, F.R.I.B.A., has made a fine use of pergolas,



which entirely do away with the severity of the plain brick room in the centre. The creepers give the pavilion just the necessary summer-house appearance. The brickwork to the front, sides and columns is carried out in the firm's special varied and broken coloured bricks, 2 inches thick, with a wide white mortar joint. The back and inside walls are in plain sand-faced red bricks, and the window openings in C H N rubbers, which are moulded to shape, and require no

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rubbing. The floor is laid with large red tiles. The cornice is of wood painted white. It may be added that the pavilion was erected in ten days. It has attracted a considerable amount of admiration, and should be instrumental in raising the general standard of the Stands on future occasions. The original drawing for this pavilion is included in the Architectural Room of this year's Royal Academy.

The Stand of *Duggan, Neel & McColm, Ltd.*, shows what can be done with one coat (and only one) of "Dodo" enamel on a properly prepared ground. The panels are in shades of grey "Dodo" flatting, which finishes with an eggshell surface. To get the best results new work should be knotted with a good shellac and filled with "Dodo" filler. After this has dried the undercoating can be applied, and then the enamel.

Messrs. Yates, Haywood & Co. make a series of patent ranges known as the "Quadrant," which are fitted with their self-adjusting lifting-fire, which can be raised or lowered to any point with one hand. One of these is shown together with a "Guinness" range for artisans' dwellings, as well as wood chimney-pieces and interiors.

Messrs. J. T. Phillips & Son exhibit at Stand 205, Row N, their system of low-pressure hot water heating, and known by the name of the "Cable" system, the patentees claim that they can overcome any obstacles and maintain an efficient circulation of hot water in all circumstances and at any temperature, and the system may be applied to any existing building without damage or interference, as no excavations or channelling is required.

Wall-tiling with a dull surface, glazed and antique, is shown to great advantage by *Mintons, Limited*. In "Eburite" dull-surface tiling, which is one of the newer varieties, the decoration is entirely flat, no embossment whatever being used in producing the patterns. Hygienically this has much to recommend it; artistically, also, it makes a pleasant change. The glazed work lends itself to painted figure panels.

One of the newcomers is the *Modernia Patent Glass Tile Company*, who base a claim to be altogether different from the ordinary glass tiles on the fact that they are about ¼ inch thick and are made with a natural backing. Sand blast is used for the surface. The tiles can be made in sheets as large as 5 feet by 2 feet. This does away with cross joints and gives an unbroken pattern. They may be had in almost any colour and of many designs.

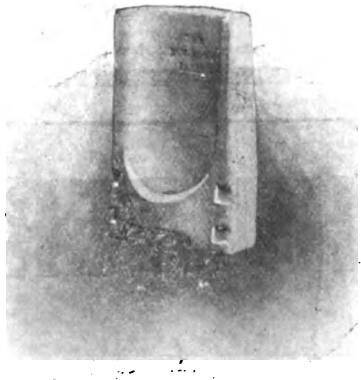
Messrs. Tredegar & Co. show an electric-lighting set for small users, and display the announcement that the cost of lighting is at the rate of 25 lamps, each of 16 candle-power, for 1*d.* an hour. The plant is very compact, and of sufficient simplicity to enable an intelligent gardener or stableman to work it after brief instructions. Indeed, the accumulators are especially made for working under unskilled attention. The engines are driven by ordinary petroleum (lamp oil), of which one gallon will give sufficient current to light ten 16-candle-power lamps for seventeen hours. The cost of a complete plant, consisting of engine, dynamo, accumulators (to last a week in summer and three days in winter), switchboard and accumulators for 30 lamps, is 71*l.* 10*s.*; for 50 lamps, 83*l.* 10*s.* Their average price for wiring the house, fixing the plant and fittings for 50 lamps, and giving instruction in running and maintenance, is about 40*l.* The company's "Colonial" system enables the whole of the plant and wiring to be fitted up for temporary uses by unskilled labour. Messrs. Tredegar & Co. have established a sound reputation for their electric fittings, which harmonise with their surroundings. They are ready to embody clients' rough suggestions into their finished drawings.

There are several exhibits of gas from petrol vapour, and in consequence of the brilliant light from these Stands the attention of the visitor has been arrested. The *Non-Explosive Gas Company* at Stand 156, Wall Space, have received a somewhat large proportion of attention, and certainly with some justice. The light, with the assistance of an incandescent burner, is intense, absolutely steady, and free from shadow. We shall hope to give a longer notice of this system in a subsequent issue.

Mr. E. G. Wright is exhibiting at Stand 185, Row K, his Twentieth Century chimney cowl. As there are no revolving parts the inventor claims that it is practically impossible for it to get out of order, and the cowl can be swept as easily as an ordinary chimney.

Mr. James Gibbons has an imposing display at Stand 59, Row D, of door furniture, electric light fittings, &c. A new

See Stands Nos. 137 and 176, Row H, Building Trades Exhibition, Olympia, April 17 to May 1.



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feature is Gibbons' patent adjustable cloak-room fittings. The hook known as the "Gosforth" safety hook is attached to a bar rail instead of the usual tube; this is an advantage both from the point of neatness, strength and simplicity.

WE shall refer to one or two stands next week which we have been unable to obtain particulars of.

VARIETIES.

THE Corporation of Harrogate are about to invite tenders for additions and extensions to the Royal Baths.

THE estimated cost of the new pavilion to be erected at Llandrindod Wells is 10,000*l*. The Local Government enquiry has just been held.

MR. C. HARRISON TOWNSEND, F.R.I.B.A., has removed his offices from Great George Street, Westminster, to 32 Queen's Road, St. John's Wood, N.W.

THE Electric Supply Committee of the Marylebone Borough Council recommend the appointment of Mr. A. H. Seabrook, M.I.E.E., as engineer and manager of the local electrical enterprise, at a salary of 800*l*. a year. There were 128 applicants for the office. Mr. Seabrook is at present enginer and manager of West Ham, and was formerly assistant electrical engineer at Hampstead and Great Yarmouth.

MESSRS. BROWNE & LILLY, LTD., builders, of Fobney Works, Reading, have secured the contract for building a large hotel at Messina, Italy, in spite of the keenest competition of a number of American, German, Italian and English firms. A full staff of men, including Mr. J. Lilly, will be shortly leaving for Messina to carry out the work of erection. The building in question, which was designed by Messrs. Browne & Lilly, Ltd., to withstand earthquake shocks, will contain upwards of 100 rooms, and cover an area of 21,000 superficial feet. It is to be erected in the record time of eleven weeks. After the Valparaiso disaster the same firm were entrusted with a number of relief buildings, which they erected in record time.

AN interesting industrial development is reported in China. The Government have erected cement works on Honan Island, near Canton, on the south branch of the Pearl River. The works are reported to be now complete, and will start manufacturing immediately. On the North River are some large limestone quarries, on the property of a Cantonese confiscated two or three years ago by the Chinese Government, and these will supply the material. A large quantity of cement is required for the construction of the Canton bund and in connection with the railways of the province. The high price of cement in Hong Kong is said to have stimulated the Government to this enterprise. It is intended, besides supplying the Government wants, to place cement on the market for sale. The output is to be 500 barrels per day. The machinery for the cement works was supplied by a German company.

THE Dundee and Arbroath Joint Line Company have accepted the tenders of Messrs. G & R. Cousin, Edinburgh, for the works to be executed under contracts Nos. 1 and 2 in connection with Arbroath Station reconstruction. It is expected that a start to the works will be made at an early date. Contract No. 1 comprises earth work, retaining walls, bridges, platforms, steel work, verandahs over platforms, &c.; and contract No. 2 consists of work in connection with the construction of booking offices and platform building, &c. A large number of contractors, including several Arbroath tradesmen, tendered for the work. It is estimated that the work of reconstruction will cost about 50,000*l*., and it is calculated that the work will extend for a period of two years.

THE sixth annual report of the Metropolitan Committee on Materials and Means of Paving the Streets of London (of which Mr. Deputy Morton, M.P., is the Chairman) has just been issued. The Committee, it may be remembered, was formed in 1903, following a conference held at the Westminster City Hall by representatives of the Metropolitan Borough Councils, to consider the best means of paving the streets of London. The report contains a great deal of technical information concerning the "life" of the various materials for street paving. Mr. Frank Sumner (City Engineer) states that the effect of motor omnibus traffic on the

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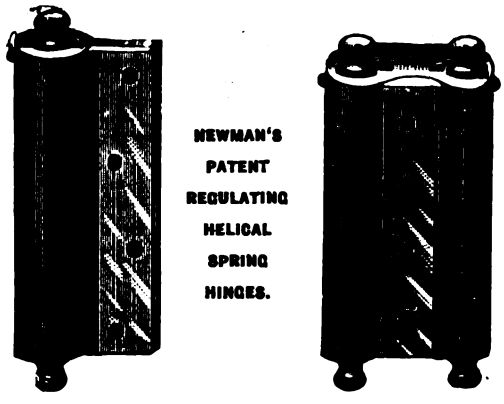
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roads is most difficult to assess, but that the various contractors to the Corporation are agreed that the oil from motors is proving detrimental to asphalte pavements.

The Court of Common Council, at their last meeting, considered a letter which was read from the Clerk to the London County Council reporting the decisions arrived at by a conference of City and borough representatives with reference to an abatement of the smoke nuisance. The decisions were as follows:—"That section 24 (b) of the Public Health (London) Act, 1891, which provides that 'any chimney (not being the chimney of a private dwelling-house), sending forth black smoke in such quantities as to be a nuisance,' shall be a nuisance liable to be dealt with summarily under the Act, should be amended by the deletion of the word 'black.'" "That the word 'chimney,' in section 24 (b) should be deemed to include: (1) Openings through which smoke is emitted from buildings or places in which processes of manufacture are carried on, and the chimneys of any building or place where furnaces are used in operations carried on under statutory powers. (2) The chimneys of any Government workshop or factory. That in special cases of nuisance arising under sections 23 and 24 of the Public Health (London) Act, 1891, the proceedings in respect of any nuisance may, at the request of and by agreement with the sanitary authority, be taken by the London County Council in such special cases." The communication was referred to the Sanitary and the Port Sanitary Committee for consideration.

The medical officer of health for Horsham has submitted a lengthy report on the subject of "insufficient" water-closets. He regards any water-closet or drainage system without proper means of flushing as a potential source of danger, and "insufficient" within the meaning of Section 36 of the Public Health Act, 1875. Practically all the artisan cottages in the town, with the exception of those built in recent years, are without flushing cisterns. In 1908 no fewer than eighty-six blocked drains were brought officially to the notice of the sanitary inspector. The medical officer has recommended that "where there is a public supply, the owners of houses be required to provide a flushing apparatus to water-closets, and the sanitary inspector be instructed to report each case of 'insufficient' closet that comes to his notice." The report has been referred to the works committee.

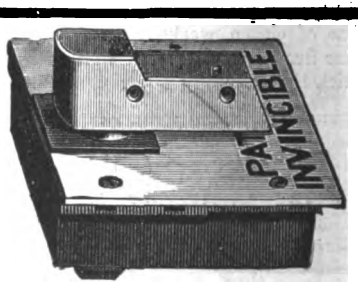
H.M. Consul-General at Hamburg (Sir W. Ward, C.V.O.) has forwarded, under date of March 9, the following memorandum on the German cement trade in 1908, which has been drawn up from information supplied by a leading Hamburg firm engaged in the trade:—"The expectations of the cement industry in Germany formed at the commencement of 1908 were not fully realised, for the results of the financial crisis were everywhere observable, especially in the larger towns. There was a serious falling off in the building trade, particularly in the building of cheap houses, and the owners of factories which were not fully occupied showed little inclination to alter or extend their buildings; consequently large stocks of cement, accumulated during the summer at the cement factories. The latter sought relief in the export market, with the result that the export prices fell quickly nearly 25 per cent. Owing to the demand brought about by these low prices, several of the syndicates disposed of a considerable portion of their stocks. The financial results realised during the year by the German cement works were, nevertheless, regarded upon the whole as good, in spite of the unfavourable state of trade, because the prices, regulated in the interior of Germany by means of agreements between the syndicates, ensured a good profit. These agreements have been renewed for 1909, and among the German cement works there has for several months past been an effort to raise the export prices, which had sunk far below the normal rate. Steps have, moreover, been already taken in this direction and a minimum price has been fixed. . . . Recently the state of trade appears to have shown some slight improvement, and, as money has become considerably cheaper, it is thought that in 1909 there will be an increasing activity in the building trade."



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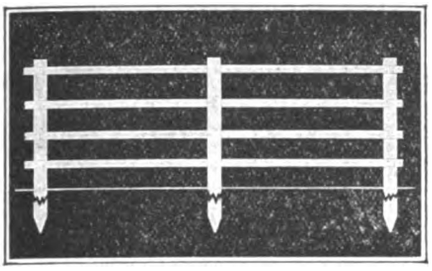
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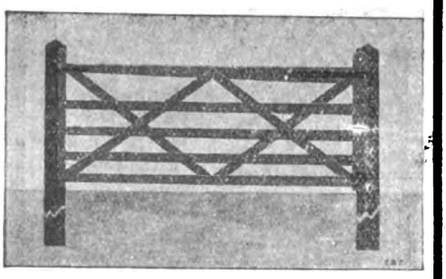
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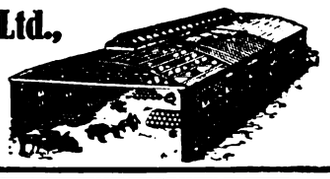
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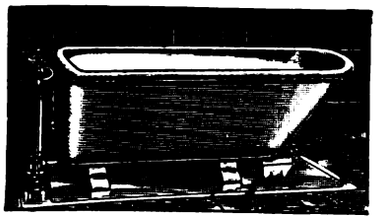
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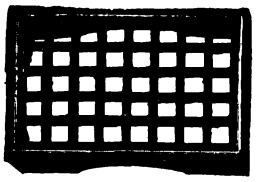
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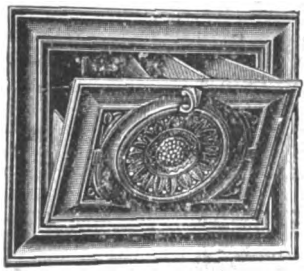
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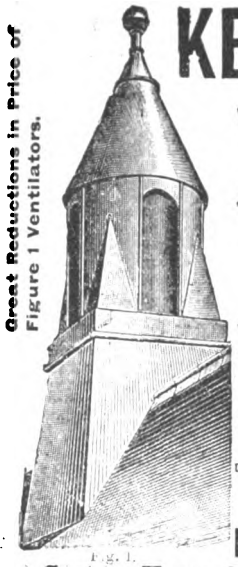


Fig. 1.

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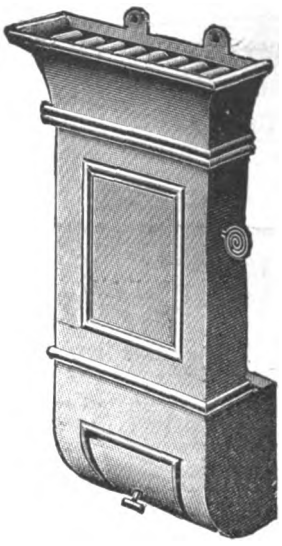
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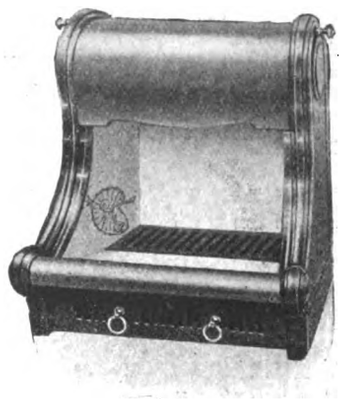
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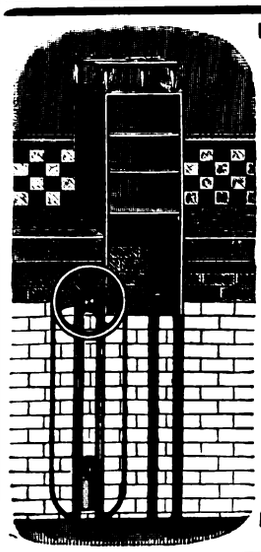
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THE Communal authorities of Varna, Bulgaria, have decided to grant to a Mr. Benert a concession for the establishment of a large hotel, which will contain 300 rooms. The cost of construction will amount to 3,000,000 francs (120,000*l.*). The hotel will become, according to the *Board of Trade Journal*, the property of the Communal authorities in fifty years.

TRADE NOTES.

UNDER the direction of Mr. L. A. McDonnell, architect, the Boyle system of natural ventilation, embracing the latest patent "Air Pump" ventilators, has been applied to the Night School, Sacred Heart Convent, Dublin.

THE parish church at South Normanton, near Mansfield, is about to have a new clock which will play the Westminster quarter chimes upon four bells and show time on a large illuminated dial. The work is being done by Messrs John Smith & Sons, Midland Clock Works, Derby.

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AMONG the popular errors regarding drinking water is that which believes that an ordinary microscope will show countless animalcules in our drinking fluid. This is an utterly erroneous idea. Ordinary water contains no animalcules, but it may contain far more dangerous things in the shape of extremely minute disease germs, such as require the highest powers of our best microscopes to discern. These last are our real enemies, because they are capable of inflicting typhoid fever and other diseases upon us. To remove disease germs from infected water was formerly an impossibility, because common filters possess no such powers of preventing microbes from passing through them. Science has evolved the Berkefeld filters (121 Oxford Street, London, W.), which have been found to yield water absolutely free from all germ life. This power on the part of the Berkefeld filters is warranted by Dr. Sims Woodhead, Dr. Andrew Wilson and other scientists. They have experimented with these filters and have fully tested them. The filters are made suitable for the household, the camp, the factory and the ship. Full details will be sent free on application to 121 Oxford Street, London, W.

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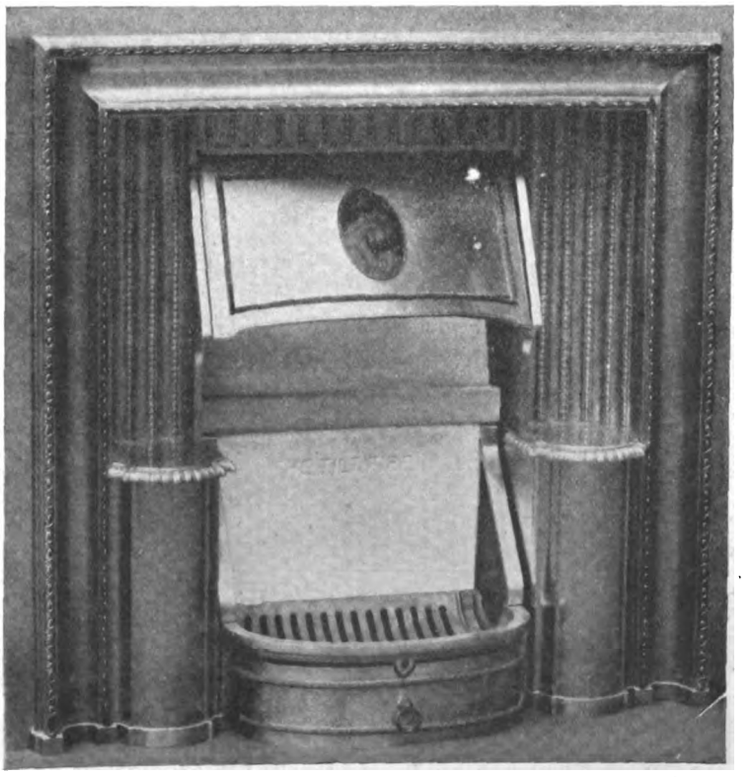
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BUILDING TRADES EXHIBITION.

On Saturday morning last their Royal Highnesses the Prince and Princess of Wales paid a visit to the Building Trades Exhibition at Olympia and visited a number of stands, and, as in his previous visit, his Royal Highness exhibited much patience and interest in listening to the descriptions given to him. The members of the Royal Family have a way of doing the right thing at the right time, and the visit of their Royal Highnesses has given an impetus to the exhibition which is undoubtedly much appreciated by the promoters, the Messrs. Montgomery. We would remind our readers that to-day and to-morrow are the last two days of what may with safety be described as the largest and best exhibition of building materials ever placed before the public of this country. We resume our notices of stands of particular interest. The first notice appeared in our issue of April 16, and a long report will be found in our pages of last week.

The *British Doloment Company, Ltd.*, have been one of the people to profit by the revival of roller skating, for "Doloment" has won favour for rinks. As a material for floor covering for this and other uses it possesses the advantage that it can be laid without a single joint, whatever the area may be. Under ordinary circumstances the thickness is $\frac{7}{8}$ inch, and it can be laid in different colours and patterns. It is fire, vermin and dust proof, and impervious to liquids. The manufacturers strongly recommend its employment wherever the foot traffic is exceptionally heavy. A cheaper flooring is sold for machine shops, warehouses, &c.

The "Venetian" Firegrate and Distributor continues to attract many people to the wall space occupied by *Mr. James D. Prior*. In this, as many visitors will probably remember, a boiler shaped something like a grille and made of corrugated copper tubes, with gunmetal fittings, is fixed at the back of the fire and connected by pipes with radiators in one, two, or even three rooms, with the necessary circulation. Among the improvements since the patent was introduced some three years ago is a greater power in the heat distributor (one of five tubes will heat 80 super feet of radiating surface), and it is also made to fit better. Mr. Prior shows various kinds of radiators, firegrates and boilers, in all of which the aim is to capture wasted heat and turn it to profit.

ILLUSTRATIONS.

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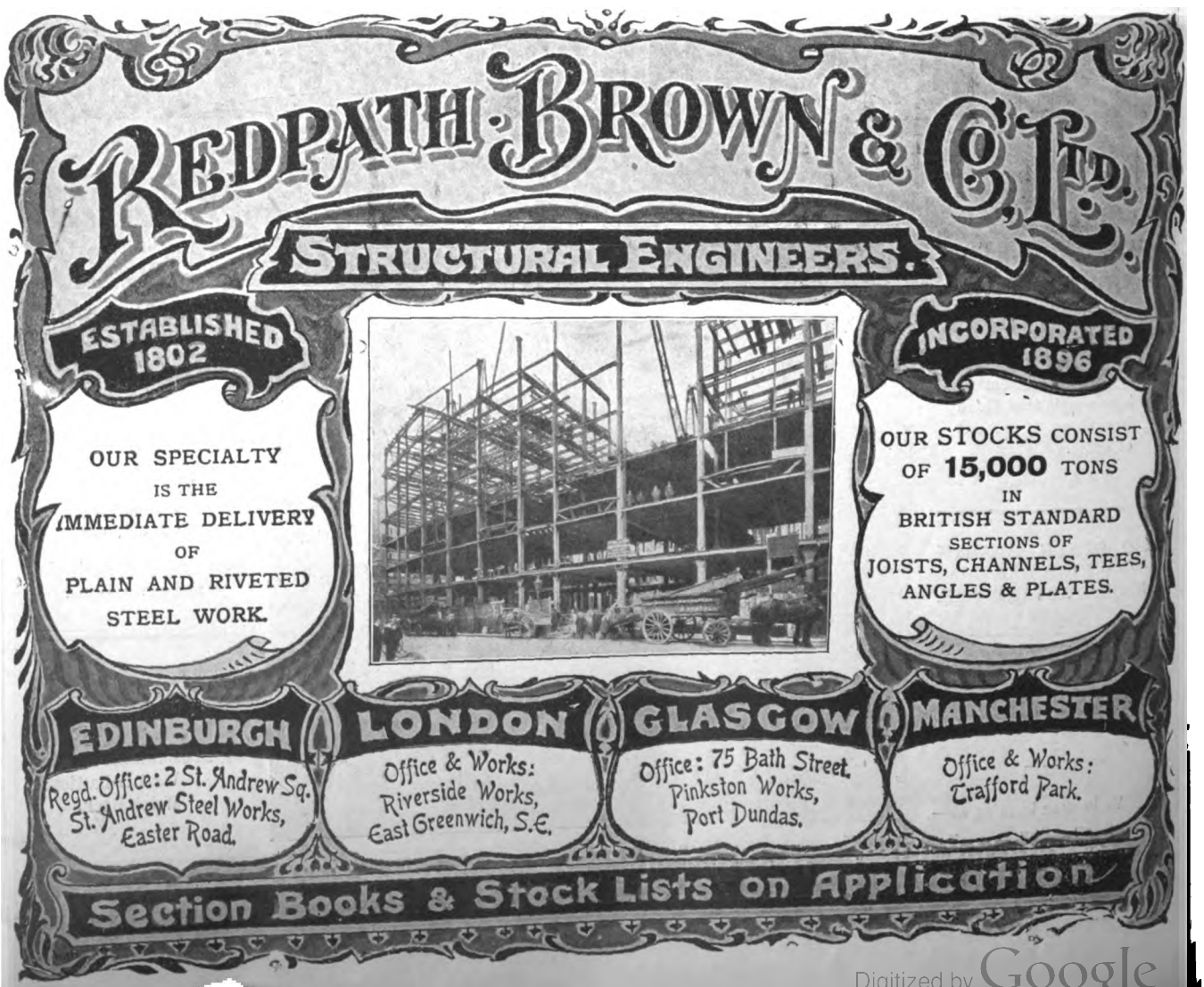
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Henry Hope & Sons, Ltd., are specialists in metal casements, and have been instrumental in bringing them into vogue for buildings for all purposes and of widely different rentals. For example, their "Garden City" casement has been specially manufactured at a price within the reach of model cottage builders, who were previously prohibited from introducing them on account of expense. The gain in picturesqueness is of course very great. On the other hand, one of their large orders was for steel windows at the new General Post Office. The firm are as ready to quote for windows for public buildings as for cottages. They also make stained glass of excellent designs.

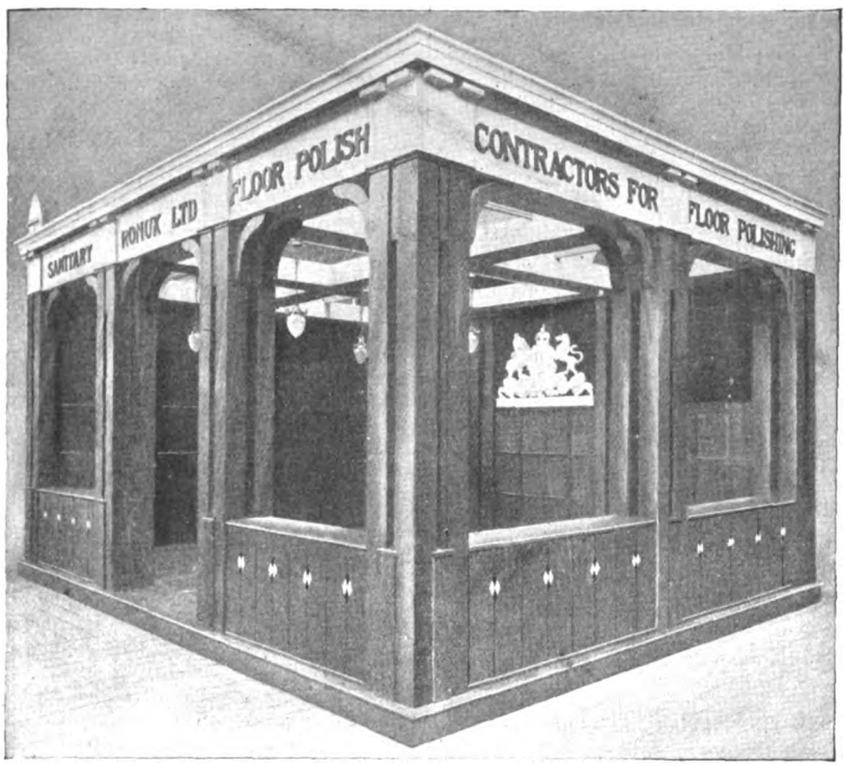
Messrs. Josiah Smart & Son, at Stand 11, Row B, show models representing the method of asphalting roof, reservoirs, &c., and samples of asphaltes in various stages of preparation.

Following the order of the catalogue the Stand of *Ronuk, Ltd.*, in the Gallery is the last to be inspected. But we have litle doubt that to a proportion—the "fair" proportion—of visitors it is one of the few exhibits that they feel at home before. This would no doubt produce a tendency to bold criticism if the Stand gave an opening for it. But it would be a somewhat hard task for a visitor to express anything but admiration for the panelled woodwork, the wood-block floor, the fittings, which have been prepared and polished by the "Ronuk" improved sanitary methods. The material was the result of the increase in use of wooden floors, which called for a surface that was smooth, hard and durable. All these conditions "Ronuk" has fulfilled. The company give estimates for preparing, polishing and maintaining the



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floors of hospitals, institutions, town houses, &c., and have on their books the National Gallery, Hertford House, the Tate Gallery, St. Bartholomew's, St. George's and St. Mary's Hospitals, and the Manchester City Art Gallery and School of Technology, and other important institutions. The housewife who has to superintend her own cleaning should remember that a little of it goes a very long way, and it might almost be said the less used the better. A "Ronuked" floor should not need any dressing oftener than once in four to six weeks provided that at frequent intervals it is brushed with the special brush and then gone over with a special cloth. The excellence of the results are best demonstrated by the small detached pieces of block flooring on the Stand. The material has the highest medical recommendations. The directions emphasise its sparing use if the best return is desired.



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Messrs. Barford & Perkins show the only motor roller in the Exhibition. It is according to their latest pattern. When the hind cylinder is filled with water the weight is 7½ tons. The engines are slow running, and use petrol or paraffin. A patent lifter on the hind axle enables this very compact machine to raise itself out of soft ground. The rollers have during the past five years proved admirably adapted for use on tar, macadam, asphalte and granite repairs. Among the places where it has been used should be included the Franco-British Exhibition.

Samuel Elliott & Sons, Ltd., Caversham, Reading, have a very attractive display at Stand 122, Row G. The most prominent feature is the handsome Austrian oak chimney-



CRAWLEY GRANGE, BUCKS.
Henry Tanner, Jun., A.R.I.B.A.

piece, with inglenook and flanked with panel pilasters. It was manufactured for Messrs. Kidner & Berry, architects, Old Broad Street, E.C. Near it is a Spanish mahogany square cut newel and balusters, with wreathed handrail (this is one of the firm's specialties) and strings. The remainder of the front of the Stand is filled with a very large variety of mouldings in hard and soft woods, all being worked clean and sharp. Ecclesiastical carving is represented by the figure of an angel for the screen at the Roman Catholic church, Caversham—Mr. F. B. Wade, architect. The figuring on the curly pitch pine door placed in one corner has attracted considerable attention. Several photographs record the important work carried out by Samuel Elliott & Sons, Ltd.; they include an oak staircase and panelling at Gaddesden Place, Herts, in which Mr. Cole A. Adams, architect, has got quite a baronial effect; a Spanish mahogany circular staircase wreathed and fully carved, put at Messrs. Osler's premises, 100 Oxford Street—Mr. G. Hornblower, architect; a mahogany door at Westminster Cathedral—Messrs. Bentley, Son & Marshall, architects (this was erected two years ago, and every joint remains perfect); the Capital and Counties Bank in Kensington—Messrs. Kidner & Berry, architects; and other contracts. The back of the Stand exhibits other specimens of high-class joinery and mouldings.

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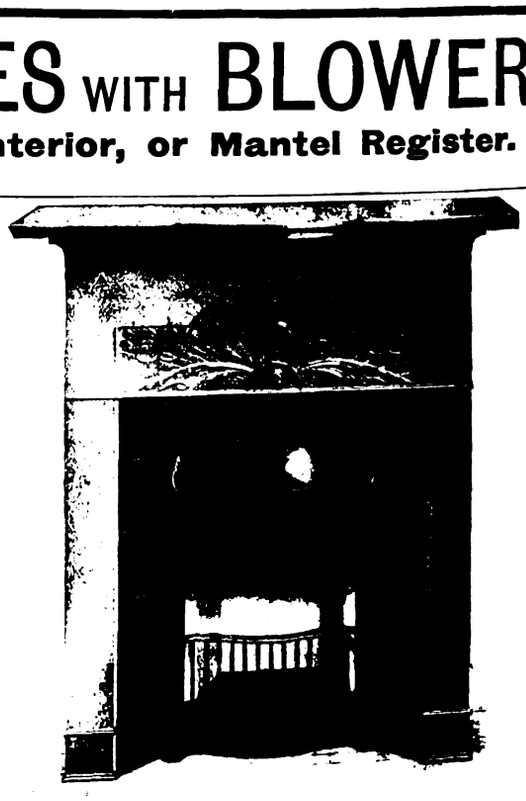
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The Contract Reporter.

to The Architect.

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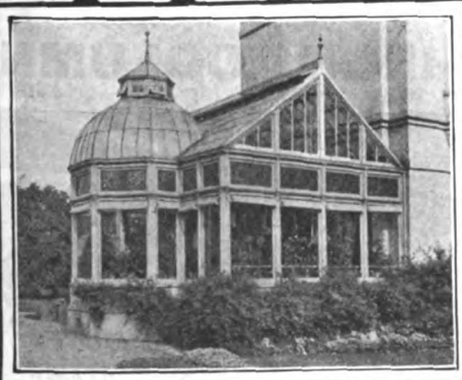
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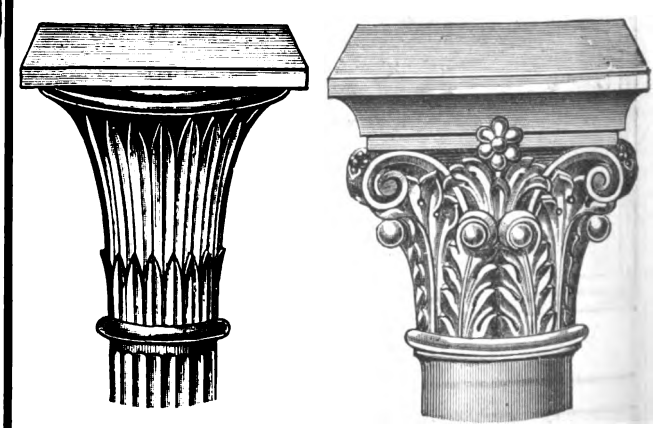
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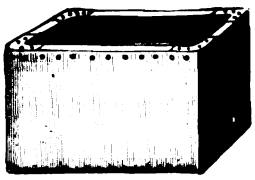
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P. A. GILBERT WOOD,

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Under no circumstances whatever can the Proprietors of this Journal guarantee alteration of copy if received after the first post on Tuesday mornings, and no proofs can be submitted if copy arrives later than first post on Saturday mornings.

EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

TENDERS, ETC.

**** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITIONS OPEN.

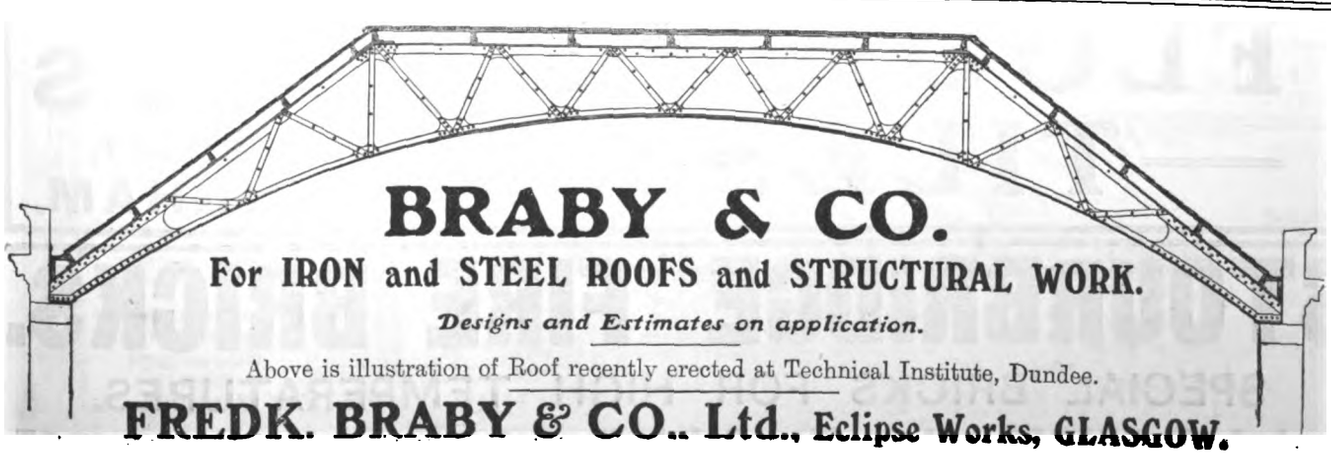
GLASGOW.—July 31.—The patrons of the Royal Incorporation of Hutchesons' Hospital invite designs for laying out for feuing and building about 195 acres of their lands of Thornliebank, Eastwood. Premiums of 100*l.*, 75*l.*, 50*l.* and 25*l.* will be awarded. Deposit 3*l.* 3*s.* Messrs. Hill & Hoggan, 194 Ingram Street, Glasgow.

GRIMSBY.—July 30.—For the extension of the town hall, at an estimated cost of 26,000*l.* Premiums of 250*l.*, 150*l.* and 100*l.* will be awarded. An eminent architect will act as assessor in conjunction with the borough engineer. Deposit 2*l.* Apply to Mr. H. Gilbert Whyatt, A.M.I.C.E., borough engineer, Town Hall, Grimsby.

MOLESEY.—June 1.—The East and West Molesey Urban District Council invite plans, with specifications and estimates, for an isolation hospital. Mr. D. Cann, Clerk, Council Offices, East Molesey.

MOSSLEY.—May 24.—For the erection of a mixed elementary school to accommodate 550 children, and an infant school for 300 infants, on land adjoining Mill Lane. Premiums 15*l.* 15*s.* and 5*l.* 5*s.* Borough Surveyor, Town Hall, Mossley, Lancs.

READING.—June 15.—The Berkshire County Council invite designs for offices, committee rooms, &c., on the Forbury, Reading. Mr. Mervyn Macartney, F.R.I.B.A., assessor. Premiums of 100*l.*, 75*l.*, and 50*l.* Deposit 1*l.* 1*s.* Apply to Mr. J. Fred Hawkins, county surveyor, Bank Chambers, Cross Street, Reading.



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Ashington.—May 17.—For additions to the Isolation Hospital near North Seaton Station. Mr. Alexander Wood, surveyor, Council Chambers, Ashington, Northumberland.

Ballintemple (Cavan).—May 15.—For repairing and refurnishing Ballintemple Church. Mr. R. N. Wellwood, C.E., Spring Villa, Cavan.

Barrow-in-Furness.—May 10.—For taking down and re-erecting Mr. F. J. Ramsden's lodge at the foot of Mill Brow. The Borough Engineer, Town Hall, Barrow-in-Furness.

Birkenhead.—May 17.—For repairs, &c., at the Poor-law offices, Conway Street. Mr. John Carter, clerk, Poor-law Offices, Birkenhead.

Birmingham.—May 19.—For erection of the superstructure of extension of Council House. Deposit 10*l.* 10*s.* Drawings and particulars to be seen at offices of architects after May 31. Tenders to be sent in by June 14. Send names by May 19 to Messrs. H. V. Ashley & Winton Newman, the architects, 14 Gray's Inn Square, London, W.C.

Cottingham.—May 13.—For the whole of the works required in erection of new offices, council chamber, surveyor's house and fire station, Market Green, Cottingham, near Hull. Deposit 1*l.* Messrs. Gelder & Kitchen, architects, Hull.

Coventry.—May 18.—For erection of out-patients' department at the Coventry and Warwickshire Hospital. Deposit 2*l.* 2*s.* Mr. Herbert W. Chattaway, Trinity Churchyard, Coventry.

Cheltenham.—May 12.—For erection of an engine-room at workhouse laundry. Mr. J. Meek, clerk, Union Offices, Swindon Road, Cheltenham.

Crumpsall.—May 19.—For erection of a block to accommodate able-bodied men and for the other additions and alterations to the workhouse at Crumpsall, near Manchester. Deposit 1*l.* 1*s.* Mr. A. J. Murgatroyd, architect, 23 Strutt Street, Manchester.

Cockfield.—May 18.—The Durham County Council invite sole tenders for new Council school at Cockfield for about 210 children. Mr. F. E. Coates, Shire Hall, Durham.

Dipton.—May 12.—For alterations and additions to the Black Bull Inn. Mr. T. H. Murray, architect and surveyor, Consett, Durham.

Ditton.—May 22.—For the erection of an elementary school for 120 scholars at Ditton, near Widnes. Deposit 2*l.* Mr. Henry Littler, county architect, 16 Ribblesdale Place, Preston.

Durham.—May 18.—The County Council invite sole tenders for new Council school at Haverton Hill, for about 900 children. Mr. W. Rushworth, Shire Hall, Durham. For Council school at Dunston (Glebe Estate), for about 800 children. Messrs. J. Potts & Son, architects, 57 John Street, Sunderland. For alteration at Washington Biddick Council school. Plans and specification only, Mr. F. E. Coates, Shire Hall, Durham.

Edinburgh.—May 10.—For erection of a motor-garage at the City Hospital, Comiston Road. Mr. J. A. Williamson, A.R.I.B.A., Public Works Office, City Chambers, Edinburgh.

Enfield.—May 12.—For erection of a public library on land adjoining the Hertford Road, Enfield Highway. Deposit 2*l.* 2*s.* Mr. Richard Collins, surveyor, Public Offices, Enfield.

Falmouth.—May 8.—For proposed additions and alterations at the Falmouth County High School. Mr. Sampson Hill, architect, Green Lane, Redruth.

Frizington.—May 12.—For extension of the Freemasons' Hall. Mr. Edmund Jackson, civil engineer, Whitehaven, Cumberland.

Glasgow.—May 17.—For the following works in connection with tramway depôt, Newlands Field, viz.:—(1) Digger, mason and brick works; (2) carpenter and joiner works; (3) cast-iron and steel works; (4) patent roof glazing; (5) slater work; (6) plumber work; (7) plaster work; (8) painter work. Deposit 2*l.* 2*s.* Mr. James Dalrymple, general manager, 46 Bath Street.

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HALIFAX.—May 15.—For all trades required in erection of a precipitant store at the sewage works, Salterhebble. Deposit 1*l.* Mr. James Lord, M.I.C.E., borough engineer. Town Hall, Halifax.

HAWES (YORKS).—May 12.—For alterations and additions at Hawes Council school. Mr. J. C. Wrigley, secretary, County Hall, Northallerton.

HEMSWORTH.—For erection and completion of athletic club buildings at Hemsworth Collieries, near Wakefield. Deposit 1*l.* 1*s.* Messrs. Garside & Pennington, architects, Pontefract and Castleford.

HOVE (SUSSEX).—May 24.—For enlarging the administration block, constructing porter's lodge, water tower and destructor, forming paths, laying drains and other work at the Infectious Diseases Hospital at Portslade. Deposit 2*l.* 2*s.* Mr. H. Hamilton Scott, borough surveyor, Town Hall, Hove.

IRELAND.—May 15.—For building and completing dwelling-house and shop at Donegal Street, Rosemount, Londonderry. Mr. Patrick H. Elliott, C.E., architect, 12 and 14 Castle Street, Londonderry.

IRELAND.—May 8.—For building and fencing nineteen single labourers' cottages for the Milford Rural District Council. Mr. S. Watters, clerk, Milford, County Donegal.

IRELAND.—May 20.—For executing structural improvement, extensive repairs, and painting of Irvinestown Church, parish of Derryvullen North. Mr. Robert Wilson, hon. secretary, Castle Irvine N. School, Irvinestown.

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LONDON.—May 11.—For erection of a brick wall and iron railing along the south side of Cloudesley Place, N., for the Islington Borough Council. Deposit 1*l.* 1*s.* Mr. J. Patten Barber, borough engineer, Town Hall, Upper Street, N.

LONDON.—May 12.—For erection of a transformer-house, switch-room, coal-store, and book-store at the Edmonton Workhouse, Upper Edmonton, N. Deposit 1*l.* 1*s.* Mr. Stuart Hill, architect, 106 Cannon Street, E.C.

MANSFIELD.—May 10.—For erection of twenty houses in Carlton Street. Mr. John F. S. Moss, architect and surveyor, Queen Street, Mansfield.

MILFORD HAVEN.—May 15.—For erection of a Congregational church, schoolrooms, vestries and caretaker's cottage. Deposit 1*l.* 1*s.* Messrs. D. Edward Thomas & Son, architects, 17 Victoria Place, Haverfordwest.

NEWQUAY (CORNWALL).—May 8.—For erecting County school at Newquay, for the Cornwall education committee. Mr. B. C. Andrew, architect.

OVENDEN.—May 14.—For the trades required in erection of a Liberal Club at Moorside, Ovenden, Halifax. Mr. Lister Coates, A.R.I.B.A., architect, Central Chambers, 10 Central Street, Halifax.

PADIHAM (LANCS.).—May 12.—For the following for the gas committee:—(1) Retort and boiler chimneys at the new gasworks; (2) engine and boiler-house at the new gasworks; (3) pipe trench for gas main to Sabden. Mr. A. J. Harrison, gas engineer, Inskip Street, Padiham.

POUNDSTOCK.—May 15.—For erection of a farmhouse at Treskinnick, in the parish of Poundstock, near Bude. Mr. S. G. Carnell, county land agent, Public Rooms, Truro.

SCOTLAND.—May 10.—For the mason, steel and iron, carpenter, joiner and glazier, plaster and slater works in connection with the erection of the Carnegie baths, Forfar. Send names to Mr. Hippolyte J. Blanc, R.S.A., architect, 25 Rutland Square, Edinburgh, or Mr. William Gordon, police clerk, Forfar.

SCOTLAND.—May 18.—For erection of a rocket life-saving apparatus house at St. Abbs, for the Board of Trade. The Coast Guard Station at Berwick.

REDHILL.—May 12.—For erection of an elementary school at St. John's, Redhill. Send names to Mr. A. Lund Newell, secretary, the Reigate education committee. Deposit 1*l.* 1*s.* Messrs. T. R. & V. Hooper, architects, Market Hall, Redhill.

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ST. ABBS.—May 18.—For erection of a rocket life-saving apparatus house at St. Abbs, for the Board of Trade. The Coastguard Station at Berwick.

SALISBURY.—For erection of three dwelling-houses and shops in Fisherton Street. Mr. Fred Bath, F.R.I.B.A., F.S.I., architect and surveyor, Salisbury.

SCOTLAND.—May 11.—For the mason, carpenter, slater, plumber, plaster, painter and glazier works of additions and alterations to the Station Hotel, Fraserburgh. Mr. Wm. S. F. Wilson, architect, 6 Broad Street, Fraserburgh.

SCOTLAND.—May 14.—For mason, carpenter, slater, plaster and plumber work of dwelling-house at Denhead, Jessiefield, Countesswells. Mr. William Sim, Jessiefield.

SCOTLAND.—May. 14.—For mason, joiner, plumber and plaster works of proposed miners' rescue station, Cowdenbeath. Mr. David B. Campbell, architect, Victoria Buildings, Cowdenbeath.

SCOTLAND.—June 11.—For mason, carpenter, slater, plasterer, plumber, painter and glazier works of additions to the Masonic Institute, Buckie. Messrs. D. & J. R. M'Millan, architects, 105 Crown Street, Aberdeen.

SCOTLAND.—May 14.—For the mason, carpenter, plumber, painter and glazier work of alterations at 16 Commerce Street, Elgin. Mr. James Jamieson, architect, 77 High Street, Elgin.

SEAHAM HARBOUR.—May 11.—For the whole of the work required in erection of P.M. church and caretaker's house. Mr. J. W. F. Phillipson, architect, Murton Chambers, 8 Grainger Street, Newcastle-on-Tyne.

SHEERNESS.—May 25.—For erection of a mineral-water factory, stables, &c., at Railway Road. The Sheerness and District Licensed Victuallers' Mineral Water Co., Ltd.

SHILDON.—May 10.—For alterations to the ceiling of the Shildon Wesleyan Church. Messrs. Kitching & Lee, architects, Houndgate Chambers, Darlington.

STANSFIELD.—May 12.—For the various works required in erection of two semi-detached houses, Eastlee, Eastwood. Messrs. Sutcliffe & Sutcliffe, architects, Todmorden and Hebden Bridge.

WALES.—May 8.—For erection of a vicarage at Mydrim, near St. Clears. Mr. Hugh Thomas, architect and surveyor, 9 Victoria Place, Haverfordwest.

WALES.—May 8.—For erection of twenty-five houses at Edwardsville, Treharris. Mr. William Dowdeswell, architect, Treharris.

WALES.—May 10.—For erection of a Council school to accommodate 100 children, at Magor, near Newport. Deposit 2*l.* 2*s.* And for a new Council school to accommodate forty-eight children, at Whitebrook, in the parish of Llandogo, near Monmouth. Deposit 1*l.* 1*s.* Mr. C. Dauncey, secretary, County Council Offices, Newport, Mon.

WALES.—May 10.—For erecting a residence and stables at Pembrey, near Llanelly. Deposit 3*l.* 3*s.* Send names to Mr. Arthur S. Williams, M.A., architect, Llandilo.

WALES.—May 10.—For erection of thirty or more houses, together with boundary walls and drains, for the Turberville Building Club at Pont Rhondda, Llwynypia. Messrs. W. Morgan Lewis & T. Naunton Morgan, architects and surveyors, Dunraven Street, Tonypandy, and Dyffryn Chambers, Pontypridd.

WALES.—May 12.—For erection of a pair of semi-detached villas and one single villa at the Lansdowne Road, Abergavenny. Mr. J. Mann, jun., architect and surveyor, 27 Lancaster Villas, Merthyr.

WALES.—May 15.—For building a north aisle, vestry, &c., to Holy Trinity Church, Abergavenny. Deposit 2*l.* 2*s.* Mr. E. A. Johnson, F.R.I.B.A., architect, Abergavenny.

WALES.—May 19.—For pulling down certain old buildings and erecting complete a small post office and telephone exchange at Brynmawr. Mr. W. H. Dashwood Caple, F.R.I.B.A., architect, 2 Church Street, Cardiff, or Mr. J. G. Bishop, solicitor, Brynmawr.

WALES.—May 21.—The Board of Trade invite tenders for erection of a rocket life-saving apparatus house at Port Talbot. Harbour Master's Office, Port Talbot.

WALES.—May 13.—For erection of a church at Caerau, near Maesteg, to seat 545 persons. Mr. George E. Halliday, F.R.I.B.A., 19 Castle Street, Cardiff.

WARMINSTER.—May 12.—For rebuilding Fern Cottage, Bell Hill. Mr. A. F. Long, architect, 53 Market Place, Warminster.

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WINCHESTER.—May 17.—For works in connection with new county offices. Persons desirous of tendering may inspect the specifications, conditions of contract and plans, and obtain copies of bill of quantities of contract No. 1; also obtain copies of plans, section and specification, and inspect the conditions of contract No. 2, and all other necessary information of Mr. W. J. Taylor, county surveyor, the Castle, Winchester. Contract No. 1, erection of a block of buildings, containing fifty-one office and store rooms, &c., mostly flint-faced with stone dressings. Deposit 10*l.* 10*s.* Contract No. 2, construction of about 2,000 square yards of Hennebique concrete flooring in the new building. Deposit 2*l.* 2*s.*

TENDERS.

BAKEWELL.

For the erection of the Men's Institute. Mr. E. M. LONGSDON, F.S.I., architect, Bakewell.

Eyre	£854 12 0
T. & F. Bates	840 2 2
Twyford & Son	815 11 9
Wildgoose	729 13 0
CLARK, Bakewell (*accepted*)	705 0 0

BARNET.

For erection of a pump house and the construction of a well-shaft and machinery foundations at the workhouse. Mr. J. C. MELLISS, M.I.C.E., 264 Gresham House, Old Broad Street, E.C.

Baughen	£313 0 0
Pearson & Son	254 0 0
BUTCHER, New Barnet (*accepted*)	228 0 0

BIGGLESWADE (BEDFORDSHIRE).

For the erection of printing works. Mr. THOMAS COCKRILL, A.M.I.C.E., architect, Biggleswade.

Redhouse & Son	£1,029 0 0
Bartle & Son	999 0 0
Wrycroft & Son	999 0 0
WRIGHT, Langford (*accepted*)	900 0 0

BEXHILL.

For central parade improvement, erection of colonnade, pavilion, shelters, bandstand, deck promenade, &c. Mr. G. BALL, borough surveyor, Bexhill.

Every	£3,767 6 5
Pattinson & Sons	3,743 6 5
Pethick Bros.	3,702 6 5
Carey	3,610 9 8
Peirson & Co.	3,584 10 4
Peskett & Co.	3,413 2 9
Peerless Dennis & Co.	3,303 6 5
Fryer & Co.	3,274 6 5
GENERAL IRON FOUNDRY CO., Upper Thames Street, E.C. (*accepted*)	3,193 0 0

DARTFORD (KENT).

For cleaning and painting works and repairs at Darenth Asylum, for the Metropolitan Asylums Board. Mr. W. T. HATCH, M.Inst.C.E., engineer-in-chief.

Smith & Son	£2,928 11 0
Lowe & Co.	2,789 0 0
Gunning & Sons	2,609 5 8
Holdsworth	2,539 17 0
Nightingale	2,189 0 0
Simms & Sons	1,902 0 0
Ellingham	1,789 0 0
Wright	1,577 8 8
Vigor & Co.	1,576 0 0
Inns	1,549 0 0
KAZAK, Belvedere (*accepted*)	1,329 9 8

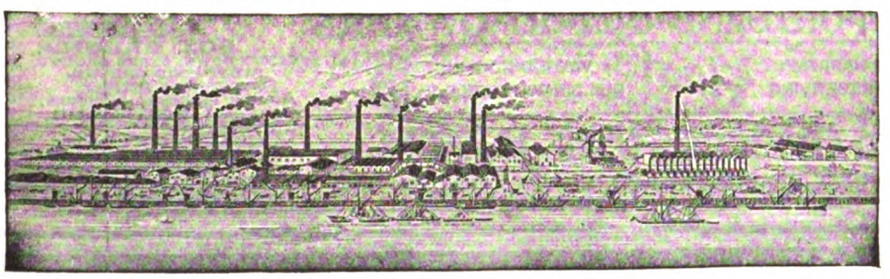
DEVONPORT.

For providing and constructing a new drainage system and other sanitary work at the workhouse, Ford, Devonport, for the Devonport Board of Guardians. Mr. CHAS. CHEVERTON, M.S.A., architect, Devonport.

Beattie	£1,258 14 0
Allen	932 19 1
Smith & Son	929 15 0
Sale	925 0 0
Wakeham	915 0 0
Crockerell	844 4 0
Budge & Co.	786 0 0

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J. Shaddock	875	0	0
Stevenson	800	0	0
T. Shaddock	779	9	0
Jefford & Sons	748	13	4
Stephens	732	0	0
Jenkin & Son	725	0	0
Steer & Pearce	712	4	0
Pearn Bros.	654	0	0
W. C. SHADDOCK, Plymouth (*accepted*)	641	2	3

DURHAM.

For making a new road to the proposed goods siding at Ushaw Moor Station.

Oliver	£266	11	9
Meredith	164	19	7
Walton	141	0	0
CARRICK, Durham (*accepted*)	123	17	11

FENTON.

For the construction of a corridor and alterations of a staircase at the town hall (with the object of rendering the larger hall safer in case of panic). Mr. S. A. GOODALL, surveyor.

Goodwin	£522	0	0
Ball & Robinson	520	0	0
CAULCOTT, Fenton (*accepted*)	519	0	0
Walters, jun.	510	0	0
Tomkinson & Bettelley	495	0	0

GAINSBOROUGH (LINCS.).

For erection of, or additions to, elementary schools, for the Lindsey County Council education committee, viz.:—Ropery Road, Gainsborough (new block); South Killingholme (new school with teacher's house); Skegness Council (additions); Crosby (additions). Messrs. SCORER & GAMBLE, architects, Lincoln.

Crosby.

Sykes	£1.970	10	0
Thompson	1.920	0	0
SCARBOROUGH, Lincoln (*accepted*)	1,784	0	0

GAINSBOROUGH—*continued.*

Skegness.

Cade	£595	0	0
Hockley & Co.	497	3	10
Thompson	485	0	0
Wainer	440	0	0
Kime	438	0	0
Turner & Sons	436	0	0
Elmes	430	0	0
SCARBOROUGH, Lincoln (*accepted*)	384	18	4

Ropery Road, Gainsborough.

Dorrington	3,700	0	0
Cooling	3,674	0	0
Wright & Son	3,558	0	0
Burrell	3,330	0	0
Scarborough	3,307	0	0
Pumfrey	3,250	0	0
ELMES, North Street (*accepted*)	3,240	0	0

HENDON.

For road and sewer works, for the Urban District Council. Mr. S. SLATER GRIMLEY, engineer, Hendon.

Muirhead & Co.	£5,512	4	6
Paterson	4,909	2	1
Champniss & Co	4,856	11	0
Ewart	4,648	13	1
Acme Flooring and Paving Co. (1904)	4,342	11	1
Ballard	4,287	3	0
Brummell	4,217	6	5
Hamiltons	4,209	17	2
Adams	4,150	19	11
Griffiths & Co.	4,138	12	9
Mowlem & Co.	4,098	16	5
Powdrill	4,097	17	2
Williams	3,968	18	2
Watson, jun.	3,873	16	0
PEDRETTE & Co., Finsbury Park, N. (*accepted*)	3.577	6	10

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HIGH LITTLETON.

For erecting a chapel for the Primitive Methodist Society. Mr. G. H. GIBSON, Radstock, near Bath.

Coles	£1,116 11 6
Bristol Joinery and Shop Fitting Co.	995 2 0
Gleed Bros.	978 4 7
Heal	949 8 3
Osman	871 5 6
Flower	787 12 10
Adams & Jefferies	777 0 0
Moore & Son	770 0 0
Padfield	754 4 6
Bird & Son	750 0 0
COLES BROS., Peasedown (*accepted*)	700 0 0

IVER (BUCKS).

For works of sewerage and sewage disposal for the parish of Iver, Bucks, for the Eton Rural District Council. Mr. A. GLADWELL, engineer and surveyor, Slough.

LANGLEY & JOHNSON, Slough (*accepted*)	£5,813 17 0
Engineer's estimate	5,859 0 0

LITTLE COATES (LINCS.).

For building an elementary school, for the Lindsey County Council education committee. Messrs. SCORER & GAMBLE, architects, Lincoln.

Hewins & Goodhand	£8,335 14 6
Moss & Sons	8,300 0 0
Marrows	8,071 0 0
Thompson	7,902 0 0
Longden & Son	7,771 10 0
Pattinson & Son	7,748 0 0
Holmes & Richardson	7,736 0 0
WRIGHT & SON, Lincoln (*accepted*)	7,697 0 0

LONDON.

For relaying with asphalte the carriageway and footways of Throgmorton Street, for the Corporation.

	Carriageway.	Footway
Limmer Asphalte Co.	468 2 6	119 6 3
London Asphalte Co.	467 8 0	115 0 0
Val de Travers Asphalte Co.	450 12 0	118 9 0
FRENCH ASPHALTE CO. (*accepted*)	433 0 0	114 0 0

LONDON—*continued.*

For the extension to stables at the Liverpool Road depôt, for the Islington Borough Council. Mr. J. P. BARBER, borough engineer.

Weibking & Co.	£1,414 15 0
Rawkins & Jackson	1,361 0 0
Sabey & Sons	1,305 0 0
Eyre	1,266 10 0
Stevens & Sons	1,164 0 0
Mattock & Parsons	1,164 0 0
Reason	1,159 0 0
Newell & Lusty	1,148 4 0
Hollingsworth	1,124 0 0
Percy	1,098 5 0
F. & G. Foster	1,080 0 0
McLoughlin & Harvey	1,077 10 0
Nightingale	1,074 0 0
Coles	1,058 0 0
Roberts & Co.	1,019 0 0
Pasterfield & English	1,017 0 0
HYDE & Co., Norwood Junction, S.E. (*accepted*)	924 0 0

For the erection of St. Saviour's Church house, Ealing. Mr. G. H. FELLOWES PRYNNE, F.R.I.B.A., architect, 6 Queen Anne's Gate, Westminster, S.W.

Mussellwhite & Sapp	£4,978 0 0
Walden & Cox	4,694 0 0
Ansell	4,650 0 0
Holland & Hannen	4,589 0 0
Goddard & Sons	4,582 0 0
Jarvis & Sons	4,484 0 0
Carmichael	4,397 0 0
Ogilvie & Co.	4,350 0 0
Myring & Son	4,297 0 0
Wilkins & Sons	4,278 0 0
Bowman & Sons	4,220 0 0
Kingerlee & Son	4,179 0 0
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LONDON—*continued.*

For erection of depôt buildings at Norman Road, Greenwich, for the Greenwich Borough Council.

Buildings, &c., excluding cart shed.

F. & G. Foster	£1,850 0 0
Kirk & Randall	1,734 0 0
Wood Bros.	1,700 0 0
Western	1,659 0 0
Mills & Sons	1,640 0 0
Newell & Lusty	1,600 0 0
Thomas & Edge	1,597 0 0
Groves	1,569 0 0
Gorham	1,554 11 0
Deacon & Son	1,395 0 0
Pasterfield & English (*recommended*)	1,298 0 0

Cart shed.

Pasterfield & English (*recommended*)	98 0 0

For the following paving works, for the Wandsworth Borough Council.

Acuba Street, Southfield.

Harringdon & Co.	£259 4 5

Ashvale Road, Tooting.

Lane & Co.	748 0 0

Earldom Road, Putney.

Adams	427 18 2

For the construction of a new pipe-sewer beneath Rangoon Street, for the Corporation.

Jackson	£565 0 0
Parry & Co.	439 0 0
Anderson	365 0 0
Greig & Matthews	340 0 0
Mowlem & Co.	311 0 0
EWART (*accepted*)	290 0 0

For setting back the fences and forecourt walls of Nos. 78 to 84, 88 to 106 and 116 to 120 (even numbers) Wandsworth Road, for the L.C.C.

Crooks & Co.	£374 0 0
Triggs	266 10 0
HOWARD, Herne Hill, S.E. (*accepted*)	247 18 10
Estimate of the Council's valuer	397 19 0

LONDON—*continued.*

For the erection of a painting shop at the Hammersmith car-shed, for the L.C.C.

Wall	£5,273 0 0
Estimate of the architect	5,140 0 0
J. & C. Bowyer	5,080 0 0
Johnson & Co.	5,005 0 0
Leslie & Co.	4,991 0 0
ROBERTS & Co., Earl's Court Road, S.W. (*accepted*)	4,990 0 0

NEWCASTLE-ON-TYNE.

For new P.M. schools and classrooms, Chilton Lane Ends. Mr. J. W. F. PHILLIPSON, architect, Newcastle-on-Tyne.

George	£1,175 0 0
Rutherford	1,166 5 8
J. W. Moore	1,129 0 0
Fenwick	1,123 0 0
J. Moore	1,110 18 0
Sowerley	1,092 19 3
Kennedy	1,090 0 0
Manners	1,079 14 0
Draper & Sons	1,075 0 0
Hope & Sons	1,063 12 6
Fairnington	1,053 4 9
Lazenby	1,046 9 5
Pearson	1,030 0 0
Brazell	1,027 10 0
Oliver	1,006 10 0
DOUGLAS, New Shildon (*accepted*)	1,001 4 2

PORTSMOUTH.

For alterations to the police department at the Town Hall.

Jones	£340 17 0
Crockerell	237 0 0
Durrant	235 0 0
Coltherup & Woods	235 0 0
Tanner (*recommended*)	225 0 0

For the construction of a ladies' lavatory and alterations to the ladies' cloak-room at the Town Hall.

Jones	£194 0 0
Coltherup & Woods	160 0 0
Durrant	142 0 0
Tanner (*recommended*)	114 0 0

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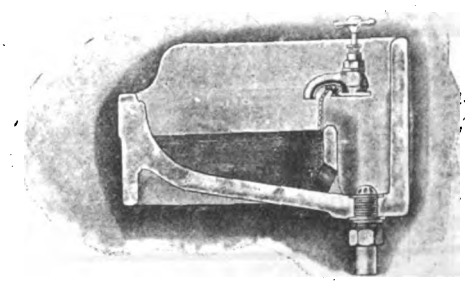
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ILLUSTRATIONS.

WELLINGTON COLLEGE.—PRINCIPAL FRONT TO GREAT HALL—THE GREAT HALL.

HOWE COOMBE, WATLINGTON.

ST. SWITHUN'S, HITHER GREEN, S.E.—INTERIOR, LOOKING EAST.

BISHOPSTONE CHURCH, WILTS.—SOUTH TRANSEPT.

SALISBURY CATHEDRAL.—INTERIOR OF NAVE.

PINNER (MIDDLESEX).

For forming new roads and for other works, Hand-post Field estate. Mr. C. P. AYRES, F.S.I., Watford.

Free & Sons	£1,490 0 0
Dykes	1,444 0 0
Lane & Co.	1,177 0 0
Ford	1,050 0 0
Trueman	1,049 0 0
Brown	1,028 0 0
Catley	1,023 0 0
Bracey & Clark	998 0 0
Kavanagh & Co.	997 0 0
Adams	988 0 0
Mann	980 0 0
Watson	970 0 0
CHAMPNISS & Co., Wealdstone (*accepted*)	890 0 0

SCOTLAND.

For the erection of the Wemyss parish council offices, Buckhaven.

Accepted tenders.

Reekie, Kirkcaldy, mason	£446 4 7
Dewar & Walker, Methill, joiner	403 5 0
J. & T. Stobie, plasterer	147 17 9
Nicoll, plumber	105 12 5
Currie, Kirkcaldy, slater	45 1 6
Dickson & Nairn, painter	41 16 0
Peters, blacksmith	26 0 0

PUTNEY (LONDON).

For additions to the Royal Hospital for Incurables, Putney. Mr. R. L. HESKETH, F.R.I.B.A., architect, 110 Cheapside, E.C.

Parkinson & Son	£7,045 0 0
Lorden & Son	6,191 0 0
Lovatt	6,178 10 0
Leslie & Co.	5,958 0 0
Holloway Bros.	5,835 0 0
Higgs & Hill	5,831 0 0
Bywater & Co.	5,828 0 0
Foster & Dicksee	5,809 0 0
Cubitt & Co.	5,804 0 0
Wallis & Son	5,798 0 0
Dove Bros.	5,757 0 0
Holland & Hannen	5,696 0 0
Patman & Fotheringham	5,656 0 0
Garlick	5,603 14 0
Laurence & Son	5,543 0 0
Carmichael	5,512 0 0
MINTER (*accepted*)	5,415 0 0

SOUTH KILLINGHOLME (LINCS.).

For erection of a new school. Messrs. SCORER & GAMBLE, architects, Lincoln.

Stamp	£2,052 5 0
Usher	2,050 0 0
Thompson	1,851 0 0
Hollingsworth Bros.	1,831 11 0
Pattison & Son	1,800 0 0
Pettifer & Stainton	1,770 0 0
Holmes & Richardson	1,765 0 0
SCARBOROUGH, Lincoln (*accepted*)	1,585 0 0

STONE.

For carrying out the Eccleshall sewerage scheme.

BARKE, Stoke-on-Trent (*accepted*)	£3,371 13 8

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Municipal Buildings, Crewe. Columns and Pilasters. Henry T. Hare, Esq., F.R.I.B.A.

King's Theatre, Southsea. Proscenium Border, Piers, Architraves, &c. Messrs. F. Matcham & Co.

9 Great St. Helen's, E.C. Wall-lining, Dado, &c. Messrs. Ellwood & Sledmere.

Waldorf Hotel. Columns and Pilasters. Messrs. A. Marshall Mackenzie, F.R.I.B.A., & Son.

Central Library, Islington. Columns. Henry T. Hare, Esq., F.R.I.B.A.

Palace Kapurthala. Columns and Pilasters. Messrs. Waring & Gillow, Ltd.

Leigh Town Hall. Columns and Pilasters. J. C. Prestwich, Esq.

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STAFFORDSHIRE.

The Staffordshire education committee at their meeting last week adopted the following tenders.

For the erection and completion of Sedgley proposed special subjects centre.

Gough & Son, Wolverhampton	£1,590 0 0

Proposed Council school.

Guest & Son, Amblecote	3,050 0 0

Kingswinford, Brockmoor, proposed boys' Council school, and enlargement and adaptation of existing Brockmoor Council school as one for girls and infants.

Guest & Son, Amblecote	4,150 0 0

Alterations and improvements at Audley mixed Council school.

Godwin, Hanley	460 0 0

Enlargement and improvement of Onecote Council school and provision of new offices.

Godley, Hanley	479 0 0

Alterations and improvements at Smallthorne, Leek Road Council school.

Moss, Milton	279 0 0

Improved lighting and surface of playgrounds, conversion of offices, &c.

Williams, Great Wyrley	315 0 0

WINCHMORE HILL.

For road repairing and tar paving work, &c., at the Northern (Convalescent) Fever Hospital, for the Metropolitan Asylums Board. Mr. W. T. Hatch, M.Inst.C.E., engineer-in-chief.

Roadamant Co.	£2,042 14 0
Wainwright & Co.	1,622 12 4
Northern Quarries Co.	1,076 18 7
Greenfield	1,021 6 9
Mann	1,012 10 0
Shepherd & Sons	1,011 0 4
Adams	997 0 0
A. C. W. Hobman & Co.	875 0 0
Griffiths & Co.	839 0 0
Grounds & Newton	709 10 0
S. Hobman & Co., Peckham (*accepted*)	649 0 0

WALES.

For erection of a bridge in ferro-concrete over the River Taff at Rhydfelen. Mr. W. E. Lowe, engineer, Pontypridd.

Page, Cardiff (*accepted*)	£575 0 0

WOLVERHAMPTON.

For construction of tramway track and contingent works from Queen Square to Penn Road. Mr. G. Green, M.I.C.E., borough engineer.

Homer & Co.	£12,200 0 0
Graham & Sons	8,347 0 0
J. & W. S. Briscoe	8,203 0 0
Trentham	7,253 5 0
Faulks	7,204 6 6
Griffiths & Co.	7,035 3 0
Stark & Sons	6,885 2 6
Dobson	6,791 11 3
Owens	6,750 0 0
Law	6,579 0 0
Holloway	6,518 8 5
Boswell	6,131 3 2
Trentham, Handsworth (*accepted*)	5,404 0 0

Received too late for Classification.

FRINTON-ON-SEA.

For the erection of a branch bank for Messrs. Barclay & Co. Messrs. Tomkins, Homer & Ley, architects, Frinton-on-Sea, and 54 & 55 Bishopsgate Street Without, E.C. Quantities by Mr. R. H. Mayhew, St. Benet Chambers, Fenchurch Street, E.C.

Ward	£2,596 0 0
Deaves	2,545 0 0
Everett & Son	2,397 0 0
Parsons	2,380 0 0
Chambers	2,348 0 0
Gladwell	2,333 0 0
Farr	2,300 0 0
Dobson & Son	2,296 0 0
Catchpole & Sons	2,272 0 0
Wash	2,258 0 0
Jones	2,179 0 0
Grimwood & Sons	2,159 0 0
Beaumont, Colchester (*accepted*)	2,096 0 0
Architects' estimate	2,185 0 0

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Chelmsford, 12th January, 1909.

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(Signed) William F. Gepp.

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THE INFLUENCE OF RAINFALL ON THE DESIGN OF SEWERS.*

THE author stated that existing records of rainfall are of little value in settling the provisions that must be made for surface water passing to the sewers, which is generally estimated on the basis of the total rainfall over the whole area to be drained. This method, however, frequently leads to inadequate provision for storm water.

Judging from the report of the Royal Commission on Sewage Disposal, it is not unusual for sewers to serve as land drains also, but it is a mistake to allow the quantity of foul sewage which has to be purified, and in some cases lifted, to be increased by a large volume of subsoil water, and suitable precautions would render this unnecessary.

It will generally be found that the augmented cost of dealing with the larger quantity of sewage would in time considerably exceed the cost of repairing the sewer.

Reference was made to the author's experiments undertaken to enable him to estimate the quantity of rainwater absorbed by various surfaces during heavy storms of short duration, and particulars of some heavy rainstorms were quoted from "Records of British Rainfall," by H. R. Mills, D.Sc., LL.D., the average rate of rainfall per hour in these storms being 3 inches during an average period of seventeen minutes.

Since but few reliable records are kept of the rate of rainfall in inches per hour, the author thought that the frequency of heavy storms may be assumed to be greater than is generally believed, and that the provision to be made for storm water, when designing sewers, should be 3 inches per hour during a period of fifteen minutes.

A detailed illustrative description was given for the purpose of demonstrating the author's methods of estimating the quantities of water which may be expected to find their way into the sewers from (*a*) roofs and yards; (*b*) road surfaces; and the opinion was expressed that in the more densely populated centres the proportion of rainwater from roofs and clean yards exceeds that from roads and foul surfaces.

* Abstract of a paper by C. A. Battiscombe read on Monday, May 3, before the Society of Engineers.

Referring to the use for drinking purposes of rainwater from roofs, as sometimes obtains both at home and abroad, the inference was drawn that this water, if allowed to pass into the sewers, is wasted, while at the same time the cost of purification and pumping (if any) is increased.

As regards the cost of providing a separate system of drainage for roof and surface water, the author considered that the cost would not be prohibitive, while the accruing advantages would be considerable.

INSTITUTION OF MUNICIPAL ENGINEERS.

THE inaugural meeting of the members resident in District No. 6 (South-Eastern District Committee) was held at Olympia on Saturday, April 24, 1909, at 11 A.M., when there were present:—Messrs. Henry C. Adams (London), W. Louis Carr (Ruislip-Northwood), S. J. Higgs (London), P. J. May (Wealdstone), A. J. Meeson (Brentwood), B. Partridge (Walthamstow), J. H. Reay (Hertfordshire), J. W. Riggs (Hertford) and G. Simcox (South Mimms). Mr. Henry C. Adams, having undertaken the duty of calling the committee together, opened the proceedings, and asked Mr. A. J. Meeson, surveyor and engineer, Brentwood Urban District Council, member of Council, to preside. Mr. A. J. Meeson then took the chair.

On the proposition of Mr. A. J. Meeson, seconded by Mr. J. H. Reay, it was resolved that Mr. Henry C. Adams, A.M.I.C.E., A.M.I.M.E., A.M.I.E.E., be appointed district chairman; and on the proposition of Mr. A. J. Meeson, seconded by Mr. J. W. Riggs, it was resolved that Mr. Bernard Partridge be appointed hon. district secretary.

It was decided that Messrs. S. J. Higgs, P. J. May, J. H. Reay, J. W. Riggs, W. Louis Carr and George Simcox be appointed members of an executive sub-committee to arrange visits and meetings in conjunction with the chairman and hon. secretary; and later that, having regard to By-law 22, the chairman, hon. secretary and the executive sub-committee should continue in office until the annual general meeting of the Institution, to be held not later than October 1910, when they would become eligible for re-election.

During an informal discussion it was suggested that the utility of the district meetings would be increased in pro-

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portion as the district membership increased, and the hon. secretary was instructed to send a list of all the members in the district to each member, in the hope that it might further this object. The hon. secretary was also instructed to ask the members for suggestions for visits to any suitable works in progress in their neighbourhood, and to ascertain the names of those members willing to contribute papers to be discussed at a district meeting to be held in the autumn.

It was proposed that as far as possible visits to works and meetings for the discussion of papers should be arranged in conjunction with District Committee No. 7, in order to obtain larger attendances, which would be to the mutual advantage of the members in both districts.

Southern District Committee.—The inaugural meeting for the formation of this committee was held at Olympia, London, on April 24, there being present Messrs. E. A. Stickland (Windsor), Horace Boot (Tunbridge Wells), T. C. Barralet (Godstone), Geo. H. Widger (Godstone), Charles Turton (East Grinstead), G. B. Hartfree (Alton), S. B. Drake (Leatherhead), J. Randerson (Sevenoaks), L. Randerson (Strood), John Marshall (Malling), W. Stephenson Raine (Hungerford), A. H. Jennings (Erith), H. F. Newland (Newport, Isle of Wight), E. W. Ray-Johnson (Uckfield) and E. W. Veale (Farnham)

Upon the motion of Mr. E. W. Veale, who had undertaken the preliminary work of organising the committee, Mr. Horace Boot, A.M.I.M.E., M.I.E.E., was unanimously appointed chairman pro tem., the question of the appointment of a permanent chairman being left until the next meeting. Mr. Veale temporarily accepted the hon. secretaryship.

It was proposed by Mr. Turton, seconded by Mr. Randerson and carried, that London be the central meeting place of the committee for ordinary business, but that upon invitation being extended to the committee by members in varying centres of the district, for inspection of works, &c., the meetings should be held at such centres if so decided.

Upon the invitation of Mr. Horace Boot it was proposed by Mr. Hartfree, seconded by Mr. Ray-Johnson and carried, that the next meeting of the committee should be held on June 5 at Tunbridge Wells. A cordial vote of thanks to Mr. Boot for presiding, and to Mr. E. W. Veale for organising the committee, terminated a very successful meeting.

South-Western District Committee.—A meeting was held at Exeter on April 22 for the purpose of forming the South-Western District Committee of the Institution. The following were present:—Messrs. S. Algar (Exeter), C. Owen Baines (Paignton), J. Hanson (Tiverton), H. A. Hughes (Tiverton), S. Hutton (Exmouth), Thomas Jones (Crediton), Frank Latham (Penzance), T. Orchard (Clutton). Mr. B. Wyand, the secretary of the Institution, attended, and Mr. Latham occupied the chair.

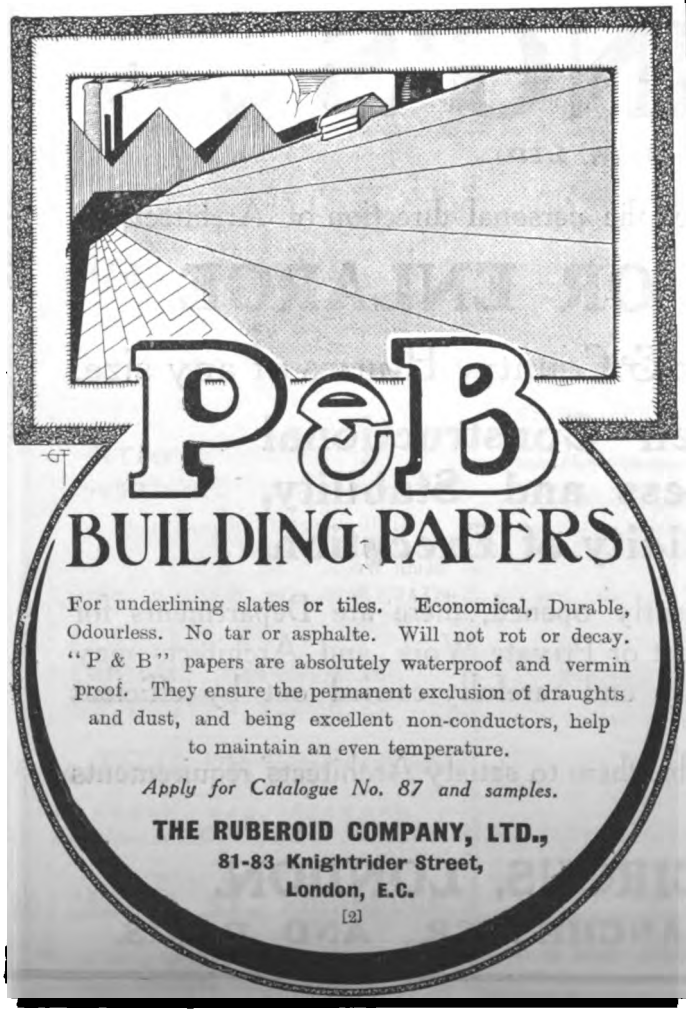
Mr. Latham was elected district chairman, and Mr. Baines hon. district secretary. In order that local representation upon the Council should not be weakened by the fact that Mr. Latham was already a member of the Council, Mr. Hutton was recommended for election on the Council of the Institution, and the secretary was instructed to communicate this desire at the next Council meeting. With reference to the question which was raised of transferring Somerset to the Western District, it was decided to preserve intact the South-Western District, as mapped out by the President of the Institution.

TRADE NOTES.

The Coalbrookdale Company. Ltd., have supplied the Tilt fire to the Duke of Argyll for Roseneath Castle.

Mr. George Coats, of Glen Tanar, N.B., has given an Episcopal church to Aboyne, near Aberdeen, and commissioned William Morris & Co. (Ruskin House), Ltd., Westminster, to supply the windows with glass of the early fifteenth century. The chancel window is richly decorated and strictly to the period, whilst the remainder of the windows are formed of actual old glass collected by the firm for the general filling, and have valuable specimens of Flemish and Swiss heraldic and ecclesiastical coloured glass introduced. The architects were Messrs. Fryers & Penman, of Largs, N.B.

Mr. E. P. Hooley, the Notts county surveyor, has been invited to read a paper before the American section of the International Road Congress at Seattle on tar macadam and the maintenance of roads.



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BUILDING TRADES EXHIBITION.

ALTHOUGH the Building Trades Exhibition is now closed there is no reason to believe that it is forgotten by those to whom it was intended to appeal. According to the popular verdict—the jury was non-technical as well as technical—it may be accepted as the most attractive of the series. The number of visitors was very large and included many who were highly welcome to the exhibitors. It is to be hoped that there will be a good harvest to reward the enterprise of the building trades.

We have already given a detailed account of a considerable proportion of the stands; but there still remain one or two which call for a more particular notice than is afforded in the classified list of exhibitors with which we conclude our articles on the memorable Building Trades Exhibition of 1909.

Panels, Ltd., of Birkenhead, produce repoussé work and decorative metal work for use as friezes, overmantels, or other spaces where panels can be introduced with effect. The materials employed are copper or brass or silver. In decoration of this sort there ought to be the greatest possible care in the selection of designs and designers, if it is to win a place in the esteem of architects. The Stand showed one panel in silver (designed, we believe, by Mr. Gilbert Bayes) which is worthy of a place anywhere, and conclusively shows how effective and artistic they can be. By the new methods a picture can be reproduced up to 3 feet by 4 feet, and Panels, Ltd., are ready to reproduce any special design. They have already a very large selection ranging from Classic processions to a twentieth century lifeboat rescue. The work would be particularly suitable for passenger ships, cafés, or hotels, smoking-rooms or libraries. Architects can incorporate the panels in their scheme of interior decoration with most pleasing results.

A few months ago samples of roofing tiles made by the *Nostell Brick and Tile Works*, near Wakefield, were sent to undergo weathering tests in London. We give below the results. A sample when totally immersed in water for twenty-four hours absorbed 0.28 per cent. A sample when totally immersed in water for seven days absorbed 0.33 per cent. A sample when subjected to an atmosphere of damp sulphurous acid gas (after saturation with water) for fourteen days remained unaffected. A sample when subjected to an average temperature of 25.4 degrees frost, being saturated with water and frozen and thawed twelve times remained unaffected. A sample when subjected to an average temperature of 25.4 degrees frost, being frozen and thawed twelve times (dry) remained unaffected. These results are conclusive proof that the tiles are as good as they look. The Stand had a buff terra-cotta entrance doorway. The Nostell Brick and Tile Works, as their name implies, make red and blue bricks as well as plain and ornamental roofing and flooring tiles.

The *Globe Trading Company*, of Haarlem, Holland, exhibited at Stand 214, Row N, Cruyff's patent panic-proof revolving door, which they sold at the Exhibition to the Carlton Hotels Company, Ltd., for the Pall Mall entrance to the hotel. The special features claimed for this new patent are as follows:—This revolving door has distinct and important advantages. It has a safety handle in each of the four panels, which, if pulled down, immediately closes the four wings, whether in action or not. The action of folding up the wings causes the bolt to be withdrawn from the floor, and the whole door can be moved aside in a few seconds. This is a most important advantage, not only in case of panic, but it also enables bulky packages to be carried through and gives free access or exit.

One of the Stands honoured with a detailed inspection by the Prince and Princess of Wales was that of *Messrs. William Mallinson & Son*, and their Royal Highnesses expressed great admiration for the quality and variety of the woods and carving. Part of the Stand was partitioned off as a room for the purpose of showing the excellent effect of an apartment panelled with finely figured Italian walnut. The work was executed from the designs of Mr. H. Tanner, jun., by Mr. H. H. Martyn, of Cheltenham, who carried out the remarkable hand carving shown by Messrs. Mallinson. There were also numerous polished panels of rare fancy woods, and a big stock of seasoned hardwoods selected for high-class joinery in interior decoration and shop-fitting. This Stand received very general attention throughout the exhibition.

The *British Panelling Guild, Ltd.*, are exploiting the Mansfield-Robinson's patents, and should meet with considerable success in putting this form of decoration within the reach of many houseowners who are at present unable to

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indulge their desire for it by reason of the cost. Their inclusive price is 1s. 6d. per foot super in the London district; this, it is important to remember, is inclusive of sterile oiling, capping and skirting rail; or, if moulded, the price is 3d. per super foot more. The panelling requires neither screws nor nails, and can be either a tenant's or a landlord's fixture. One feature of it is the rapidity with which it may be fixed. The system was used in the *Daily Mirror* Perfect Cottage at the Franco-British Exhibition and was awarded a gold medal. It is made at Samuel Elliott & Sons', Ltd., joinery and moulding works, Caversham, Reading.

"Red Cross" brand of Portland cement and "Reinforcrete" are the two products of the *Wouldham Cement Company, Ltd.*, a business which was established in 1855, and has now a weekly output of 3,000 tons from their Lion Works at Grays, in Essex. The company guarantee that the "Red Cross" brand more than fulfils the requirements of the revised British Standard Specification. Messrs. Henry Faija & Co. recently carried out some tests which fully prove this statement. Thus, the residue left after sifting through a 180 by 180 mesh sieve was 13.7 per cent., instead of the 18 per cent. allowed, and when a 76 by 76 sieve was used, the residue was 0.4 instead of 3 per cent. The tensile strain on briquettes seven days and twenty-eight days from gauging averaged 539 lb. and 677 lb. per square inch respectively, compared with the 400 lb. and 500 lb. set down in the standard specification. The sample expanded 3 millimetres, compared with the 10 millimetres permissible after twenty-four hours aeration. The other tests were of a no less satisfactory character. Tests were also carried out on a sample of "Reinforcrete," which is specially manufactured for reinforced concrete work, and with equal success. The Wouldham Cement Company export to most parts of the world, and have their own cooperages where casks are made which render leakage practically impossible.

The *Moule's Patent Earth Closet Co.* were exhibiting at Stand 245, Row P., their new patent pedestal earth closet, with draw-out mechanism. The earth closets of Messrs. Moule & Co. have been before the public for so many years that architects are generally well acquainted with the system.

Cornish granite was shown by *John Freeman, Sons & Co., Ltd.*, who have their headquarters at Penryn. Part of the stand was formed of the granite balustrading and piers in course of erection at the new reservoir at Chingford for the Metropolitan Water Board. The material has been used on several recent London buildings, including the L.C.C. Technical Schools, Southampton Row, New Old Bailey, Embankment Wall, new County Hall, New Scotland Yard extension, &c. The quarries are equal to supplying 500,000 cubic feet of dressed granite a year.

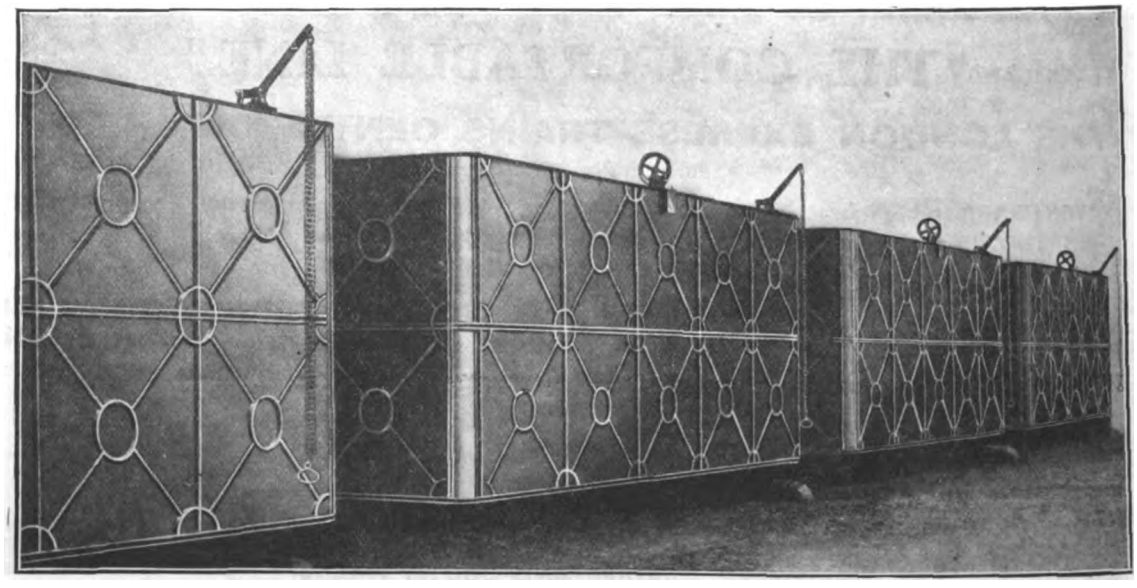
The *Strebel Boiler Co., Ltd.*, had in Bay 5 of the Gallery the hot water boiler "Kennet" and the low pressure steam boiler "Dorchester." These consist of upright O-shaped cast-iron sections connected at top and bottom with push-nipples, making a reliable and elastic metallic joint. They are intended primarily for heating buildings. This make of boilers has obtained very wide popularity by reason of their simplicity and efficiency.

On Monday the *Kleine Patent Fire-Resisting Flooring Syndicate, Ltd.*, gave a demonstration of the effect of heavy loads falling from a height on their floor. A stone weighing 90 lb. was dropped from 10 feet on to the centre of the floor, measuring 20 feet by 12 feet, the clear span between girders being the latter dimension. After repeated falls on the same spot, about 15 inches square, a hole was knocked through, the stone remaining suspended on the tension bands. Similarly a 30-lb. iron shot was dropped from 18 feet on to another part with much the same effect. Against the side of the floor, consisting of one of the 9 by 4 girders, a glass measuring tube was placed, so that any thrust or pressure on the steelwork would break it. A hen's egg was also laid on the concrete surface a few feet from where the stone was dropped, so that the least vibration would crack it. On examination afterwards it was found that every portion of the floor, except the small spaces on which the weights had fallen was unharmed; neither the glass tube nor the egg showed any fracture, and there was absolute cohesion of the cement mortar joints in which the iron tension bands were embedded.

We are unable to find room for a detailed notice of each of the Stands, consequently we conclude by mentioning the names of those exhibitors to whom no allusion has yet been made:

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Geo. Farmiloe & Sons ; James Gibbons; Stanley Jones & Company; C. J. Thursfield & Company; Wenham & Waters, Limited ; E. Worrall & Company.

Baths and Bath Rooms.—John Bolding & Sons ; Davis, Bennett & Company; Ellkay & Company, Limited; Farringdon Works and H. Pontifex & Sons, Limited ; Fenlon & Son ; John Jones (Chelsea), Limited ; Patent Tip-Up Bath Company ; Wenham & Waters, Limited.

Boilers (Domestic).—W. J. Burroughes ; Eagle Range and Gas Stove Company, Limited ; Ellkay & Company, Limited ; Fenlon & Son ; Loco Vapour-Gas Light Company, Limited ; London Warming and Ventilating Company, Limited ; J. F. Phillips & Son ; Thomas Potterton ; James Stott & Company ; Smith & Wellstood ; Werner, Pfleiderer & Perkins, Limited.

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Carving.—Bath Cabinet Makers' Company, Limited ; John Daymond & Son.

Chimney Pots, Cowls, etc.—G. Gross ; Haunchwood Brick and Tile Company, Limited, and G. W. Lewis' Tileries, Limited ; Jno. Knowles & Company ; E. G. Wright.

Concrete Mixers.—Ransome verMehr Machinery Company ; Stothert & Pitt.

Damp-course Roofing Felts, etc.—D. Anderson & Son ; Bitumite Damp-course Company, Limited ; R. W. Blackwell & Company, Limited ; Corsite Sales Company, Limited ; Dublin Asphalte and Flat Roofing Company ; F. Jones & Company ; La Brea Asphalte Company, Limited ; Limmer Asphalte Paving Company, Limited ; F. McNeill & Company ; Vulcanite, Limited.

Door Furniture and Fittings, etc.—Birmingham Guild of Handicraft ; James Gibbons ; H. G. Goodwin & Son.

Doors.—H. C. Cleaver, Limited ; Globe Trading Company ; Pemberton, Arber & Carey ; Stavers & Stavers ; Jno. P. White.

Drain Testing Appliances.—Banner Sanitation Company ; Burn Brothers ; Cakebread, Robey & Company ; H. Hart ; Webb Lamp Company, Limited ; Jno. Yates & Company, Limited.

Drain Cleansing Machines.—Ward, Skelding & Company.

Drawing Office Specialities.—L. Franklin ; B. J. Hall & Company ; S. C. & P. Harding, Limited ; Limmer & Company ; Vincent Brooks, Day & Son, Limited.

Electric Light Fittings.—Teale Fireplace Company ; C. J. Thursfield & Company.

Entrance Gates.—Jno. P. White ; E. Worrall & Company, Iron Gate Works.

Fencing.—Economic Fencing Company, Limited ; Fernden Fencing Company ; T. W. Palmer & Co.

Filters.—Candy Filter Company, Limited.

Fire Extinguishers and Appliances.—J. Blakeborough & Sons ; Messer & Thorpe.

Floors, Fire-Resisting, and Materials.—Jos. F. Ebner ; Fireproof Partition and Spandrel Wall Company ; Lewis Construction Company, Limited ; Manu Marble Company, Limited ; Newellite Glass Tile Company, Limited ; Sideolith ; Vulcanite, Limited.

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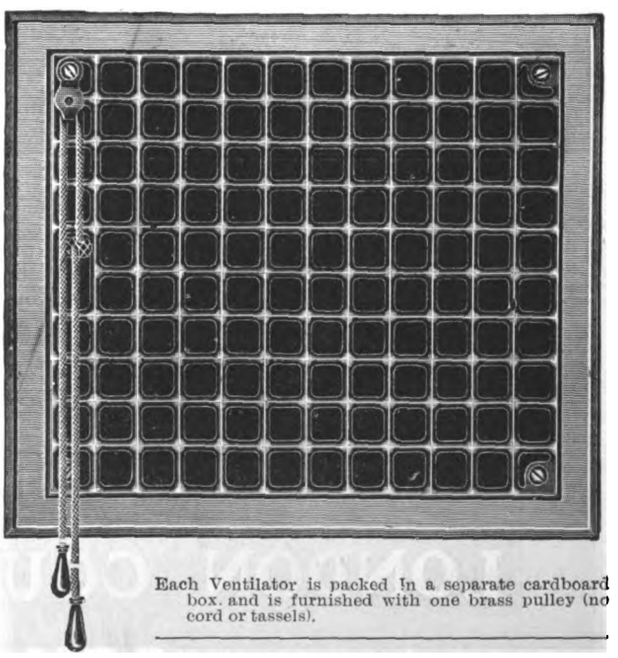
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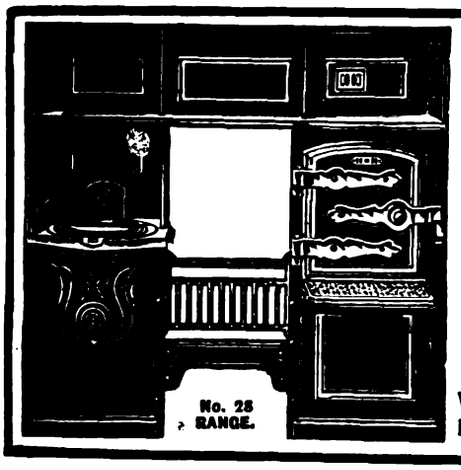
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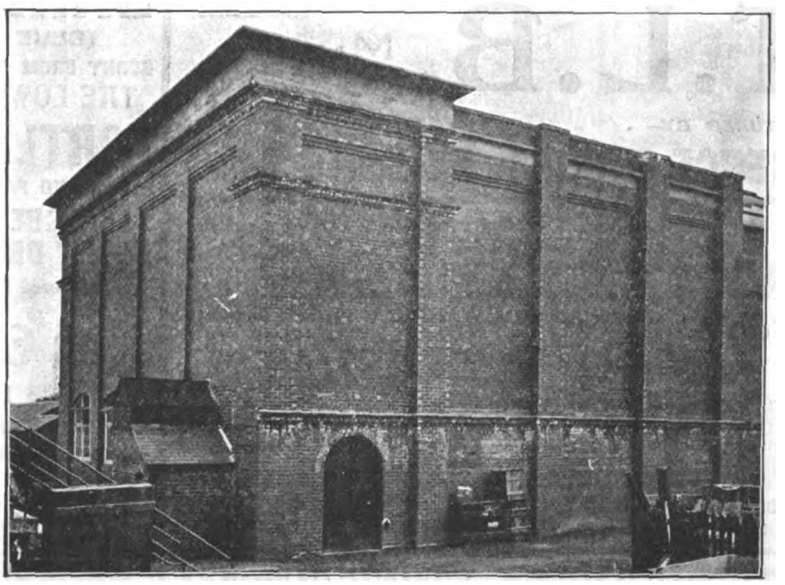
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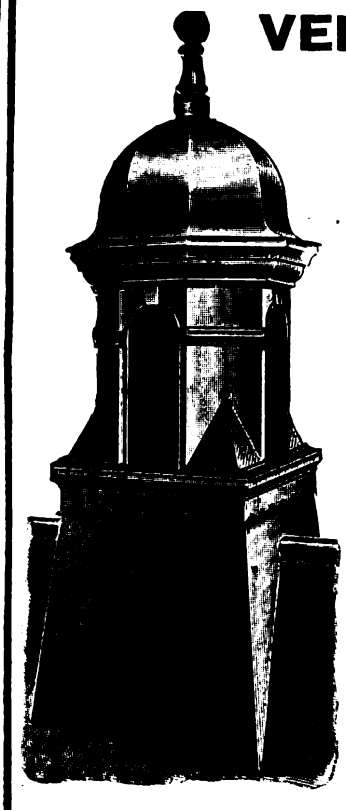
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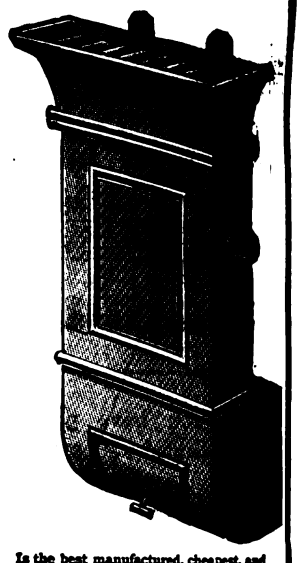
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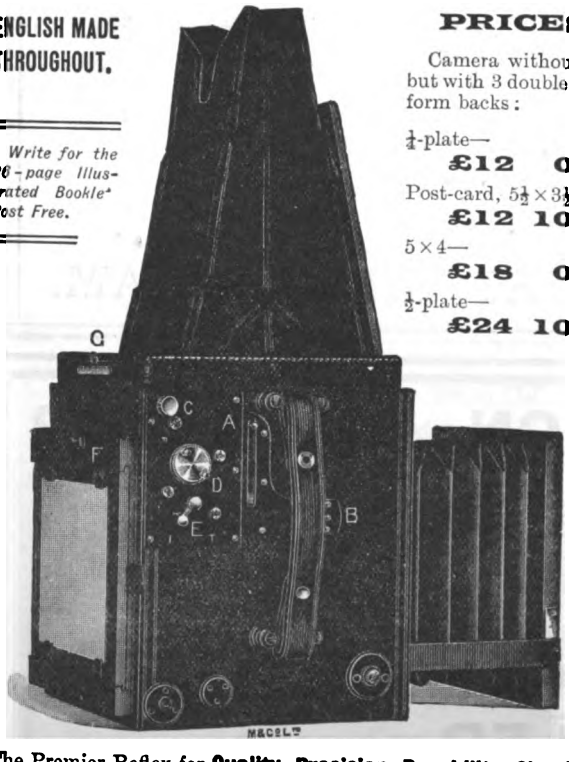
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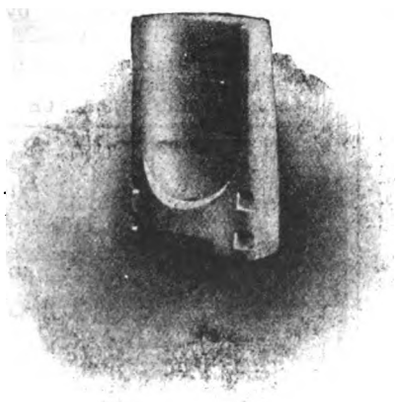
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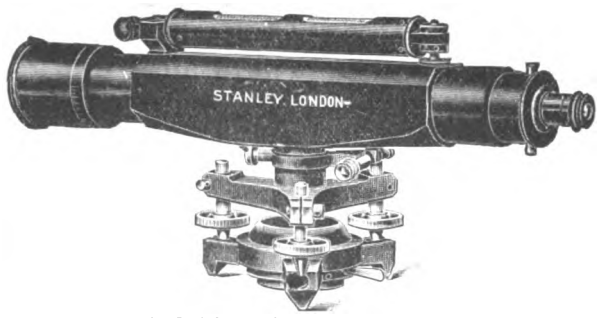
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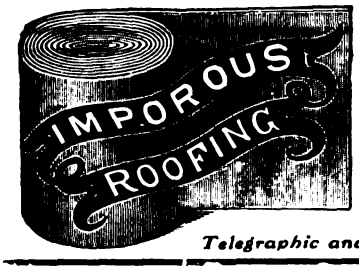
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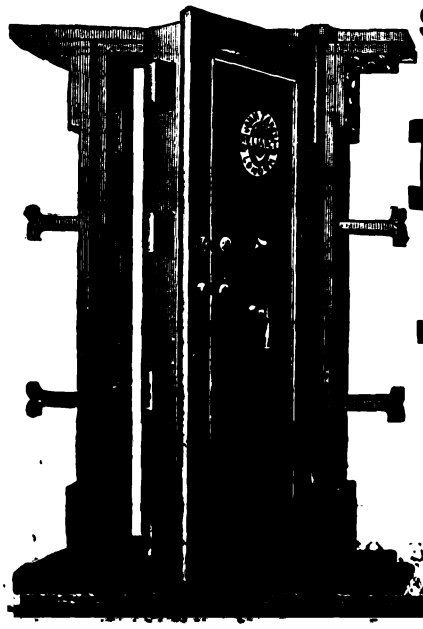
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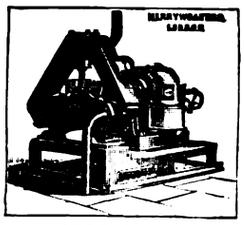
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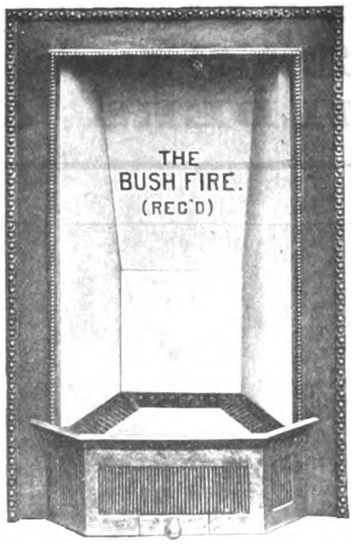
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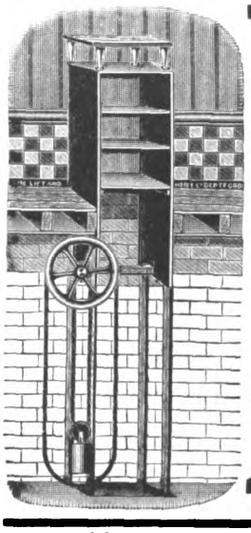
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EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

TENDERS, ETC.

*** *As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than* 2 P.M. *on Thursdays.*

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MOLESEY.—June 1.—The East and West Molesey Urban District Council invite plans, with specifications and estimates, for an isolation hospital. Mr. D. Cann, Clerk, Council Offices, East Molesey.

MOSSLEY.—May 24.—For the erection of a mixed elementary school to accommodate 550 children, and an infant school for 300 infants, on land adjoining Mill Lane. Premiums 15*l.* 15*s.* and 5*l.* 5*s.* Borough Surveyor, Town Hall, Mossley, Lancs.

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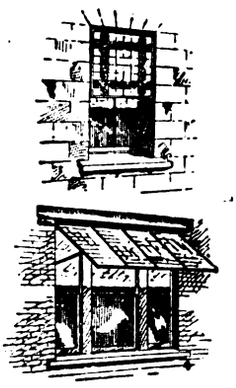
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AMBLESIDE.—May 19.—For building a billiard-room, &c., and for the heating a residence at Outgate, Hawkshead, Ambleside. Mr. John Stalker, M.S.A., architect, 57 Highgate, Kendal.

ASHTON-UNDER-LYNE.—May 17.—For the following works for the electricity committee:—(1) Brick setting for one water-tube boiler; (2) building one fanhouse. The Borough Electrical Engineer, Wellington Road, Ashton-under-Lyne.

ASKRIGG.—May 20.—For alterations at the Askrigg Conservative and Unionist Club. Mr. A. T. Storey, Askrigg, Yorks.

BALLINTEMPLE (CAVAN).—May 15.—For repairing and refurnishing Ballintemple Church. Mr. R. N. Wellwood, C.E., Spring Villa, Cavan.

BARROW-IN-FURNESS.—May 26. For the construction of movable partitions, &c., at the technical school. The Borough Engineer's Office, Town Hall.

BIRKENHEAD.—May 17.—For repairs, &c., at the Poorlaw offices, Conway Street. Mr. John Carter, clerk, Poorlaw Offices, Birkenhead.

BIRMINGHAM.—May 19.—For erection of the superstructure of extension of Council House. Deposit 10*l*. 10*s*. Drawings and particulars to be seen at offices of architects after May 31. Tenders to be sent in by June 14. Send names by May 19 to Messrs. H. V. Ashley & Winton Newman, the architects, 14 Gray's Inn Square, London, W.C.

BUSHEY.—May 18. For alterations and additions to the Hall Road pumping station. Deposit 3*l*. 3*s*. Mr. E. E. Ryder, engineer, Council Offices, Bushey, Herts

BELFAST. May 31.—For the construction and erection of a running shed for engines, with workshops, offices, &c., close to the Adelaide and Windsor station, 1½ miles from Belfast, the entire block measuring about 280 feet by 192 feet 6 inches. Deposit 2*l*. Mr. W. H. Mills, the Great Northern Railway Company (Ireland), engineer-in-chief, Amiens Street terminus, Dublin, or the District Engineer, Belfast.

BOURNEMOUTH.—May 21.—For the construction of convenience, Fisherman's Walk, convenience on East Cliff, and convenience, Durley Road, and other works in connection therewith. Deposit 2*l*. 2*s*. Mr. F. W. Lacey, borough engineer.

BOWNESS.—For the various works required in the enlargement and alteration of the Royal Oak Hotel. Mr. John Hutton, M.R.S.I., architect, Kendal.

BRADFORD.—May 18.—For work required to be done at Kirkgate Market, viz.:—(1) Alterations to conveniences; (2) repairs to roof; (3) painting on roof, for the Corporation. The City Architect, Whitaker Buildings, Brewery Street, Bradford.

BROUGHTON MOOR.—May 15.—For erection of a parsonage at Broughton Moor, Cumberland. Mr. J. Clark, Estate Office, Maryport.

CHAPEL-EN-LE-FRITH.—May 24.—For the reconstruction of the following highway bridges, for the Rural District Council:—Contract 1.—(1) Crowden Brook; (2) Upper Booth; (3) Barber Booth; (4) Yeman's, in Edale; (5) Killhill; (6) Watergate, Hope; and (7) Shatton. Contract 2.—(8) Cornheys; (9) Wash; (10 and 11) Blackbrook; (12) Bridgehelme Green; (13) Whitehough; (14) Baghouse; and (15) Collinacre, Combs. Deposit 3*l*. Mr. T. Partington, A.M.I.C.E., Bank Chambers, Market Place, Chapel-en-le-Frith.

CHARTHAM DOWNS.—May 27.—For alterations and improvements to laundry and works in connection therewith at the Kent County Lunatic Asylum, Chartham Downs, near Canterbury. Deposit 5*l*. Mr. W. J. Jennings, architect, 4 St. Margaret's Street, Canterbury.

CHESTER-LE-STREET.—May 31.—For a secondary school (sole tenders). The Education Architect's Office, Shire Hall, Durham.

COVENTRY.—May 18.—For erection of out-patients' department at the Coventry and Warwickshire Hospital.

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Deposit 2*l.* 2*s.* Mr. Herbert W. Chattaway, Trinity Churchyard, Coventry.

CRUMPSALL.—May 19.—For erection of a block to accommodate able-bodied men and for the other additions and alterations to the workhouse at Crumpsall, near Manchester. Deposit 1*l.* 1*s.* Mr. A. J. Murgatroyd, architect, 23 Strutt Street, Manchester.

COCKFIELD.—May 18.—The Durham County Council invite sole tenders for new Council school at Cockfield for about 210 children. Mr. F. E. Coates, Shire Hall, Durham.

DITTON.—May 22.—For the erection of an elementary school for 120 scholars at Ditton, near Widnes. Deposit 2*l.* Mr. Henry Littler, county architect, 16 Ribblesdale Place, Preston.

DURHAM.—May 18.—The County Council invite sole tenders for new Council school at Haverton Hill, for about 900 children. Mr. W. Rushworth, Shire Hall, Durham. For Council school at Dunston (Glebe Estate), for about 800 children. Messrs. J. Potts & Son, architects, 57 John Street, Sunderland. For alteration at Washington Biddick Council school. Plans and specification only, Mr. F. E. Coates, Shire Hall, Durham.

EGREMONT.—May 15.—For erection and completion of three cottages at Bookwell, Egremont, Cumberland. Mr. Ernest Martindale, architect and surveyor, Cleator Moor and Workington.

EGREMONT.—May 15.—For erection and completion of chapel and schoolroom at Glanamman, Carm. Mr. H. Herbert, architect and surveyor, Ammanford.

GLASGOW.—For the mason, wright, plumber, plasterer, glass, tile, fireproof flooring, cast-iron, steel, heating, lighting and painting works required for new buildings at the Royal Glasgow Asylum for the Blind, Castle Street. Deposit 2*l.* 2*s.* Messrs. John Baird & Jas. Thomson, architects, 88 Bath Street, Glasgow.

GLASGOW.—May 17.—For the following works in connection with tramway depôt, Newlands Field, viz.:—(1) Digger, mason and brick works; (2) carpenter and joiner works; (3) cast-iron and steel works; (4) patent roof glazing; (5) slater work; (6) plumber work; (7) plaster work; (8) painter work. Deposit 2*l.* 2*s.* Mr. James Dalrymple, general manager, 46 Bath Street.

GLASGOW.—May 17.—For the construction of a goods-shed about 718 feet long by 57½ feet wide on Springfield Quay, south side of Glasgow Harbour, for the trustees of the Clyde Navigation. The Trustees' Engineer, 16 Robertson Street, Glasgow.

HALIFAX.—May 15.—For all trades required in erection of a precipitant store at the sewage works, Salterhebble. Deposit 1*l.* Mr. James Lord, M.I.C.E., borough engineer, Town Hall, Halifax.

HAMSTALL RIDWARE, NEAR RUGELEY.—May 15.—For erection and completion of a Council school for eighty-two children. Deposit 1*l.* 1*s.* Mr. Graham Balfour, director of education, County Education Offices, Stafford.

HEMEL HEMPSTEAD.—June 1.—For repairs and decorations to municipal buildings. Mr. Walter R. Locke, borough engineer and surveyor, Town Hall, Hemel Hempstead.

HOVE (SUSSEX).—May 24.—For enlarging the administration block, constructing porter's lodge, water tower and destructor, forming paths, laying drains and other work at the Infectious Diseases Hospital at Portslade. Deposit 2*l.* 2*s.* Mr. H. Hamilton Scott, borough surveyor, Town Hall, Hove.

IRELAND.—May 15.—For building and completing dwelling-house and shop at Donegal Street, Rosemount, Londonderry. Mr. Patrick H. Elliott, C.E., architect, 12 and 14 Castle Street, Londonderry.

IRELAND.—May 19.—For building and completing a police office and morgue at Victoria Market, Londonderry. Deposit 1*l.* 1*s.* Mr. P. H. Elliott, C.E., architect, Castle Street, Londonderry.

IRELAND.—May 20.—For executing structural improvement, extensive repairs, and painting of Irvinestown Church, parish of Derryvullen North. Mr. Robert Wilson, hon. secretary, Castle Irvine N. School, Irvinestown.

IRELAND.—June 1.—For the erection of a branch bank and residence at Abbeyleux, Queen's County. Deposit 2*l.* 2*s.* Mr. W. Butler, surveyor, 58 Mountjoy Square, Dublin.

KENDAL.—For converting Nos. 1 and 2 Thorny Hills into a girls' day and boarding school. Mr. John Hutton, M.R.S.I., architect, Kendal.

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Kirkham.—May 19.—For erection of an elementary school and cookery and manual building at Kirkham, Lancs, to accommodate 200 scholars. Deposit 2*l*. Mr. Henry Littler, county architect, 16 Ribblesdale Place, Preston.

Leeds.—May 24.—For certain builder's work in connection with the installation of a new heating and ventilating apparatus in the town hall, Leeds. Mr. W. T. Lancashire, city engineer, Municipal Buildings, Leeds.

London.—May 17.—For additions to the infectious diseases hospital, near Renters Lane, Hendon, N.W. Deposit 10*l*. Mr. S. Slater Grimley, engineer, Council Offices, The Burroughs, Hendon, N.W.

London.—May 20.—The Guardians of Wandsworth Union invite separate tenders for the provision of a new concrete and timber floor to one of the wards at the infirmary, St. John's Hill. Mr. F. W. Piper, clerk, Union Offices, St. John's Hill, S.W.

London.—May 17.—For enclosing and roofing-in the depôt in Walmer Road, Notting Hill, W., for the Kensington Royal Borough Council. Borough Engineer's Department, Town Hall, Kensington.

Milford Haven.—May 15.—For erection of a Congregational church, schoolrooms, vestries and caretaker's cottage. Deposit 1*l*. 1*s*. Messrs. D. Edward Thomas & Son, architects, 17 Victoria Place, Haverfordwest.

Monk Bretton.—May 15.—For erection and completion of twelve houses, Barnsley Road, Monk Bretton, Barnsley. Mr. Ernest W. Dyson, architect and surveyor, 10 Regent Street, Barnsley.

Newbury.—May 17.—For pulling down and rebuilding premises at St. Mary's Hill. Mr. Walter H. Bell, architect, the Market Place, Newbury.

Newton Abbot (Devon).—May 18.—For alterations to and painting, papering, &c., Brookhill House, High-Week. Mr. S. Segar, architect, 26 Union Street, Newton Abbot.

Pontefract.—May 17.—For the conversion of premises, Southgate, and Friends' Meeting House Lane, Pontefract, into eight houses. Mr. J. Heseltine, architect and surveyor, Old Castle Drawing Office, Pontefract.

Poundstock.—May 15.—For erection of a farmhouse at Treskinnick, in the parish of Poundstock, near Bude. Mr. S. G. Carnell, county land agent, Public Rooms, Truro.

Rotherham.—May 17.—For alterations to the nurses' messroom at the hospital, for the Guardians. Mr. W. C. Harrison, clerk, Union Offices, Rotherham.

St. Agnes.—May 24.—For erection of a farmhouse at Anchor, St. Agnes, Cornwall. Mr. Alfred J. Cornelius, M.S.A., architect, Truro.

St. Abbs.—May 18.—For erection of a rocket life-saving apparatus house at St. Abbs, for the Board of Trade. The Coastguard Station at Berwick.

Scotland.—May 18.—For erection of a rocket life-saving apparatus house at St. Abbs, for the Board of Trade. The Coast Guard Station at Berwick.

Scotland.—May 25.—For the mason, carpenter, slater, plumber, plasterer, painter and glazier, steel and iron and heating works of buildings to be erected in Marischal Street and Thistle Street, Peterhead. Mr. James Watt, C.E. and architect, 26 Marischal Street, Peterhead.

Scotland.—June 11.—For mason, carpenter, slater, plasterer, plumber, painter and glazier works of additions to the Masonic Institute, Buckie. Messrs. D. & J. R. M'Millan, architects, 105 Crown Street, Aberdeen.

Sheerness.—May 25.—For erection of a mineral-water factory, stables, &c., at Railway Road. The Sheerness and District Licensed Victuallers' Mineral Water Co., Ltd.

Stratford-upon-Avon.—For erection of a villa residence. Deposit 1*l*. 1*s*. Mr. E. G. Holtom, architect and surveyor, 58 Henley Street, Stratford-on-Avon.

Sutton-in-Ashfield.—May 25.—For the construction of retort-house, retort-bench, coal elevator and conveyor, hoppers, &c., in connection with the gasworks extension. Deposit 3*l*. 3*s*. Messrs. Corbet, Woodall & Son, Palace Chambers, Bridge Street, Westminster, S.W.

Trimdon Grange.—For building six houses. Messrs. Wandless, Orton & Wilkinson, Trimdon Grange, Durham.

Wales.—May 15.—For building a north aisle, vestry, &c., to Holy Trinity Church, Abergavenny. Deposit 2*l*. 2*s*. Mr. E. A. Johnson, F.R.I.B.A., architect, Abergavenny.

Wales.—May 18. For erection of a covered goods platform at Port Talbot station, for the Great Western Railway Company. The Engineer at Neath station.

Wales.—May 19.—For pulling down certain old buildings and erecting complete a small post office and telephone

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exchange at Brynmawr. Mr. W. H. Dashwood Caple, F.R.I.B.A., architect, 2 Church Street, Cardiff, or Mr. J. G. Bishop, solicitor, Brynmawr.

WALES.—May 19.—For erection of twenty-nine houses at Taibach, Port Talbot, for the Taibach Building Club. The Talbot Arms Hotel, Taibach, Port Talbot.

WALES.—May 20.—For erection of lock-up shop and offices at Castle Square, Carnarvon. Mr. Henry Thomas, architect, &c., Castle Buildings, Carnarvon.

WALES.—May 21.—The Board of Trade invite tenders for erection of a rocket life-saving apparatus house at Port Talbot. Harbour Master's Office, Port Talbot.

WALES.—May 22.—For erection of two dwelling-houses at Mountain Ash. Messrs. Morgan & Elford, architects, 1 Jeffrey Street, Mountain Ash.

WALES.—May 22.—For erection of a Welsh Congregational chapel at Penclawdd, having 800 sittings. Deposit 3*l.* 3*s.* Mr. W. Beddoe Rees, architect, 3 Dumfries Place, Cardiff.

WALES.—May 24.—For erection of a pair of semi-detached villas at Llandaff. Deposit 1*l.* 1*s.* Mr. W. H. Dashwood Caple, F.R.I.B.A., architect and surveyor, 2 Church Street, Cardiff.

WALES.—May 27.—For erection of a church at Seven Sisters, near Neath. Mr. J. Cook Rees, architect, The Parade, Neath.

WALES.—May 29.—For erection of a new church at Crynant. Mr. J. Cook Rees, architect, Parade Chambers, Neath.

WAREHAM.—May 23.—For erection of a dwelling-house. Mr. W. Watts Fookes, architect and surveyor, Wareham, Dorset.

WARKWORTH AND WIDDRINGTON.—For (1) alterations to cottages at Maudlin Farm, near Warkworth; (2) erection of farmhouses and buildings on West Stobswood Farm, near Widdrington. The County Land Agent, Moothall, Newcastle-upon-Tyne.

WORKSOP.—May 25. For the erection of wood or wood and iron buildings for the treatment of phthisical patients at Kilton Hill, Worksop. The building to be for twelve patients, and must include nurses' room, bathroom and w.c. Mr. James Snow Whall, clerk, 66 Bridge Street, Worksop.

TENDERS.

ADDLESTONE.

For repairs to the Princess Mary Village Homes. Messrs. THURGOOD, SON & CHIDGEY, architects, 8 Adelphi Terrace, W.C.

	Estimate No. 1.	Estimate No. 2.
Parrott & Isom	£1,620 0 0	546 0 0
Grover & Son	1,523 0 0	529 0 0
Tompsett & Co.	1,120 0 0	350 0 0
Gaze & Sons	1,097 0 0	367 0 0
Cæsar Bros.	1,050 0 0	310 0 0
Love	978 0 0	353 0 0
Drowley & Co.	930 0 0	280 0 0
Potterton	915 0 0	375 0 0
Greenfield	847 0 0	452 18 0
DEACON & SON, Addlestone (*accepted*)	689 0 0	269 0 0

BARNSLEY.

For the several works required in erection of two dwelling houses in Blenheim Road. Messrs. WADE & TURNER, architects, Barnsley.

Taylor, mason and bricklayer	£389 0 0
Thornley, carpenter and joiner	139 0 0
Drunsfield, plumber and glazier	57 10 0
Seacroft, plasterer, Cudworth	34 9 0
Fleming, slater	25 19 6
Stephenson & Son, painter	10 0 0

Rest of Barnsley.

CHELL.

For new dining-hall at workhouse, for Wolstanton and Burslem Guardians. Messrs. FORD & SLATER, architects, Overhouse Chambers, Burslem.

Cooke	£1,050 0 0
Gallimore	898 0 0
J. Grant	880 0 0
W. Grant & Son	850 0 0
Sambrooke	845 0 0
Smith	825 0 0
COLCLOUGH & BREEZE, Pitshill (*accepted*)	800 0 0
Jones	790 13 2

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The Holborn Viaduct Buildings, London.
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CHARTHAM DOWNS.

For recreation-rooms and other works at the Kent County Lunatic Asylum, near Canterbury. Mr. W. J. Jennings, architect, Canterbury.

H. & S. Myleton	£2,766 0 0
Johnson & Co.	2,724 0 0
Godden & Son	2,462 0 0
T. T. Denne	2,310 0 0
Browning	2.245 0 0
Turtle & Appleton	2,173 0 0
Wallis & Sons	2,132 0 0
Adcock & Son	2.130 0 0
G. H. Denne & Co.	2,120 0 0
F. & G. Foster	1,949 0 0
Sellick & Sons	1,944 5 0
Amos & Foad, Whitstable (*accepted*)	1,897 0 0

CLAYTON-LE-MOORS (LANCS.).

For work to be done in the following:—(1) Private street works; (2) repaving of portions of Whalley Road, Victoria Street and Church Street; (3) painting of street lamps, fire station, stables, property, &c. Mr. Arthur Dodgeon, A.M.I.C.E., surveyor.

Street Paving Works.

Brown	£152 13 4
Crompton	146 16 8
Hindle	122 16 4
Chadwick Bros.	111 13 4
Broadley, Clayton-le-Moors (*accepted*)	102 18 4

Private Street Works.

Crompton	586 6 5
Hindle	470 17 5
Brown	468 3 6
Broadley (*accepted*)	437 8 11

Painting.

Sheffield, Clayton-le-Moors (*accepted*)	51 13 0

DEVIZES.

For erection of an engineer's house at the County Asylum. Mr. J. George Powell, county surveyor, Trowbridge.

Tydeman Bros.	£441 9 6
Chivers & Sons	436 15 0
Linzey	412 0 0
Preece, Trowbridge (*accepted*)	340 0 0

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Spagnoletti, London	172 0 0

Incandescent-lamp posts, brackets, and fittings.

Lucy & Co., Oxford	24 14 8

HENDON.

For The Hyde improvement and other works. Mr. S. Slater Grimley, engineer to the Council, Hendon.

Latter	£2,182 7 5
Pedrette & Co.	1,661 19 10
Moss & Co.	1,447 0 0
Brebner & Co.	1,298 13 9
Paterson	1,267 8 2
Griffiths & Co.	1,247 16 0
Ballard	1,245 13 9
Hamiltons	1,233 9 0
T. W. Pedrette	1,226 15 6
Adams	1,204 12 6
Brummell	1,196 6 0
Powdrill, Luton (*accepted*)	1,106 8 5

For construction of bacteria beds Nos. 6, 7 and 8, sewage-outfall works. Mr. S. Slater Grimley, engineer to the Council, Hendon.

Brebner & Co.	£4,880 4 2
Pedrette & Co.	4,034 17 6
Muirhead & Co.	3,123 4 9
Ballard	3,077 1 6
Latter	2,992 8 0
Brummell	2,882 5 9
F. W. Pedrette	2,716 19 5
Moss & Son	2,680 0 0
Wellerman Bros.	2,633 19 6
Paterson & Co.	2,560 16 7
Adams	2,538 3 3
Hamiltons	2.361 0 0
Powdrill, Luton (*accepted*)	2,287 9 6



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HULL.

For new bottling stores. Messrs. HARBRON & ROBSON, architects, Hull.

Fenwick	£1,438	0	0
Southern	1,410	0	0
Houlton & Son	1,385	0	0
Jackson & Sons	1,383	0	0
Bayes & Son	1,374	0	0
Simpson & Son	1,349	0	0
Levitt	1,330	0	0
Scott	1,320	0	0
Goates & Sons	1,319	0	0
Kettlewell	1,319	0	0
Harper	1,295	0	0
QUIBELL, SON & GREENWOOD, Hull (*accepted*)	1,276	0	0

KINGSWEAR.

For repairs to farmhouse at Hoodown Farm. Mr. T. O. VEALE, surveyor, Castle View, Dartmouth.

Sidery	£250	0	0
Short	187	0	0
Pillar	180	0	0
Triggs	125	0	0
WATTS, Dartmouth (*accepted*)	122	0	0

LONDON.

For alteration and regulation of the course of Pymme's Brook, for the Edmonton Board of Guardians, N. Mr. S. R. Lowcock, engineer, 50 Queen Anne's Gate, Westminster.

Greenfield	£674	8	0
Sangwin	638	16	10
Hyde & Co.	572	0	0
Bloomfield	507	10	2
Wilson, Border & Co.	499	1	0
Adams	411	0	0
Pedrette	406	4	0
Kavanagh & Co.	404	7	3
Bell & Sons	394	5	6
Dykes	359	17	0
Grounds & Newton	288	11	11
CATLEY, 23 Lloyd Square, W.C. (*accepted*)	247	0	0

LONDON—*continued.*

For the supply and delivery of (1) about 4,000 tons of track rails and fastenings and (2) about 3,000 tons of slot rails and conductor tees, required for the construction or reconstruction of lines included in the programme of tramway works for 1909-10.

Track rails and fastenings.

Barrow Hæmatite Steel Co.	£27,399	6	6
Scott	26,865	5	0
P. & W. Maclellan (manufactured by the North-Eastern Steel Co.)	26,465	1	0
Lorain Steel Co., U.S.A.	26,052	19	0
Bolckow, Vaughan & Co. (*recommended*)	24,958	19	8
Société Anonyme des Aciéries d'Angleur, Belgium	22,656	14	0
Société Anonyme d'Ougrée Marihaye, Belgium	22,511	16	2
Stahlwerks-Verband, Düsseldorf (manufactured by Phœnix Steel Co., Ruhrort) (rails quoted f.o.b. at Antwerp instead of on basis of delivery in London) (incomplete tender)	21,057	5	0
Chief engineer's estimate	26,001	10	0

Slot rails and conductor tees.

Barrow Hæmatite Steel Co.	33,650	0	0
P. & W. MacLellan (manufactured by the North-Eastern Steel Co.)	22,012	10	0
Scott	21,784	5	0
Frodingham Iron and Steel Co. (*recommended*)	21,197	15	0
Société Anonyme des Aciéries d'Angleur, Belgium (incomplete tender, for slot rails only)	14,869	0	0
Chief engineer's estimate	21,012	0	0

For supplying and fitting a furnace as specified for the "Stirling" boiler about to be installed, for the Hammersmith Borough Council.

Rosser & Russell	£205	0	0
Howden & Co.	195	0	0
Cadogan Ironworks Co.	175	0	0
Brown, Duncan & Co. (*recommended*)	105	10	0

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LONDON—*continued.*

For renovation and decoration of Park Church, Grosvenor Road, Highbury. Messrs. JOHN C. T. MURRAY, F.R.I.B.A., and J. A. MINTY, A.R.I.B.A., architects.

	General.	Extra for tar paving.	Deduction for varnishing, &c.
Lancaster & Co.	£2,202 19 8	£68 1 6	£140 13 0
Parrott & Isom	2,188 0 0	73 0 0	187 0 0
Graham & Graham	1,876 0 0	52 0 0	90 0 0
Silk & Son	1.867 C 0	52 16 0	64 0 0
Dainton	1.800 0 0	54 0 0	76 0 0
Patman & Fotheringham	1.791 0 0	45 0 0	20 0 0
Higgs & Hill	1,744 0 0	38 0 0	84 0 0
Staines & Co.	1.695 0 0	50 0 0	100 0 0
Mattock & Parsons	1.671 0 0	35 0 0	75 0 0
Stewart	1.604 0 0	48 13 11	75 15 10
Watson & Co.	1,586 10 0	57 6 6	98 3 0
Read	1,560 0 0	52 0 0	45 0 0
Etheridge	1,450 0 0	75 0 0	30 0 0
Shaw	1.443 0 0	66 0 0	48 10 0
Campbell & Christmas	1,362 0 0	47 0 0	51 0 0

For the execution of the roadwork and platelaying, exclusive of the supply of rails and special trackwork, in connection with the construction on the underground conduit system of electric traction of the authorised tramways (1) from the Plough, Clapham, to a point in Cedars Road, near Lavender Hill, and (2) the single lines from Lewisham High Road to Brockley Road, which form part of the authorised Lewisham High Road to Forest Hill tramways.

	Tramway Works.	Paving Works.	Total.
Nowell	£42.855 0 6	£761 17 6	£43,616 18 0
Brebner	32.698 9 2	970 7 11	33,668 17 1
Fry Brothers	30.495 14 1	709 19 1	31,205 13 2
Mowlem & Co.	29.578 3 5	696 1 2	(say) 30,274 0 0
Manders	28.921 19 0	697 8 8	29,619 7 8
Coles	28.703 8 5	657 17 0	29,361 5 5
Dick Kerr & Co., Ltd., Abchurch Yard (*recommended*)	27.990 16 0	717 4 0	28.708 0 0
Chief engineer's estimate	—	—	29,710 17 7

For street works at Castlewood Road, for Hackney Borough Council. Mr. NORMAN SCORGIE, M.Inst.C.E., Borough Engineer, Hackney.

	Norwegian Granite.	Cornish Granite.	Irish Granite.	Guernsey Granite.	Leicestershire Granite.
Bloomfield	£1,195 0 0	£1,295 0 0	£1.295 0 0	£1.300 0 0	£1,290 0 0
Griffiths & Co.	1,187 17 7	1.167 10 7	1.177 14 1	1.156 9 11	1,183 19 11
Adams	1,186 6 2	1.196 6 2	1.196 6 2	1.236 6 2	1,186 6 2
Dykes	1,179 3 5	1,179 3 5	—	1.249 3 5	1.170 3 5
Porter	1.149 10 2	1.159 13 8	1,129 3 2	1.159 0 2	1.159 13 8
CATLEY, 23 Lloyd Square	1.135 15 2	1,115 15 2	1.135 15 2	1,115 15 2*	1.165 15 2

* Accepted.

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LONDON—*continued.*

For the conversion of the lift in the Town Hall from hydraulic to electric power, for the Hammersmith Borough Council.

Easton Lift Co.	£290 0 0
Neville, Karge & Co.	278 0 0
Higginbottom & Mannock	275 0 0
Spagnoletti	245 0 0
Turner, Atherton & Co.	190 0 0
Smith & Stevens	180 0 0
Childs & Co.	178 0 0
Electromotor Equipment Co.	177 0 0
Waygood & Co.	175 0 0
Medway's Safety Lift Co. (*recommended*)	167 0 0

For alterations and sanitary work in connection with new bath-rooms, &c., at the District Sick Asylum, Devons Road, Bromley, E., for the managers of the Poplar and Stepney Sick Asylum District. Messrs. J. & W. CLARKSON, architects, 136 High Street, Poplar, E.

		Alternate tender
Lowe & Co.	£620 0 0	£605 0 0
Dohman & Mathews	607 0 0	597 0 0
Reason	589 0 0	582 0 0
Sharpin	549 0 0	531 0 0
Griggs & Son	545 0 0	530 0 0
Leek	540 0 0	516 0 0
Calnan & Son	538 0 0	518 0 0
Newell & Lusty	513 0 0	485 0 0
Upson	501 0 0	489 0 0
Dyke	498 0 0	488 0 0
WOOLLASTON & Co., Bow, E. (*accepted*)	498 0 0	475 0 0

For fitting up as a shop No. 219 Waterloo Road, Webber Row Estate, for London County Council.

Haskins & Bros.	£117 3 0
Sage & Co. (1905)	110 0 0
Spreckley & Co.	93 0 0
Clancy & Slater	77 0 0
Nicholls	74 0 0
WALL, Lloyd's Avenue, E.C. (*accepted*)	72 10 0

LONDON—*continued.*

For painting, distempering, general repairs, &c., at infirmary, Fulham Road, S.W., for St. George's Guardians.

Rowley	£1,187 2 6
Spencer, Santo & Co.	1,130 0 0
White & Co.	1,120 0 0
Hough	915 0 0
Chamberlain	910 0 0
Penton	873 0 0
Woollaston & Co.	845 0 0
Wright	829 0 0
Nightingale	822 0 0
Squire	810 0 0
Stone	800 0 0
Inns	795 0 0
MCCARTHY, Clapham Park, S.W. (*accepted*)	715 0 0

For the withdrawal and relaying of certain low-tension cables in connection with the working of the Victoria Embankment tramways from the Elephant and Castle sub-station.

Siemens Bros. & Co.	£3,438 7 9
Callender's Cable and Construction Co.	3,435 16 6
Glover & Co.	3,324 17 7
W. T. Henley's Telegraph Works Co.	3,245 0 3
British Insulated and Helsby Cables	3,198 17 6
Johnson & Phillips	3,191 2 2
Western Electric Co.	3,147 17 4
Blackwell & Co. (*recommended*)	2,944 16 2
Estimate of the chief officer of tramways	3,000 0 0

MICKLEY (NORTHUMBERLAND).

For erection of a United Methodist church at Mickley Riding. Messrs. BADENOCH & BRUCE, architects, Newcastle-on-Tyne.

MIDDLEMISS BROS, Newcastle-on-Tyne (*accepted*)	£1,031 5 0

NEW HUNSTANTON.

For the making-up of Hill Street, New Hunstanton.

Southgate & Son	£485 10 0
LEACH, Hunstanton (*accepted*)	482 5 0
Shanks & Sons	474 0 0

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PINNER.

For erecting a pair of semi-detached houses on the West End Park Estate. Mr. J. E. Henderson, architect, Pinner, Middlesex.

Reynolds	£1,310 0 0
Ellement	1,290 0 0
Milsom & Co.	1,190 0 0
Perren, Wealdstone (*accepted*)	1,000 0 0

PLYMOUTH.

For the reconstruction of the premises acquired for the extension of the Devon and Cornwall Homœopathic Hospital, Lockyer Street, Plymouth. Each contractor sent in three tenders, the following being the totals of Nos. 2 and 3 tenders only. Mr. F. A. Wiblin, architect and surveyor, 92 Old Town Street, Plymouth.

Lapthorn & Son	£5,069 0 0
Wilkins & Sons	4,704 0 0
Trevan	4,569 0 0
Shepherd	4,445 0 0
Wakeham Bros.	4,355 0 0
Porter	4,293 0 0
Allen	4,129 0 0
Endicott	4,083 0 0
Carwithen	4,063 0 0
Stevenson	3,974 0 0
Turpin	3,957 0 0
Andrews	3,875 0 0
Roberts	3,801 0 0
Stanbury	3,757 0 0
Coles	3,702 0 0
Pearn Bros. (*accepted*)	3,374 0 0

SHREWSBURY.

For new residence, Kingsland. Messrs. Dickens, Lewis & Haymes, architects, Shrewsbury.

Treasure & Sons	£1,810 0 0
Price	1,785 19 0
Hayes	1,760 0 0
Bickerton, Shrewsbury (*accepted*)	1,636 0 0

SCOTLAND.

For the erection of six dwelling houses at Park Hill, Leven. Mr. James Birrell, architect.

Accepted tenders.

Wilkie, mason.
Birrell, joiner.
Walker & Son, plumber.
Dewar & Howie, plasterer.
Irons, railings.

For erection of a new drill hall in Dundee.

Accepted tenders.

Bennet, mason.
Stewart & Son, joiner.
Robertson & Son, plumber.
Reoch, plasterer.
J. & R. Ramsay, slater.
Donald & Smith, glazier.
Keay, iron work.

STEVENAGE.

For erection of a County Council school, Herts. Mr. U. A. Smith, county surveyor.

Hinkins & Son	£5,565 3 5
Marriott	4,118 16 0
Hockley & Co.	3,940 3 8
Jaggard	3,770 8 6
Glasscock & Son	3,668 0 0
Raban & Son	3,580 9 10
F. & G. Foster	3,579 0 0
Shrouder & Matthews	3,555 0 0
Vail & Shore	3,525 0 0
Hacksley Bros.	3,508 0 0
Flint	3,480 0 0
Pattinson & Son	3,470 0 0
Bailey & Co.	3,396 0 0
Coles	3,378 16 0
Willmott & Son	3,294 0 0
Henson & Son, Wellingborough (*accepted*)	3,222 13 6
Clark & Son	3,163 0 0



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STAINES.

For the construction of roads and sewers on the Riverfield Estate, Staines. Mr. CLARKE ASHWORTH, architect, Richmond.

Free & Sons	£1,079 0 0
Harringdon & Co.	1,060 0 0
Wright & Porter	945 0 0
Trueman	898 0 0
Streeter & Co.	850 0 0
Kavanagh & Co.	847 0 0
LANE & Co., Wimbledon (*accepted*)	741 0 0

SUTTON-ON-SEA.

For erection of a Wesleyan church. Messrs. J. WELLS & SON, architects, Derby and London.

PARKS & SON, Grantham (*accepted*)	£3,465 16 6

WALES.

For erecting thirty or more cottages at Gelligaer village. Mr. W. HARRIS, architect and surveyor, Bargoed.

	Per house.
Davies & Lloyd	£170 0 0
Jones	157 10 0
H. J. Davies	141 5 6
Williams	139 5 0
A. W. Davies	138 10 0
Brown	130 0 0
Barnett	125 10 0
Matthews	124 10 0
E. P. DAVIES, Dowlais (*accepted*)	124 0 0

For erection of two additional classrooms at the County School, Cardigan.

WILLIAMS & SONS, Cardigan (*accepted*)	£566 10 0

WALES—*continued.*

For reconstruction of upper floors, new bath-houses, &c., of Monmouthshire Asylum, Abergavenny. Mr. E. A. JOHNSON, F.R.I.B.A., architect, Abergavenny.

Bloxham	£16,500 0 0
Smith	15,728 0 0
Long & Co.	15,490 0 0
Jenkins	15,125 0 0
Williams	14,990 0 0
Thomas & Sons	14,482 0 0
Hayward & Wooster	13,969 0 0
BROAD, Great Malvern (*accepted*)	13,739 0 0
Colborne	13,599 14 0

For erection of lodging-house in Fisher Street, Swansea. Mr. H. A. ELLIS, architect, Swansea.

Richards	£3,250 0 0
Architect's estimate	3,245 0 0
Lloyd Bros.	3,230 0 0
Billings	3,170 0 0
J. & F. Weaver	3,150 0 0
J. & D. JONES, Swansea (*accepted*)	3,140 0 0

WEST HARTLEPOOL.

For erecting the Empire Theatre. Messrs. W. & T. R. MILBURN, FF.R.I.B.A., Sunderland.

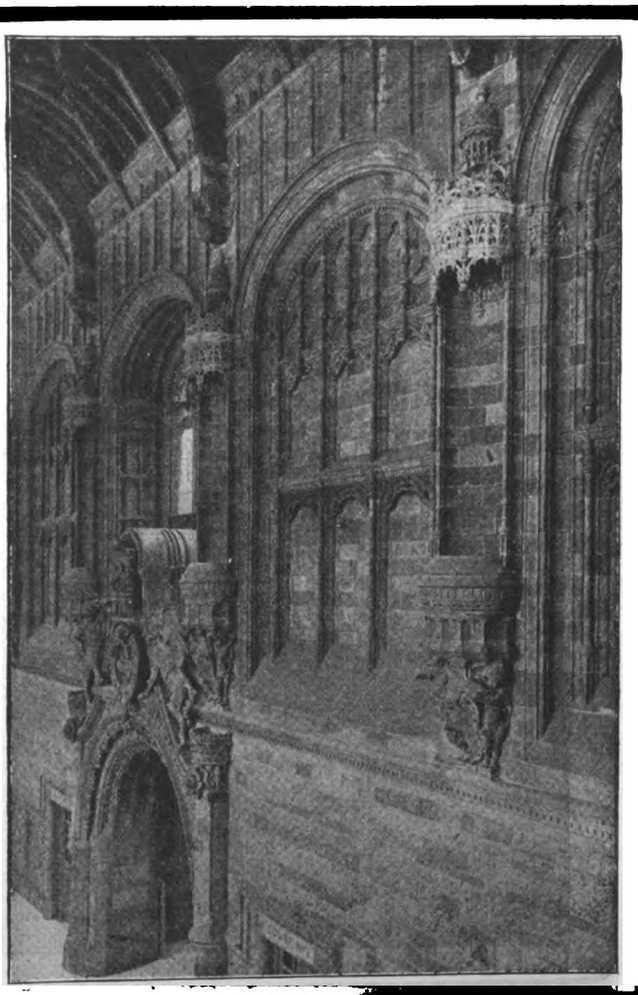
Garvie & Sons	£15,074 0 0
Watt Bros.	14,923 0 0
Tweddle	14,718 0 0
Clerey & Charlton	14,626 0 0
D. & J. Ranken	14,444 0 0
Brazell	14,204 13 5
White	14,100 0 0
Pringle	14,081 0 0
Davidson & Miller	13,977 12 7
Parkinson & Sons	13,916 18 6
Easten	13,751 1 3
Huntley	13,710 0 0
Howe	13,431 8 4
Pearson	13,161 0 0
Proud	13,128 0 0
HOWE & Co., West Hartlepool (*accepted*)	12,746 0 0

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WEST AUCKLAND.

For erecting a church hall. Mr. F. H. LIVESAY, architect and surveyor, Newgate Street, Bishop Auckland.

HOPE & SONS, Coundon (*accepted*) . .	£922 16 2

WEST PENNARD.

For water supply works, for Wells Rural District Council. Mr. W. PHELPS, C.E., Shepton Mallet.

POLLARD & Co., Taunton (*accepted*) . .	£2,348 13 4

WOLVERHAMPTON.

For erecting baths. Mr. G. GREEN, M.Inst.C.E., borough engineer, Wolverhampton.

Wilson	£9,744 9 0
Cave & Son	9,419 0 0
Willcock & Co.	9,375 0 0
Jones	9,361 0 0
Gough & Sons	9,300 0 0
T. & S. Ham	9,300 0 0
LOVATT, Wolverhampton (*accepted*) . .	9,269 0 0
Speake & Sons	9,194 0 0

WOOD GREEN.

For erection of a new county school at Wood Green for the Middlesex County Council. Mr. H. G. CROTHALL, architect to the education committee.

Martin Wells & Co.	£13,470 0 0
Holloway Bros.	12,400 0 0
Lawrance & Son	12,367 0 0
Minter	12,340 0 0
F. & H. Higgs	12,080 0 0
Rowley Bros.	12,080 0 0
Mattock & Parsons	11,735 0 0
Ford & Walton	11,698 0 0
Neal	11,496 0 0
Treasure & Son	11,453 0 0
Lawrence & Son	11,444 0 0
Gough & Co.	11,430 0 0
Fairhead & Son	11,243 0 0
Knight & Son	11,050 0 0
MATTOCK BROS., Wood Green (*accepted*) .	11,037 0 0

CONTRACTS OPEN.

Received too late for Classification.

ALBASTON.—May 21. For the erection of a school-room, &c. Mr. W. J. Henwood, St. Ann's Chapel, Albaston.

BRIXHAM.—May 31.—For the erection of a residence adjoining the Berry Head Road. Deposit 3*l.* 3*s.* Mr. F. W. Vanstone, C.E., Palace Chambers, Paignton, Devon.

DARTFORD.—June 15.—For the Kent education committee, for the erection of new secondary school to accommodate 200 girls. Plans and specifications prepared by the committee's architect (Mr. W. H. Robinson, M.S.A.) may be inspected at committee's offices on and after June 1. Names of tenderers and deposit of 2*l.* by May 28. Mr. Fras. W. Crook, secretary, Caxton House, Westminster, S.W.

DUNTON GREEN.—June 12.—For the Kent education committee, new school to accommodate 250. Plans and specifications, prepared by Mr. Wilfrid H. Robinson, M.S.A., the committee's architect, may be inspected after June 1. Applications and deposit of 1*l.* by May 28, to the secretary to the committee, Mr. Fras. W. Crook, Caxton House, Westminster, S.W.

LIVERPOOL.—May 26.—For the erection of an out-patients' department at the Royal Infirmary. Deposit 2*l.* 2*s.* Mr. J. Francis Doyle, 4 Harrington Street, Liverpool.

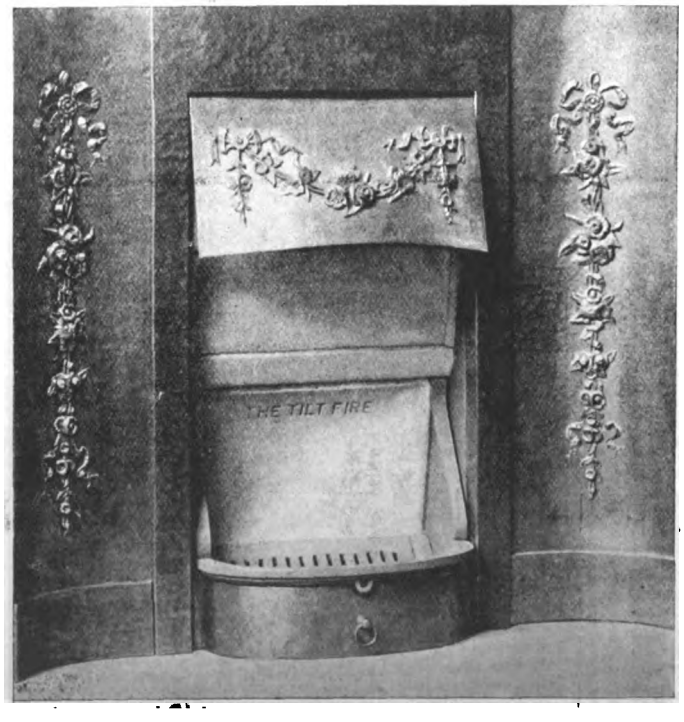
SCOTLAND.—May 27.—For the internal reconstruction of the Royal Institution, Edinburgh (Contract 1). Deposit 1*l.* 1*s.* The Principal Architect, H.M. Office of Works, Parliament Square, Edinburgh.

SITTINGBOURNE.—June 12.—For the Kent education committee, new school to accommodate 400 children. Plans and specifications, prepared by Mr. Wilfrid H. Robinson, M.S.A., the committee's architect, may be inspected on or after June 1. Applications and deposit of 1*l.* by May 28 to the secretary, Mr. Fras. W. Crook, Caxton House, Westminster, S.W.

WHALLEY.—May 27.—For the erection of three houses, two lodges and eight attendants' cottages at the Whalley Asylum. Deposit 2*l.* Mr. Henry Littler, 16 Ribblesdale Place, Preston.

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NEW CATALOGUES.

THE Carron Company have sent us a new heating stove catalogue and a general catalogue which in less than a hundred and fifty pages gives some general idea of the wide range of their manufactures. There is a very large variety of slow combustion stoves, ranging from the severely simple to the type with cast ornamental casing, as well as many other types suitable for multifarious requirements. Certain of the designs are very attractive, as, for example, No. 7A, a hot-air stove. The catalogue description is:—"Oval festoon panel in curtain, hinged fire-doors with bright knobs, ashpan with steel venetians, brick back to fire, self-coloured tiles in side panels, nozzle at top or back." It would be suitable for a hall or ship saloon.

Messrs. Twyfords, Ltd., Cliffe Vale Potteries and Enamelled Fireclay Works, Hanley, Staffs, have compiled Catalogue "A" 1909, for the purpose of showing the principal sanitary appliances they manufacture for colleges, schools, factories and buildings of a similar character. Messrs. Twyfords guarantee their ware and fittings "to be the best in their class, and will replace free of charge any article proved to be of inferior quality or defective in action." The "Adamant" fireclay lavatories are glazed on every exposed surface, and have no crevices for harbouring dirt. This name is given to several patterns of different shapes and sizes, and with different overflows. A special line is the various single and twin ranges for use in schools, &c., as well as trough lavatories and marble or slate lavatories. In the white "CV" ware lavatories the ironwork can be obtained painted, galvanised, white metallic enamelled, or white porcelain enamelled according to price. The manufacture of the basin is only a part of the complete work; Messrs. Twyfords pay no less attention to their fittings and accessories, whether it be a tap, trap or bracket, or anything else in connection with their appliances. For w.c. basins the firm use their "Vitrina" ironstone ware, which is absolutely non-absorbent, and of great strength and durability. For ranges of these, enclosures of cast-iron divisions with pine doors (the whole being fitted into columns and rails) are recommended. The "Adamant" urinals are manufactured with many variations. This admirably arranged catalogue concludes with illustrations and prices of shower, spray, foot, and ordinary baths. Messrs. Twyfords have a firmly established reputation, and there is no fear of their losing it so long as they continue to produce work of the present degree of excellence.

Messrs. J. H. Tozer & Son, Ltd., York Mansion, Westminster, S.W., have issued a "Handbook of Formulæ and Tables, with Explanatory Notes on the Lock Woven System of Reinforced Concrete and its Application to Various Structures." It is, however, something more than a pamphlet of one particular system, for the first fifty pages deal in a broad manner with reinforced concrete as a whole. It is rather remarkable that the first patentee seems to have been aiming at something like what has since developed into the Lock woven system. In 1840 M. Louis Leconte proposed "the use of trusses of iron plates for floors, from which iron rods were suspended to carry a wire meshwork for sustaining plaster, i.e., a sort of elementary reinforced concrete slab." This brief history stops short at 1892 when the material really began its triumphant career. It is followed by several pages of calculations and carefully-drawn diagrams, in which the method of treatment conforms generally to that adopted by the R.I.B.A. joint committee, the German Government, and the by-laws of many American cities. The second and smaller half of the book is explanatory of the Lock woven mesh system. This, as many of our readers are already aware, is a wire mesh reinforcement, in which the tension and transverse wires are knotted at their point of intersection by a mechanical process. A convenient size has proved to be a 5-cwt. roll of mesh which has an average length of 150 feet. The system has proved eminently useful in the construction of floors, foundation rafts, walls, sewers, culverts, and so on. A "side line," so to speak, is the Lock woven continuous wire-fencing—a hard steel wire of great elasticity—which is to be seen at the White City, Shepherd's Bush. In many important buildings the Lock woven mesh system has been introduced with highly satisfactory results.

MR. WILLIAM GEORGE LEANEY, of Southend, builder and contractor, deputy-mayor of the town, left estate valued at 19,398*l.* gross.

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TRADE NOTES.

THE Hempstead Patent Brick Company, of Hemel Hempstead, Herts, have received an order for the supply to the new central offices, Devonport Dockyard, of their patent partitions and casings for stanchions and for the protection of the concrete beams.

ELOQUENT testimony of the value of Skidmore's bent steel safes is to be found in the long list of municipal buildings where they have been installed to safeguard civic valuables, records and documents. It includes Wolverhampton (where the works are), Manchester, Belfast, Omagh, Blackburn, Chelsea, Bournemouth and Norwich. Letters are constantly received from purchasers whose chief consolation when their premises have been partially or wholly destroyed by fire is that the contents of the Skidmore safe have been recovered unharmed.

MESSRS. FREDK. BRABY & CO., LTD., Eclipse Iron and Galvanising Works, Glasgow, are erecting a large roller-skating rink on Bunhouse Grounds, Glasgow. The whole contract has been entrusted to them by Mr. Norman M. Allan, and it includes all digger work, foundations, builder and joiner work, plumber work and steel work, the latter being the greater part of the contract. The trusses are of 75 feet clear span, and constructed of steel on the French truss principle. The columns, girders and bandstand are also steel. The external covering is of corrugated sheets painted red for the roofs, and stone colour for the sides and ends, the interior being painted in sky blue. The frontage is in brick and rough cast, decorated in woodwork. The rink when completed will be one of the finest in the country and the largest in Glasgow (the skating surface being of maple wood and covering an area of 22,000 square feet), and will be magnificently furnished throughout, including tea-rooms, cloakrooms, lavatories, and all other necessary accommodation. Messrs. Braby & Co. have undertaken to complete the contract within sixty days from date of order, which is very smart work considering the size of the building.

MESSRS. L. G. MOUCHEL & PARTNERS have just published Part I. of their handbook under the title "Hennebique Ferro-Concrete Theory and Practice" (price 3*s.* 6*d.*). The contents are thus arranged:—(1) Introduction; (2) General description of the Hennebique System; (3 Fundamental principles of the Hennebique System—(*a*) theory of beam design, (*b*) theory of column design, (*c*) theory of pile design; (4) Concluding Remarks. The letterpress is remarkable for lucidity and for the absence of mathematical calculations. As each point is dealt with a marginal heading is given—a method which helps to lighten the appearance of the text.

THE April number of the *Journal* of the British Chamber of Commerce of Egypt draws attention to the opening in Egypt for door and window fittings, and also for sanitary appliances. English door and window fittings, says the *Journal*, are scarcely known in the Egyptian market. It should be remembered, however, that catalogues in technical English are almost useless for a country such as Egypt, where most architects and contractors belong to other nationalities.

THE Urban District Council for Seaford have passed the plans for a new and extensive drainage scheme.

A NEW hotel is proposed near the Montrose Golf Course. It is intended to float a company with a capital of 30,000*l.*

THE Torquay Town Council have decided to spend between 300*l.* and 400*l.* in providing a new ornamental entrance to the recreation ground.

A SUM of 13,000*l.* is being spent in making new roads and paths at the Shepherd's Bush Exhibition, and 250,000*l.* is being expended on new attractions.

THE Accrington electricity committee has decided to grant a bonus to workmen employed at its works for any saving in production below a certain figure by the use of new appliances which are to be bought.

THE Chertsey Rural District Council are about to make application to the Local Government Board for sanction to borrow 23,975*l.* for the expenses in connection with the Byfleet sewerage scheme.

CHANCELLOR EDMONDS states that there is no foundation for the statement which has appeared in a London paper "that a considerable portion of the roof of Exeter Cathedral, which is the oldest vaulted roof in the kingdom, had sunk some distance." The roof, he explained, leans a little towards the western side, and it has been in that position for about 600 years, and it has not apparently moved during that period.

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VARIETIES.

THE Walsall Town Council approved of an amended scheme of sewage disposal at a total estimated cost of 50,000*l*., and will request the Local Government Board to sanction the borrowing of a loan of that amount in place of 62,734*l*. originally applied for.

THE Council of the Incorporated Association of Municipal and County Engineers announce that the Board of Trade have agreed to sanction the change of the name of the Association to "The Institution of County and Municipal Engineers."

THE Urban District Council of Kingstown, Ireland, have appointed a deputation to wait upon Lords De Vesci and Longford with a view to securing a suitable site for a new library. In the event of a site being secured the existing reading room will be used in connection with the new technical schools there.

THE Epsom fire-station sub-committee recommend the adoption of a scheme for the erection of a new and permanent fire station at Bromley Hurst, with all necessary appliances, and the fixing of street alarms at an approximate total cost of £2,300. The recommendation was deferred until the next meeting of the general purposes committee.

THE Hornsey Town Council recently instructed their finance committee to advise the Council what is an adequate sum to charge to the Housing of the Working Classes account in respect of management, collection of rents, &c. The committee having had before them an analysis of replies as to their practice, received from other local authorities who have adopted and erected dwellings under Part III. of the Housing of the Working Classes Act, report that an adequate sum would be 1½ per cent. on the total amount of rents collected.

ACCORDING to the *Board of Trade Journal*, a draft Bill has been published for the carrying out of important reforms in the postal and telegraph service of Spain. Arrangements are to be made for the erection of central post and telegraph offices in the various provincial capitals, and also at Carthagena, Ferrol, Gijón, Reus, Vigo, Las Palmas and Mahón. The cost of the latter is estimated at about 839,300*l*.

NEW Sunday schools to accommodate about 600 scholars, in connection with the Conference Hall, Stratford, E., were opened recently. They were designed by Messrs. George Baines & Son, 5 Clement's Inn, W.C., and carried out by Mr. J. W. Jerram, East Ham, under contract at 1,930*l*.

THE electric light committee of the Sheffield City Council, having almost exhausted their borrowing powers for feeders and general mains and services, propose to apply for sanction to borrow 50,000*l*. for the purpose of laying main feeders and for general main extensions and sub-stations, and 6,000*l*. for services.

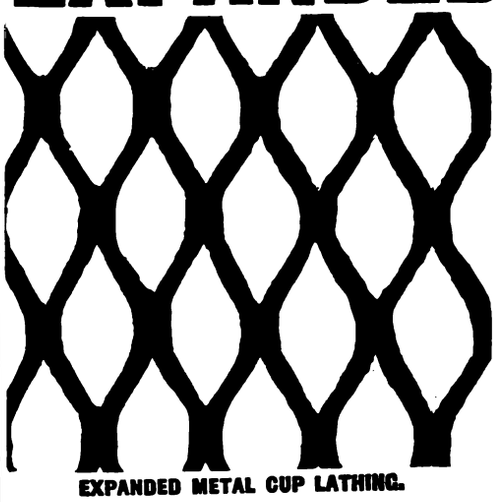
THE Nottingham City Council have agreed to the construction of a double line of tramway along Carlton Road from Sneinton Market to Thorneywood Lane; and also an additional passing place on Nottingham Road between Sandon Street and Haydn Road. The total cost is estimated at 23,850*l*.

THE Partick Dean of Guild Court last week passed plans for a large extension to the Western Infirmary. The new buildings, which are to cost 30,000*l*., will form an addition to the present west wing, and provide accommodation for upwards of 100 additional beds. The present extension forms part of a much larger scheme, which will probably involve a cost of 80,000*l*.

THE public works committee of Dudley Town Council report that the cost of the proposed municipal high school for girls including site will not exceed 23,500*l*., and the plans, as far as educational requirements are concerned, had been approved by the Board of Education. They recommend that application be made to the Local Government Board for their sanction to the borrowing of this sum for a term of fifty years.

THE Lindsey County Council, Lincs, at their last meeting agreed on the following expenditures:—695*l*. in providing a school at Gunthorpe, 725*l*. in erecting one at East Ferry, 3,900*l*. for an infants' block at Gainsborough Ropery Road school, 1,950*l*. for new school and teacher's house at South Killingholme Haven, 540*l*. for additions to Skegness Council infants' school, 2,300*l*. for additions to Crosby Council school, and 1,475*l*. for acquiring a site at Scunthorpe for a school.

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In an action in the Manchester County Court brought by a former tenant of premises in Strangeways to recover gas fittings he had put in, Judge Parry decided that his rights to these were limited. A tenant could remove ordinary gas fittings such as brackets, but not supply pipes substituted for others, and whatever fittings he had a right to must be removed before he gave up the tenancy. He had no right after leaving the premises to re-enter and remove anything without the permission of the owner or his agent.

The Liverpool Philharmonic Society on Monday agreed to reconstruct the roof of their hall at a cost of 6,000*l.* The Society's architects on their periodical examination of the roof of the hall discovered a defect. This was immediately remedied at a cost of 800*l.*, but the city building surveyor declined to certify the fitness of the hall for public use after the present season unless the roof was entirely reconstructed. Mr. B. Hall Blyth, of Edinburgh, was called in to consult with the Society's architects, and a scheme was decided upon, the plans for which have met with the approval of the authorities.

The Makers of Playing Cards Company offer "the Company's prize" of 15*l.* 15*s.* for the best designs for the backs of playing cards, illustrating the subject of England's naval supremacy. The "H. D. Phillips prize" of 10*l.* 10*s.* is also offered by the Company for the best design on any other subject than that mentioned above. The designs selected for prizes are to be the absolute property of the company, and one of them will be reproduced for the pack of cards presented by the Company to its livery and guests at the Master and Warden's inauguration banquet. Designs must be sent not later than June 24 next to W. Hayes, the clerk of the Company, Guildhall, E.C.

THE PRESERVATION OF ANCIENT BUILDINGS.

The preservation of ancient buildings possesses unique interest for the architect, and at the same time presents difficulties which cannot obtain in any other architectural problem.

In carrying out work of this nature, the necessary structural repairs sometimes obliterate historical, architectural, or archæological features of great value, and frequently, owing to the lack of suitable materials, parts have to be renewed when the architect would have preferred to have restored the original, and thus retain that value given to a building only by time and history.

One of the most important, if not the most important remedies for these evils lies in the scientific use of cement. On ancient and historical buildings in Great Britain, like Winchester Cathedral, the "Auld Brig o' Ayr," Glastonbury Abbey, &c., cement under pneumatic pressure is now being used with consummate success. But to obtain such a desirable result the use of a carefully and specially prepared high-grade cement is imperative. Of this nature is the "Cathedral" quality Portland cement. It is made from ideal raw materials and with the most up-to-date machinery, under the supervision of specially trained chemists. It was supplied in the first instance for the restoration of Winchester Cathedral, and since its introduction in 1906, no other make of cement has been used for that work.

An essential feature of cement intended for use in the grouting machine is that it should be exceptionally finely ground, and that the grinding should ensure a large proportion of flour in the finished product. Special attention is given to this point in the preparation of "Cathedral" quality Portland cement, which is sold only in sacks bearing the makers' name, and secured with seals impressed with the registered trade mark "Cathedral." It is manufactured exclusively by the Sussex Portland Cement Company, Ltd., of Newhaven, Sussex.

THE STATUS OF THE MODERN SANITARY ENGINEER.*

Sanitary engineering has in recent years increased to such an important extent, while the character of the work engaged in by those who have adopted the title of sanitary engineer is so diversified, that his position with

* Abstract of a paper read before the Institute of Sanitary Engineers, at a meeting held on March 15, by Geo. W. Chilvers (Fellow and Vice-President).

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relation to other professions and trades has become of a somewhat complicated nature. The time has arrived when some effort should be made to more clearly define both his position and work in the sanitary world, and to classify the various interests concerned.

The Institute of Sanitary Engineers has done much towards obtaining a proper recognition for its own members, and in doing so has at the same time raised the status of the profession generally; but even now its special work and place among other professional bodies is not so clearly indicated as it ought to be.

It is usually considered that the modern sanitary engineer began his existence with the passing of the Public Health Act, 1848, and that a great impetus was given him in his development when the 1875 Act became law. To the minds of many, sanitary engineering conveys little beyond the idea of the removal of excreta and filth from domestic buildings, and is tersely summed up in one word, "drains." Unfortunately, this only too accurately describes the single qualification possessed by a numerous class who, having been employed to lay the drains at a house, immediately describe themselves as "sanitary engineers": and that of others also who, on securing a contract to construct the outfall works at a private residence, blossom forth as "specialists in sewage disposal for country mansions."

Nearly forty years ago Mr. Baldwin Latham, in his standard work on sanitary engineering, defined the sanitary engineer in the following words:—"It is the true aim and object of the sanitary engineer to assist Nature in her great but simple operations, to facilitate the purification of the air, to prevent dangerous impurities entering our supplies of water, to supply abundance of these life-giving elements, to remove, as speedily as possible, before decomposition commences, all those matters eliminated from the animal system, together with all other decomposing refuse."

It was with such conceptions of their duty that the early pioneers of modern sanitation carried on their work. The debt we owe to these men who previous to, during, and after the passing of the Public Health Acts, did such grand work is incalculable. It is the fashion of the present day to sneer at the errors, or supposed errors, of the pioneers in most branches of human endeavour—this is especially so in sanitary matters—yet it is doubtful whether we are progressing in the same proportion as they, considering we have all their triumphs, as well as their few mistakes, to guide us.

When the 1848 Act was passed very few men were qualified to undertake the various works and duties its institution entailed. The demand, however, soon created a supply, and the sanitary engineer appeared. At first he was either a qualified civil engineer experienced in that part of the profession relating to public health, or else a man who had given special study to the subject and made himself an expert therein. After the passing of the 1875 Act, the boom which it created considerably increased the number of those engaged in sanitary work. Not only were there public works of sewerage, &c., to be undertaken, but the proper sanitation of public and domestic buildings was also desired on every hand. These were the days when the professional sanitary engineer flourished. The sanitary surveyor, expert and specialist appeared, and a large number of societies, associations and companies were formed for the purpose of advising on and professionally carrying out works of public and private improvements.

All these did an enormous amount of good in this direction, and they were enabled, in most cases, to induce their clients to undertake works of greater improvement than could be demanded under the Acts then in force; and in every way they proved themselves equal to the task set them under the Acts, and by the public desire for improved conditions. But in many cases, by their over-reaching requirements and exorbitant charges and expenses, they not only brought the profession into disrepute, but quenched considerably the desire for private improvements. The result is that at the present time it is a difficult matter for the professional sanitary engineer to induce his client to believe that the most trivial things are necessary.

There were also engaged in the work at this time some of the most prominent of later-day consulting engineers, who were either in private practice or connected with one or other of the societies, in which they made a sufficient fortune to enable them to leave this part of the work when it became common and less lucrative, and engage themselves only in larger public schemes.

Associated with these were a large body, consisting of

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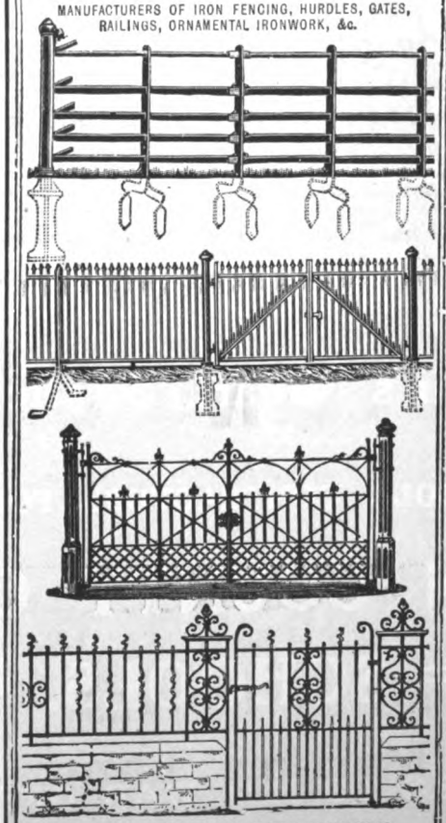
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(Signed) J. T. GREEN.

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contractors, builders, plumbers, &c., who were employed in carrying out the practical work. These men soon realised that the work was most lucrative, and many of them made it their especial business, and began to call themselves sanitary engineers, until, as at the present time, almost every little builder, plumber, and decorator adopted the title. Consequently, where strict supervision was not exercised, much bad work resulted. Men were not slow in observing that if they could obtain complete control of sanitary works, and be independent of the professional element, their business would become more lucrative still—as there would be no supervision of their work—and they could introduce their own fads without hindrance. So the "consulting and practical" sanitary engineer was evolved, who undertook to do the surveyor's work as well as his own. He succeeded so well in persuading the public that independent supervision was unnecessary that he was not only successful in increasing his own profits, but also in almost entirely obliterating the professional element. Consequently, much of the sanitary work at the present day is done without any supervision whatever, beyond that given to it by the local sanitary inspector; the result is that high prices and bad work in many instances obtain. The professional sanitary engineer of the past is unquestionably much to blame. It is very difficult now to get clients to understand that in endeavouring to save a few guineas in professional fees by calling in a firm to report on the sanitary condition of their property, and employing them to also carry out the works recommended, they lay themselves open to be fleeced in every way. It will no doubt be stated in objection to this that an estimate has usually to be given for the work. This, however, makes but little difference, as where it is so the estimate sent in frequently bears but a very distant relationship to the total account. Another class who of necessity appeared in the early days of sanitary reform is the "manufacturing" sanitary engineer. At first these were ordinary pottery makers employed to manufacture the various appliances patented, or plumbers who had designed some special apparatus of their own. As almost every expert had his own ideas an enormous variety of sanitary appliances were placed on the market. These were improved upon and new kinds were invented, until their name is now "legion." The manufacturing sanitary engineer of to-day is also a patentee of sanitary goods, and the business forms by no means the least portion of that known as sanitary engineering.

The process of development has gone on until the maker of drain pipes is now also a contractor for sanitary works. The manufacturer and merchant of sanitary appliances also undertakes to fit them up and carry out complete all kinds of sanitary and constructional works; and in order to secure that only their own "specialities" are used they now undertake professional work in advising on and submitting schemes for all classes of sanitary improvements. In some cases this is done free of charges. To what extent some of these are qualified as professional sanitary engineers, or even as sanitary engineers at all, is open to question. A few do undoubtedly possess it, but it is by no means desirable that such combined practice should continue, as the absence of supervision leads to the same evils referred to in the case of the "consulting and practical" man. In addition, as these firms use their own appliances, the best results may not always be obtained from the works.

During recent years an entirely different body of persons to those previously described have also included sanitary engineering in their businesses. These are shopkeepers, auctioneeers, and house and general furnishing agents. The only possible reason the public can have for placing this kind of work with such people is the inane desire to deal only at an establishment where everything can be obtained—from a mousetrap to a white elephant. If properly qualified sanitary engineers were always placed at the head of, and controlled, this particular department, and they did better work than those who are in practice as sanitary engineers, one could understand why the public patronise them; but who will be bold enough to declare that this is so?

The house and estate agent also includes sanitary work among his many professed qualifications. Sometimes he appears as a sanitary engineer, at others he is a sanitary surveyor; both words having, in most cases, a similar import, viz., complete ignorance of sanitary science. The surveys are sometimes carried out by a clerk whose knowledge of sanitary work is confined to the information he has obtained through attending a course of lectures on sanitary science at evening classes.

(To be continued.)

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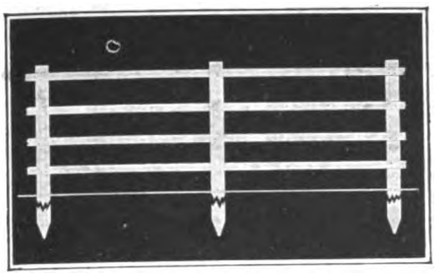
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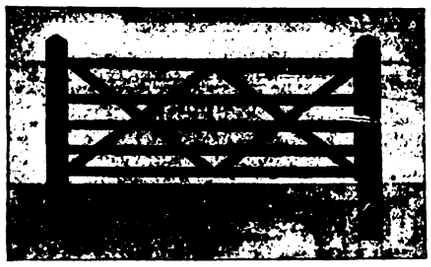
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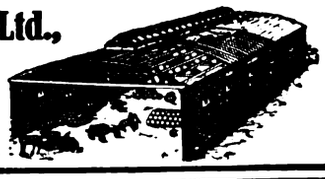
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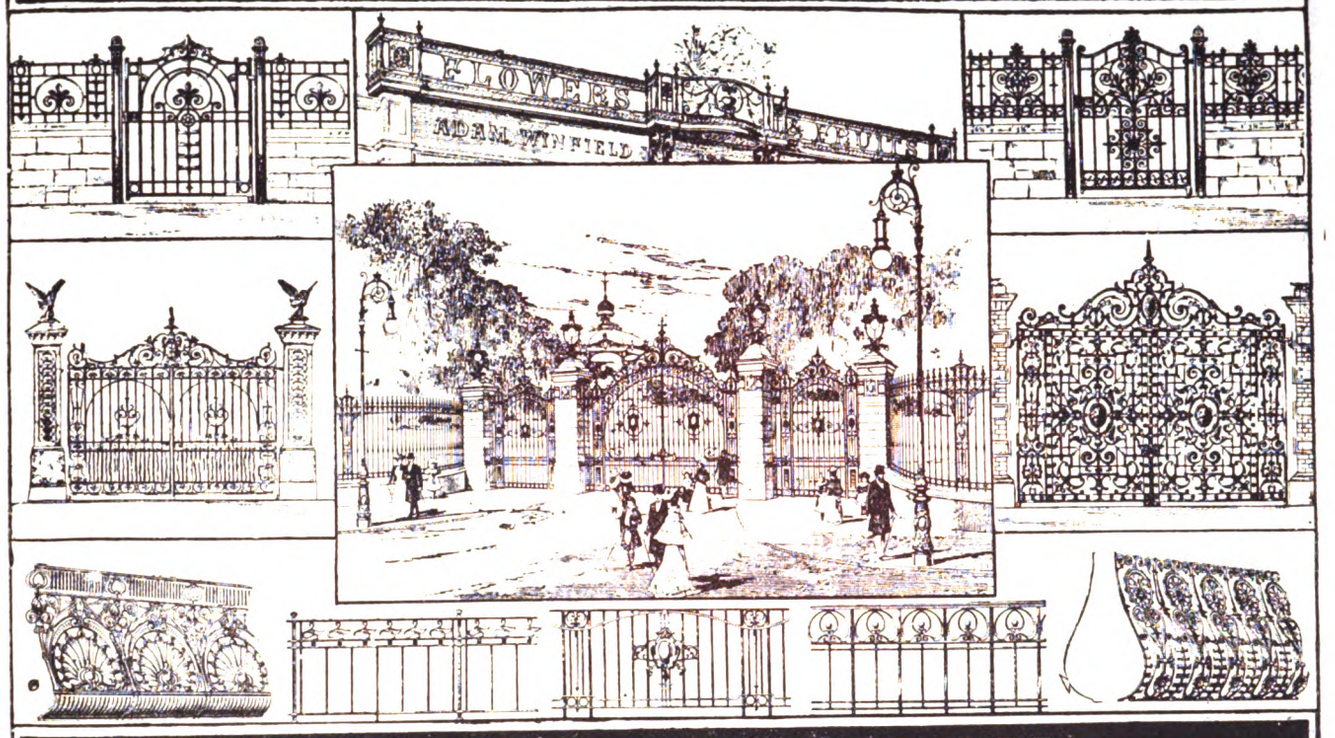
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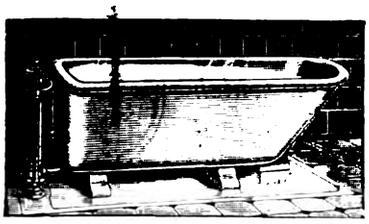
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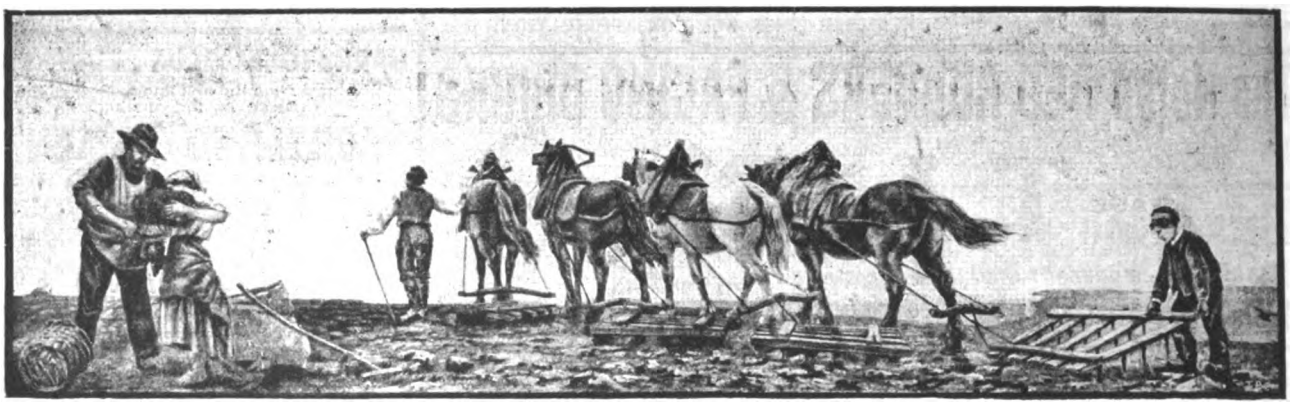
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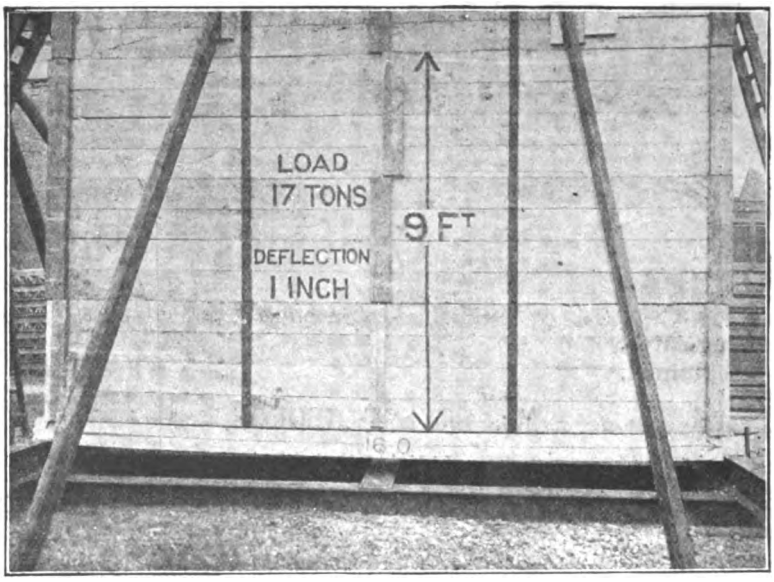
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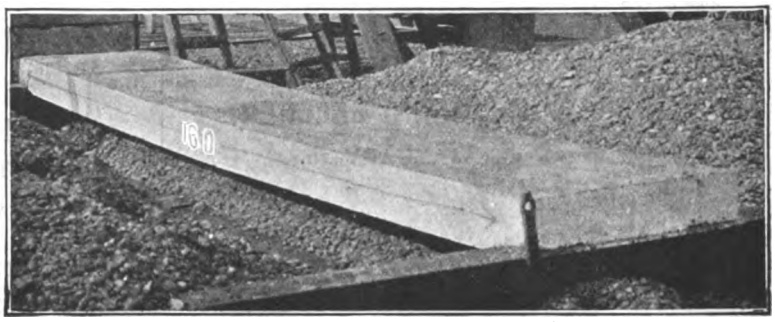
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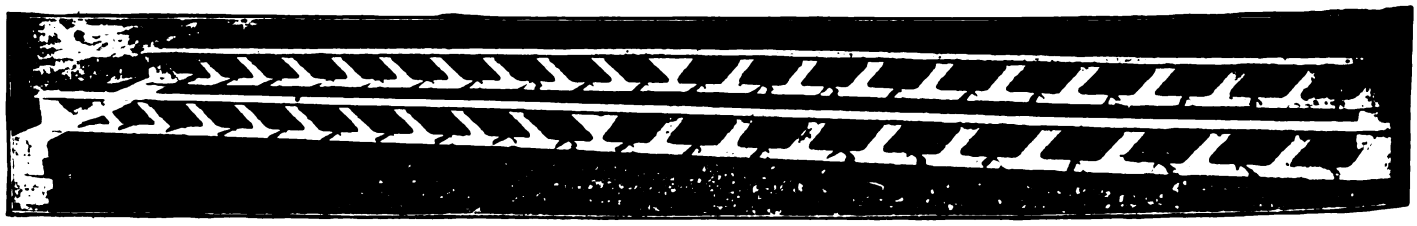
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15)63·0(4·2
60
30
30

1·5)4·2(2·8
30
120
120

Or about 2′ 9″ to 2′ 10″ Centres.



Mon'lithcrete Girders in combination with Concrete are safer than Reinforcing Bars.

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"It is claimed for this system of construction that it provides the same safeguard against the expansion of concrete as does the use of reinforcing bars, and this seems to be a justifiable claim, considering how perfectly the concrete is held by passing through the webs of the joists."—THE BUILDING NEWS, February 12, 1909.

"The aim of the inventor, Mr. Mark Fawcett, has been to obtain monolithic construction not by using concrete reinforced by bars and loose or fixed stirrups, but by using what might be described as lattice girders from which the compression members have been removed; in other words, rolled steel girders with large rhomboidal-shaped openings in the webs and tension bars pitched at an angle of 45° to the right and left of the centre, leaving the webs solid at each end to resist shear, whilst the top flanges are reduced to two-thirds the sectional area of the bottom flanges.

"The result is that the steel beams, reduced in weight 40 per cent. from the British standard, are capable of carrying at least 50 per cent. more load. The new floor has besides the advantage that an aggregate, as broken brick, can be used for the concrete, possessing greater resistance to fire and less conductive of sound than ballast concrete ordinarily employed in reinforced work."—THE ARCHITECT, February 26, 1909.



Mon'lithcrete Girders have known strength like ordinary steel joists.

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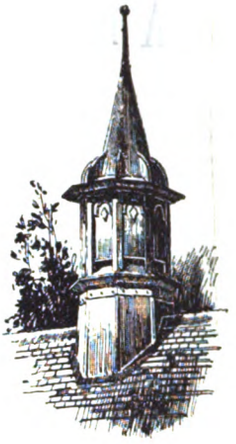
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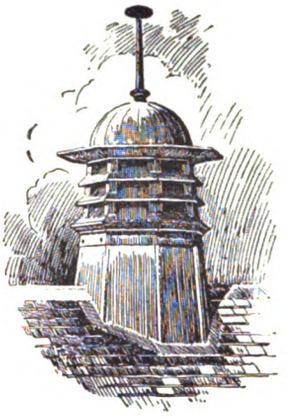
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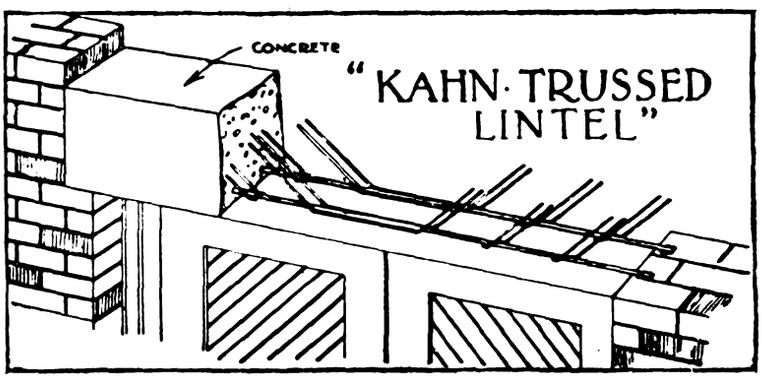
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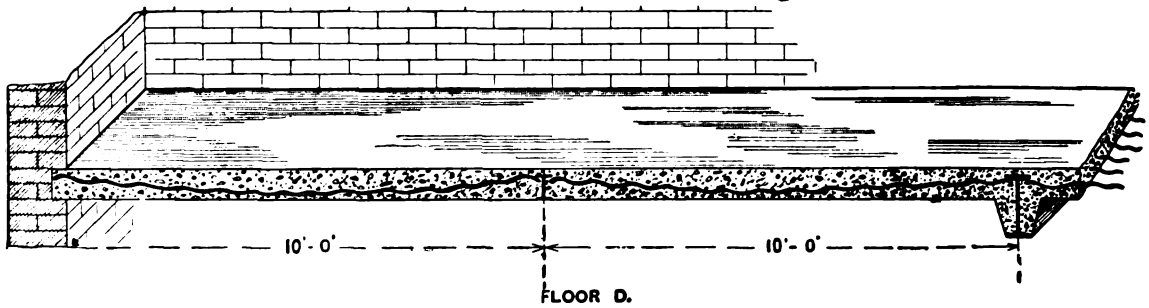
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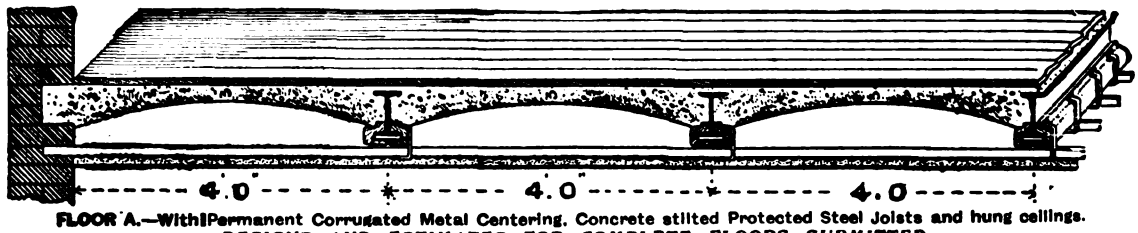
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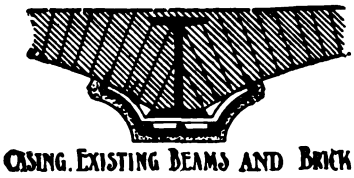
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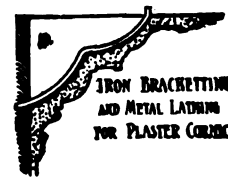




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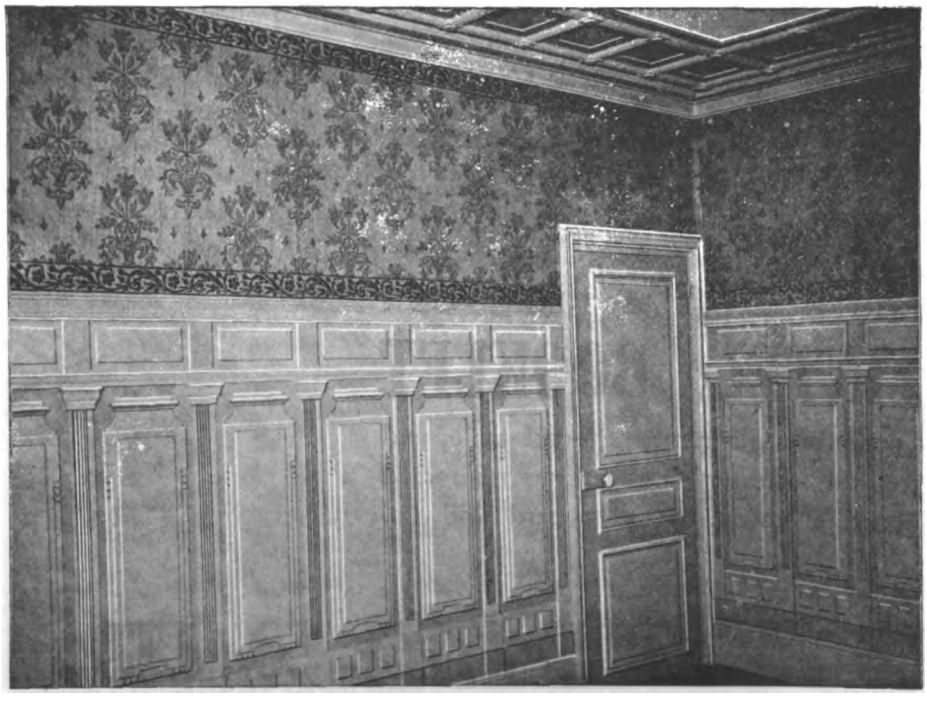
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THE

Architect and Contract Reporter.

FRIDAY, MAY 21, 1909.

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P. A. GILBERT WOOD,

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AGENTS FOR CANADA:

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Under no circumstances whatever can the Proprietors of this Journal guarantee alteration of copy if received after the first post on Tuesday mornings, and no proofs can be submitted if copy arrives later than first post on Saturday mornings.

EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

**** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

COMPETITIONS OPEN.

BURSLEM.—June 24.—For new public buildings. The author of the design placed first by the assessor will carry out the work. The architects placed second and third will receive premiums of 100*l.* and 50*l.* respectively. Deposit 2*l.* 2*s.* Mr. F. Bettany, borough surveyor, Burslem.

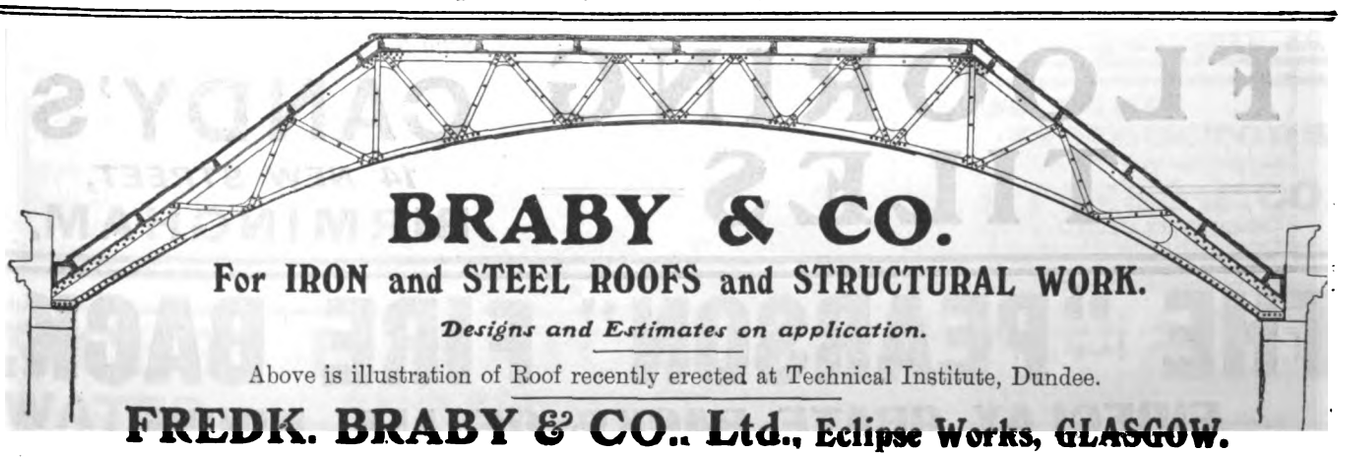
GLASGOW.—July 31.—The patrons of the Royal Incorporation of Hutchesons' Hospital invite designs for laying out for feuing and building about 195 acres of their lands of Thornliebank, Eastwood. Premiums of 100*l.*, 75*l.*, 50*l.* and 25*l.* will be awarded. Deposit 3*l.* 3*s.* Messrs. Hill & Hoggan, 194 Ingram Street, Glasgow.

GRIMSBY.—July 30.—For the extension of the town hall, at an estimated cost of 26,000*l.* Premiums of 250*l.*, 150*l.* and 100*l.* will be awarded. An eminent architect will act as assessor in conjunction with the borough engineer. Deposit 2*l.* Apply to Mr. H. Gilbert Whyatt, A.M.I.C.E., borough engineer, Town Hall, Grimsby.

IRELAND.—June 7.—The Athy Urban District Council offer a prize of 5*l.* 5*s.* for the best plans of three kinds of artisans' houses, to cost 100*l.*, 150*l.* and 200*l.* each. The successful competitor will be offered the carrying out of the scheme at 2½ per cent. on the total cost. Mr. J. A. Lawler, clerk, Town Hall, Athy.

MOLESEY.—June 1.—The East and West Molesey Urban District Council invite plans, with specifications and estimates, for an isolation hospital. Mr. D. Cann, Clerk, Council Offices, East Molesey.

MOSSLEY.—May 24.—For the erection of a mixed elementary school to accommodate 550 children, and an infant



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school for 300 infants, on land adjoining Mill Lane. Premiums 15*l.* 15*s.* and 5*l.* 5*s.* Borough Surveyor, Town Hall, Mossley, Lancs.

Reading.—June 15.—The Berkshire County Council invite designs for offices, committee rooms, &c., on the Forbury, Reading. Mr. Mervyn Macartney, F.R.I.B.A., assessor. Premiums of 100*l.*, 75*l.*, and 50*l.* Deposit 1*l.* 1*s.* Apply to Mr. J. Fred Hawkins, county surveyor, Bank Chambers, Cross Street, Reading.

Stoke-upon-Trent.—July 9.—For additions to the town hall, including hall to seat 3,000 people, and police court. Premiums of 100*l.* and 50*l.* for designs placed second and third. Mr. J. B. Ashwell, town clerk, Town Hall, Stoke-upon-Trent.

Wales.—June 3.—The Abertillery U.D.C. education committee invite competitive plans for an elementary school to be built on the Ty'r Graig site, near Aberbeeg, Mon., providing accommodation for 320 infants on the ground floor, and 430 boys and girls (mixed) on the first floor. Apply to Mr. N. J. Llewellyn, secretary, Council Offices, Abertillery.

CONTRACTS OPEN.

Barrow-in-Furness.—May 26.—For the construction of movable partitions, &c., at the technical school. The Borough Engineer's Office, Town Hall.

Barby.—June 1.—For alterations and additions at the Barby school, Northants. Mr. J. T. Blackwell, architect, 53 High Street, Kettering.

Belfast.—May 31.—For the construction and erection of a running shed for engines, with workshops, offices, &c., close to the Adelaide and Windsor station, 1½ miles from Belfast, the entire block measuring about 280 feet by 192 feet 6 inches. Deposit 2*l.* Mr. W. H. Mills, the Great Northern Railway Company (Ireland), engineer-in-chief, Amiens Street terminus, Dublin, or the District Engineer, Belfast.

Bethersden.—May 27.—For erection of offices and drainage at the Bethersden Council school, Kent. Mr. A. R. Cook, correspondent, Snettisham House, Bethersden, Ashford.

Birmingham.—May 22.—For chimney stack and extensions to engine foundations, &c., at electric generating station, Summer Lane. Deposit 2*l.* 2*s.* Send names to Messrs. Ewen Harper & Bro., architects, Ruskin Chambers, 191 Corporation Street, Birmingham.

Birstall.—May 26.—For the following works in connection with erection of a coalhouse and ashes place at Birstall central provided school, Yorks:—(1) Builder; (2) joiner; (3) slater; (4) plumber; (5) painter. The Education Offices, High Street, Heckmondwike.

Brighouse.—May 24.—For erection of a four-storey mill, 69 feet by 46 feet, at Rosemary Mills. Messrs. Sharp & Waller, architects and surveyors, 32 Bradford Road, Brighouse.

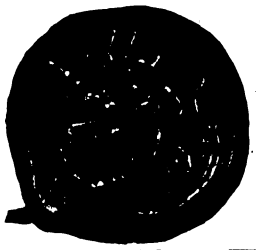
Buckley.—June 3.—For erection of an isolation hospital at Dob's Hill, near Buckley. Deposit 2*l.* 2*s.* Messrs. John H. Davies & Sons, architects, 14 Newgate Street, Chester.

Burslem.—May 24.—For erection of central schools, Moorland Road. Contract No. 1—manual training block, caretaker's house, cookery and laundry block; contract No. 2—main block for boys, girls and infants. Deposit 5*l.* 5*s.* Send names to Messrs. A. R. Wood & Son, architects, Burslem.

Bury.—June 2.—For erection of an electricity generating station at Chamber Hall, Bury, Lancs. Deposit 2*l.* Mr. Arthur W. Bradley, A.M.I.C.E., borough engineer and surveyor, Bank Street, Bury.

Chapel-en-le-Frith.—May 24.—For the reconstruction of the following highway bridges, for the Rural District Council:—Contract 1.—(1) Crowden Brook; (2) Upper Booth; (3) Barber Booth; (4) Yeman's, in Edale; (5) Killhill; (6) Watergate, Hope; and (7) Shatton. Contract 2.—(8) Cornheys; (9) Wash; (10 and 11) Blackbrook; (12) Bridgeholme Green; (13) Whitehough; (14) Baghouse; and (15) Collinacre, Combs. Deposit 3*l.* Mr. T. Partington, A.M.I.C.E., Bank Chambers, Market Place, Chapel-en-le-Frith.

Chartham Downs.—May 27.—For alterations and improvements to laundry and works in connection therewith at the Kent County Lunatic Asylum, Chartham Downs, near Canterbury. Deposit 5*l.* Mr. W. J. Jennings, architect, 4 St. Margaret's Street, Canterbury.



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CHESTER-LE-STREET.—May 31.—For a secondary school (sole tenders). The Education Architect's Office, Shire Hall, Durham.

CONSETT.—May 31.—For extensions to the Technical Institute at Consett, Durham. Sole tenders. Mr. J. A. L. Robson, secretary for higher education, Shire Hall, Durham.

DARTFORD.—June 15.—For the Kent education committee, for the erection of new secondary school to accommodate 200 girls. Plans and specifications prepared by the committee's architect (Mr. W. H. Robinson, M.S.A.) may be inspected at committee's offices on and after June 1. Names of tenderers and deposit of 2*l.* by May 28. Mr. Fras. W. Crook, secretary, Caxton House, Westminster, S.W.

DARTMOUTH.—May 28.—For alterations and additions to the Subscription Rooms; also for repairs and additions to a small cottage at South Town. Mr. Thos. W. Joyce, A.M.I.M.E., F.G.S., borough engineer and surveyor, Dartmouth.

DITTON.—May 22.—For the erection of an elementary school for 120 scholars at Ditton, near Widnes. Deposit 2*l.* Mr. Henry Littler, county architect, 16 Ribblesdale Place, Preston.

DUBLIN.—June 2.—For erecting an addition to Fairview Post Office. Mr. H. Williams, secretary, Office of Public Works, Dublin.

DUNTON GREEN.—June 12.—For the Kent education committee, new school to accommodate 250. Plans and specifications, prepared by Mr. Wilfrid H. Robinson, M.S.A., the committee's architect, may be inspected after June 1. Applications and deposit of 1*l.* by May 28, to the secretary to the committee, Mr. Fras. W. Crook, Caxton House, Westminster, S.W.

ECCLES.—May 25.—For rebuilding the Town Hall Hotel, Church Street, Eccles, Lancs. Deposit 2*l.* 2*s.* Mr. N. Hartley Hacking, architect, 50 Blackfriars, Manchester.

EDINBURGH.—May 27.—For the internal reconstruction of the Royal Institution building (first contract). Deposit 1*l.* 1*s.* The Principal Architect, H.M. Office of Works, Parliament Square, Edinburgh.

GRAVESEND.—June 1.—For repairs at Cookery School. The Borough Surveyor, Town Hall, Gravesend.

HAMPTON-ON-THAMES.—June 1.—For alterations and repairs at River View, in Thames Street. Mr. F. G. Hughes, architect, the Estate Office, Hampton.

HASTINGS.—June 7.—For building a public convenience in Fairlight Road, St. Helen's, and other works in connection therewith. Mr. P. H. Palmer, M.I.C.E., Town Hall, Hastings.

HEMEL HEMPSTEAD.—June 1.—For repairs and decorations to municipal buildings. Mr. Walter R. Locke, borough engineer and surveyor, Town Hall, Hemel Hempstead.

HOVE (SUSSEX).—May 24.—For enlarging the administration block, constructing porter's lodge, water tower and destructor, forming paths, laying drains and other work at the Infectious Diseases Hospital at Portslade. Deposit 2*l.* 2*s.* Mr. H. Hamilton Scott, borough surveyor, Town Hall, Hove.

HULL.—May 24.—For alterations and additions to Bon Marche, Ltd., Prospect Street. Mr. Jas. J. Adamson, architect, Colonial Chambers, Prince's Dock Side, Hull.

IRELAND.—May 24.—For the erection of schools at Edenderry. Deposit 1*l.* 1*s.* Mr. James Mackey, 58 Dance Street, Dublin.

IRELAND.—May 31.—For the erection of schools at Newbridge. Deposit 1*l.* 1*s.* Mr. James Mackey, 58 Dance Street, Dublin.

IRELAND.—May 31.—For painting and other improvements to Banagher Presbyterian Church, and also for alterations to the manse. Messrs. Robinson & Davidson, architects, Richmond Street, Londonderry.

IRELAND.—June 1.—For the erection of a branch bank and residence at Abbeyleux, Queen's County. Deposit 2*l.* 2*s.* Mr. W. Butler, surveyor, 58 Mountjoy Square, Dublin.

KIRBY SIGSTON.—May 29.—For the whole of the work required in erection of a Council school (to accommodate about forty children) at Kirby Sigston, near Northallerton. The Education Offices, County Hall, Northallerton.

LEEDS.—May 24.—For certain builder's work in connection with the installation of a new heating and ventilating apparatus in the town hall, Leeds. Mr. W. T. Lancashire, city engineer, Municipal Buildings, Leeds.

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LIVERPOOL.—May 26.—For the erection of an out-patients' department at the Royal Infirmary. Deposit 2*l.* 2*s.* Mr. J. Francis Doyle, 4 Harrington Street, Liverpool.

LONDON.—May 26.—For the construction of an underground record room, &c., at the town hall, for the Camberwell Borough Council. Deposit 1*l.* 1*s.* Mr. W. Oxtoby, borough engineer, Town Hall, Camberwell, S.E.

LONDON.—May 25.—For erection of rooms and the alteration of the caretaker's present quarters at the Central Library, Kensington High Street. The Borough Engineer's Office, Town Hall, Kensington, W.

LONDON.—June 2.—For the new General Post Office (King Edward Building) third contract, comprising plastering, joinery, glazing, brick and other partitions, steel framing and sashes, sanitary work, &c. Deposit 1*l.* 1*s.* The Principal Architect, H.M. Office of Works, Storey's Gate, London, S.W.

LOWCA.—May 31.—For the various works in connection with erection and completion of a mission room at Lowca, near Whitehaven. Mr. Charles W. Eaglesfield, architect and surveyor, Gordon Street, Workington.

MANCHESTER.—May 22.—For glazed partitions, &c., at the Johnson Street municipal school, Bradford. Deposit 1*l.* 1*s.* The Education Offices, Deansgate, Manchester.

NELSON.—June 5.—For erection of three shelters in Victoria and Walverden Parks. Mr. B. Ball, A.M.I.C.E., borough engineer and surveyor, Nelson, Lancs.

NELSON.—June 5.—For the construction of a retaining wall near the sewage works. Mr. B. Ball, A.M.I.C.E., borough engineer and surveyor, Nelson, Lancs.

NEWARK.—May 24.—For erection of a secondary school for girls at Newark. Deposit 10*l.* 10*s.* Send names to Mr. Chas. H. Newbald, clerk to the Governors, 31 Lombard Street, Newark.

NOTTINGHAM.—May 25.—For building alterations at Bagthorpe workhouse. Deposit 2*l.* 2*s.* Mr. Arthur Marshall, A.R.I.B.A., architect, King Street.

NORTH MUSKHAM.—May 26.—For erection of a farmhouse at North Muskham, near Newark. Messrs. Sheppard & Lockton, architects and surveyors, Bargate, Newark.

PORTSLADE-BY-SEA.—June 1.—For erection and completion of a fire-brigade station. The Surveyor, 46 St. Andrew's Road, Portslade-by-Sea, Sussex.

RUGBY.—June 4.—For the enlargement of the Head Post Office. Deposit 1*l.* 1*s.* Apply to the Postmaster of Rugby.

ST. AGNES.—May 24.—For erection of a farmhouse at Anchor, St. Agnes, Cornwall. Mr. Alfred J. Cornelius, M.S.A., architect, Truro.

SCOTLAND.—May 25.—For the mason, carpenter, slater, plumber, plasterer, painter and glazier, steel and iron and heating works of buildings to be erected in Marischal Street and Thistle Street, Peterhead. Mr. James Watt, C.E. and architect, 26 Marischal Street, Peterhead.

SCOTLAND.—May 27.—For the internal reconstruction of the Royal Institution, Edinburgh (Contract 1). Deposit 1*l.* 1*s.* The Principal Architect, H.M. Office of Works, Parliament Square, Edinburgh.

SCOTLAND.—May 28.—For the mason, carpenter, plumber, slater, plasterer, painter and glazier work of a couple of workmen's houses to be erected in Kingussie. Mr. Alexander Cattenach, architect, Kingussie, N.B.

SCOTLAND.—June 3.—For erection of a single labourer's cottage in the townland of Carthage, for the Inishowen R.D.C. Mr. Robert Moore, clerk, Carndonagh.

SCOTLAND.—June 11.—For mason, carpenter, slater, plasterer, plumber, painter and glazier works of additions to the Masonic Institute, Buckie. Messrs. D. & J. R. M'Millan, architects, 105 Crown Street, Aberdeen.

SHEERNESS.—May 25.—For erection of a mineral-water factory, stables, &c., at Railway Road. The Sheerness and District Licensed Victuallers' Mineral Water Co., Ltd.

SITTINGBOURNE.—June 12.—For the Kent education committee, new school to accommodate 400 children. Plans and specifications, prepared by Mr. Wilfrid H. Robinson, M.S.A., the committee's architect, may be inspected on or after June 1. Applications and deposit of 1*l.* by May 28 to the secretary, Mr. Fras. W. Crook, Caxton House, Westminster, S.W.

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SOUTHEND-ON-SEA.—June 1.—For alterations and additions to the London Road boys' Council school. Deposit 2*l.* 2*s.* Send names at once to Messrs. Cabuche & Hayward, architects, Hamlet Court Road, Westcliff, Southend-on-Sea.

SUTTON-IN-ASHFIELD.—May 25.—For the construction of retort-house, retort-bench, coal elevator and conveyor, hoppers, &c., in connection with the gasworks extension. Deposit 3*l.* 3*s.* Messrs. Corbet, Woodall & Son, Palace Chambers, Bridge Street, Westminster, S.W.

WAKEFIELD.—June 4.—The West Riding education committee invite whole or separate tenders for the following works:—Woodlands new school (two blocks), near Doncaster (builder, joiner, slater, plasterer, plumber, painter); Steeton provided school, closets and drainage (builder, joiner, slater, plumber, asphalter). Deposit 1*l.* each. The West Riding Architect, County Hall, Wakefield.

WAKEFIELD.—May 24.—The West Riding education committee invite whole or separate tenders for the following works:—Clapham Newby new school (builder, joiner, slater, plasterer, plumber, painter); Denholme district provided school—drainage (builder and plumber). Deposit 1*l.* each. The West Riding Architect, County Hall, Wakefield.

WALES.—May 22.—For erection of two dwelling-houses at Mountain Ash. Messrs. Morgan & Elford, architects, 1 Jeffrey Street, Mountain Ash.

WALES.—May 22.—For erection of a Welsh Congregational chapel at Penclawdd, having 800 sittings. Deposit 3*l.* 3*s.* Mr. W. Beddoe Rees, architect, 3 Dumfries Place, Cardiff.

WALES.—May 24.—For erection of (1) farmhouse at Tir-Ergyd, Llwydcoed, Aberdare; (2) farm buildings at Tir-Ergyd, Llwydcoed, Aberdare, for the trustees, Hamlen-Williams estate. Deposit 1*l.* 1*s.* Mr. J. Llewellin Smith, M.S.A., architect, Aberdare.

WALES.—May 24.—For erection of a pair of semi-detached villas at Llandaff. Deposit 1*l.* 1*s.* Mr. W. H. Dashwood Caple, F.R.I.B.A., architect and surveyor, 2 Church Street, Cardiff.

WALES.—May 25.—For building a chancel and organ chamber, extending the nave and building a north aisle to the parish church of Cwm, near Ebbw Vale. Deposit 2*l.* 2*s.* Mr. E. M. Bruce Vaughan, F.R.I.B.A., architect, Cardiff.

WALES.—May 26.—For the erection and completion of thirty-two houses and formation of road, surface, water drains, &c., at Clifton Road, Treorchy, Rhondda Valley. Mr. W. D. Morgan, M.S.A., architect, 194 Ystrad Road, Pentre.

WALES.—May 26.—For alterations and additions to the Plough Hotel, Whitchurch, near Cardiff. Messrs. Veall & Sant, architects, 5 to 7 Arcade Chambers, High Street, Cardiff.

WALES.—May 27.—For erection of a chapel vestry at Ynysddu. Deposit 1*l.* 1*s.* Mr. W. A. Griffiths, architect and surveyor, Post Office Chambers, Pontllanfraith, Mon.

WALES.—May 27.—For erection of a chapel school-room at Bargoed. Deposit 1*l.* 1*s.* Mr. Wm. Harris, architect and surveyor, Bank Chambers, Bargoed.

WALES.—May 27.—For erection of a church at Seven Sisters, near Neath. Mr. J. Cook Rees, architect, The Parade, Neath.

WALES.—May 29.—For erection of a new church at Crynant. Mr. J. Cook Rees, architect, Parade Chambers, Neath.

WALES.—May 31.—For Sunday-school premises in connection with the Garn Congregational Church, Abercarn, Mon. Deposit 2*l.* 2*s.* Mr. R. L. Roberts, M.S.A., architect, Abercarn.

WALES.—May 31.—For erection of twenty-nine houses at Hengoed. Mr. H. Gabe Jones, architect and surveyor, Hengoed.

WALES.—June 4.—The committee of management of the Royal National Lifeboat Institution are prepared to receive tenders for the construction of a lifeboat house and slipway at Porth Lydan, Moelfre, in the county of Anglesey. Major Lawrence Williams, Parclau, near Moelfre, Anglesey; or Mr. W. T. Douglass, M.I.C.E., engineer and architect to the Royal National Lifeboat Institution, 15 Victoria Street, Westminster, S.W.

WAREHAM.—May 23.—For erection of a dwelling-house. Mr. W. Watts Fookes, architect and surveyor, Wareham, Dorset.

WARRINGTON.—May 22.—For erection of infirm block at the union workhouse. Deposit 2*l.* 2*s.* Send names to Messrs. William & Segar Owen, architects, Cairo Street Chambers, Warrington.

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Whalley.—May 27.—For the erection of three houses, two lodges and eight attendants' cottages at the Whalley Asylum. Deposit 2*l*. Mr. Henry Littler, 16 Ribblesdale Place, Preston.

Whitehaven.—May 24.—For all or any of the several trades required in erection and completion of public elementary schools for 712 children, caretaker's residence, &c., in Irish Street. Deposit 1*l*. 1*s*. Send names to Messrs. Oliver & Dodgshun, architects, Carlisle.

Withington (Lancs).—May 26.—For erection of a new "In and Out Home" at the Withington workhouse, for the Guardians of Chorlton Union. Deposit 2*l*. 2*s*. Messrs. Charles Clegg & Son, architects, 21 Spring Gardens, Manchester.

Worksop.—May 25.—For the erection of wood or wood and iron buildings for the treatment of phthisical patients at Kilton Hill, Worksop. The building to be for twelve patients, and must include nurses' room, bathroom and w.c. Mr. James Snow Whall, clerk, 66 Bridge Street, Worksop.

There was an outcry last year at the absence of any representative collection of British sanitary specialities in the exhibition held in the White City, Shepherd's Bush. This omission has now been rectified, for one of the largest sections of the Imperial International Exhibition is the building and engineering constructions committee, with a sub-section for sanitation. Mr. Alfred Burr, F.R.I.B.A., is chairman, and he is assisted by Messrs. H. D. Searles-Wood, F.R.I.B.A., Edmund Wimperis, E. White Wallis, W. H. Prescott, M.I.C.E., Ellis Marsland, M.S.A., and E. R. Palmer, F.I.S.E. Mr. N. W. Hoskins, M.R.S.I., the hon. secretary of the Institute of Sanitary Engineers, is the hon. secretary of the committee. The space allotted comprises 15,000 square feet in the centre of the Exhibition buildings. The Building Trades Exhibitions have proved that the general public are keenly alive to the importance of such exhibits to themselves. The collection at Shepherd's Bush must appeal to a still wider gathering of visitors, and ought to foster a demand for those sanitary improvements in which Great Britain leads the world.

TENDERS.

AYLESBURY.

For enlargement of Council school and for other works. Mr. C. H. Riley, architect, Education Sub-Office, Aylesbury.

H. J. & A. Wright	£5,260 0 0
Mayne & Son	4,865 0 0
G. & T. Cannon	4,675 0 0
Mead	4,497 0 0
Tombs & Sons	4,415 0 0
Darlington	4,348 0 0
Hacksley Bros.	4,328 0 0
Gibson & Sons	4,283 0 0
Harris	4,269 0 0
Flint	4,187 0 0
Webster & Cannon, Aylesbury (*accepted*)	4,088 0 0

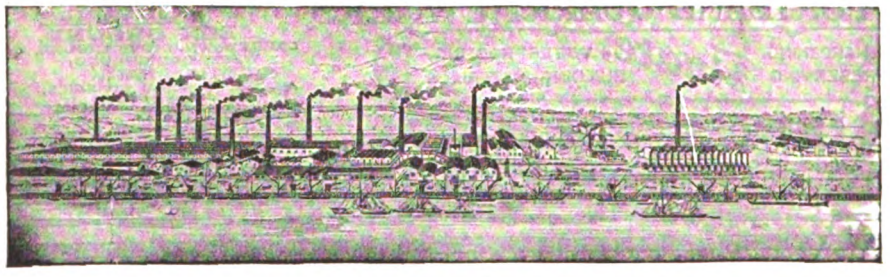
BARNSTAPLE.

For the erection of a secondary school for 304 children. Mr. Percy Morris, county architect, 1 Richmond Road, Exeter.

Baker Bros.	£11,257 6 5
Pearn Bros.	11,227 0 0
Pickett	10,990 18 5
Yeo & Sons	10,986 10 4
Davis & Son	10,875 0 0
Bryant & Sons	10,856 6 3
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Wilkins & Sons	10,397 11 6
Sillifant	10,239 6 0
Woolaway & Sons	10,175 17 0
Coles	10,050 3 0
Westcott, Austin & White	9,930 0 0
Badcock	9,887 1 4
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Stanbury	9,861 12 9
Bovey & Sons	9,790 14 10
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Bryer	9,714 0 5
Pratt	9,659 10 0
Pethick Bros.	9,636 0 0
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Pollard & Co., Ltd., Taunton (*accepted*)	9,273 2 6

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POTTS & FOLEY, Beverley (*accepted*)	£3,540 18 1

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Accepted tenders.

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Secondary school for girls.

Spencer, Aintree, Liverpool	5,660 0 0

BOSTON.

For erection of Corporation stables in Tattershall Road.

LUCAS (*accepted*)	£506 0 0

BOURNEMOUTH.

For painting the pier for the Corporation. Mr. F. W. LACEY, M.I.C.E., borough engineer and surveyor, Municipal Offices, Bournemouth.

JENKINS & SONS, LTD., Holdenhurst Road, Bournemouth (*accepted*)	£314 0 0

BROMLEY (KENT).

For certain works of sewering, &c., Shortlands Gardens and a portion of Southlands Road.

Shortlands Gardens.

FREE & SONS, Maidenhead, Berks (*accepted*)	£597 17 6

Southlands Road.

PEILL & SONS (*accepted*)	1,089 6 6

BRAILES (BANBURY).

For alterations and additions to the Parish Institute. Mr. A. EDWARD ALLEN, architect, 31A Bridge Street, Banbury.

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Burden	213 0 0
Poulton	198 0 0
Ward	165 0 0
TURNER, Adlestrop, Chipping Norton (*accepted*)	149 15 0

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For sewage-disposal works. Mr. E. E. RYDER, engineer and surveyor, Council Offices, Bushey

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Chamberlain	8,700 0 0
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Jaggard	6,833 17 0
Bliss	6,349 9 10
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CUNLIFFE & SONS, Birmingham (*accepted*)	6,286 4 0

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For limestone tar-paving, &c., North Street, Waterloo Road and the Beeches. Mr. W. WILLIS GALE, surveyor.

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MAY, Ashtead (*accepted*)	563 16 5

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GRADON & SON, Durham (*accepted*)	£6,241 0 0



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Whalley.—May 27.—For the erection of three houses, two lodges and eight attendants' cottages at the Whalley Asylum. Deposit 2*l*. Mr. Henry Littler, 16 Ribblesdale Place, Preston.

Whitehaven.—May 24.—For all or any of the several trades required in erection and completion of public elementary schools for 712 children, caretaker's residence, &c., in Irish Street. Deposit 1*l*. 1*s*. Send names to Messrs. Oliver & Dodgshun, architects, Carlisle.

Withington (Lancs).—May 26.—For erection of a new "In and Out Home" at the Withington workhouse, for the Guardians of Chorlton Union. Deposit 2*l*. 2*s*. Messrs. Charles Clegg & Son, architects, 21 Spring Gardens, Manchester.

Worksop.—May 25.—For the erection of wood or wood and iron buildings for the treatment of phthisical patients at Kilton Hill, Worksop. The building to be for twelve patients, and must include nurses' room, bathroom and w.c. Mr. James Snow Whall, clerk, 66 Bridge Street, Worksop.

There was an outcry last year at the absence of any representative collection of British sanitary specialities in the exhibition held in the White City, Shepherd's Bush. This omission has now been rectified, for one of the largest sections of the Imperial International Exhibition is the building and engineering constructions committee, with a sub-section for sanitation. Mr. Alfred Burr, F.R.I.B.A., is chairman, and he is assisted by Messrs. H. D. Searles-Wood, F.R.I.B.A., Edmund Wimperis, E. White Wallis, W. H. Prescott, M.I.C.E., Ellis Marsland, M.S.A., and E. R. Palmer, F.I.S.E. Mr. N. W. Hoskins, M.R.S.I., the hon. secretary of the Institute of Sanitary Engineers, is the hon. secretary of the committee. The space allotted comprises 15,000 square feet in the centre of the Exhibition buildings. The Building Trades Exhibitions have proved that the general public are keenly alive to the importance of such exhibits to themselves. The collection at Shepherd's Bush must appeal to a still wider gathering of visitors, and ought to foster a demand for those sanitary improvements in which Great Britain leads the world.

TENDERS.

AYLESBURY.

For enlargement of Council school and for other works. Mr. C. H. Riley, architect, Education Sub-Office, Aylesbury.

H. J. & A. Wright	£5,260 0 0
Mayne & Son	4,865 0 0
G. & T. Cannon	4,675 0 0
Mead	4,497 0 0
Tombs & Sons	4,415 0 0
Darlington	4,348 0 0
Hacksley Bros.	4,328 0 0
Gibson & Sons	4,283 0 0
Harris	4,269 0 0
Flint	4,187 0 0
Webster & Cannon, Aylesbury (*accepted*)	4,088 0 0

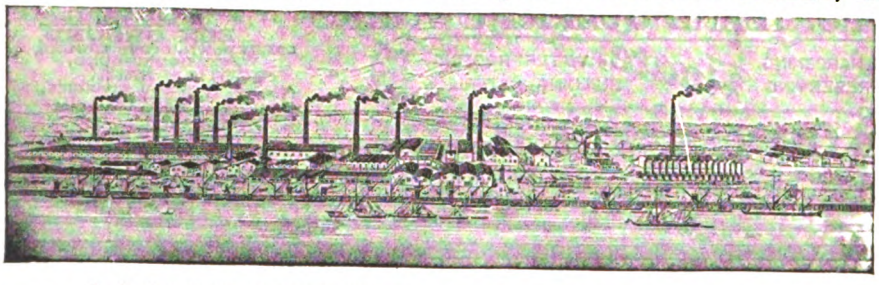
BARNSTAPLE.

For the erection of a secondary school for 304 children. Mr. Percy Morris, county architect, 1 Richmond Road, Exeter.

Baker Bros.	£11,257 6 5
Pearn Bros.	11,227 0 0
Pickett	10,990 18 5
Yeo & Sons	10,986 10 4
Davis & Son	10,875 0 0
Bryant & Sons	10,856 6 3
Johnson & Co.	10,647 4 7
Davies	10,435 0 0
Wilkins & Sons	10,397 11 6
Sillifant	10,239 6 0
Woolaway & Sons	10,175 17 0
Coles	10,050 3 0
Westcott, Austin & White	9,930 0 0
Badcock	9,887 1 4
Bennett	9,880 16 2
Stanbury	9,861 12 9
Bovey & Sons	9,790 14 10
Wakeham Bros.	9,728 0 0
Bryer	9,714 0 5
Pratt	9,659 10 0
Pethick Bros.	9,636 0 0
Darch	9,320 2 6
Pollard & Co., Ltd., Taunton (*accepted*)	9,273 2 6

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BEVERLEY.

For a Baptist chapel and schoolroom, to be erected in the proposed street from Wednesday Market to Register Square, Beverley.

POTTS & FOLEY, Beverley (*accepted*)	£3,540	18	1

BOOTLE (LANCS.).

For erection of schools.

Accepted tenders.

Orrell Council school.

Kelly & Bro., Walton, Liverpool	£9,099	0	0

Secondary school for girls.

Spencer, Aintree, Liverpool	5,660	0	0

BOSTON.

For erection of Corporation stables in Tattershall Road.

LUCAS (*accepted*)	£506	0	0

BOURNEMOUTH.

For painting the pier for the Corporation. Mr. F. W. LACEY, M.I.C.E., borough engineer and surveyor, Municipal Offices, Bournemouth.

JENKINS & SONS, LTD., Holdenhurst Road, Bournemouth (*accepted*)	£314	0	0

BROMLEY (KENT).

For certain works of sewering, &c., Shortlands Gardens and a portion of Southlands Road.

Shortlands Gardens.

FREE & SONS, Maidenhead, Berks (*accepted*)	£597	17	6

Southlands Road.

PEILL & SONS (*accepted*)	1,089	6	6

BRAILES (BANBURY).

For alterations and additions to the Parish Institute. Mr. A. EDWARD ALLEN, architect, 31A Bridge Street, Banbury.

Cliff & Co.	£259	0	0
Burden	213	0	0
Poulton	198	0	0
Ward	165	0	0
TURNER, Adlestrop, Chipping Norton (*accepted*)	149	15	0

BUSHEY.

For sewage-disposal works. Mr. E. E. RYDER, engineer and surveyor, Council Offices, Bushey

Champniss	£9,419	7	0
Chamberlain	8,700	0	0
Pedrette	8,169	13	8
Watson, jun.	7,934	15	11
Mann	7,795	16	7
W. & C. French	7,565	0	0
Bell & Sons	7,491	0	0
Ford	7,479	0	0
Adams	7,200	9	11
Wickstead & Beardsell	6,971	17	7
Jaggard	6,833	17	0
Bliss	6,349	9	10
Bailey & Sons	6,328	4	8
CUNLIFFE & SONS, Birmingham (*accepted*)	6,286	4	0

CARSHALTON (SURREY).

For limestone tar-paving, &c., North Street, Waterloo Road and the Beeches. Mr. W. WILLIS GALE, surveyor.

Shepherd & Sons	£770	12	3
Champness & Co.	752	6	0
Potter & Co.	751	19	0
Swaker	662	9	9
E. & E. Iles	634	8	4
Blaker	632	6	8
Chittenden & Simmonds	591	3	0
Streeter	582	17	0
Hobman & Son	572	10	7
Gromes & Newton	568	7	0
Potter	567	0	0
MAY, Ashtead (*accepted*)	563	16	5

DURHAM.

For proposed new science and art block and terraces in connection with the Johnston Technical School, Durham.

GRADON & SON, Durham (*accepted*)	£6,241	0	0



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CHIPPING NORTON.

For erecting an Oddfellows' hall. Messrs. Hipkiss & Stephens, architects, Birmingham.

Kimberley	£2,355	0	0
Higgs	2,199	0	0
Espley & Co.	2,190	0	0
Groves & Son	2,117	0	0
Booth & Son	2,038	0	0
Hickman	2,020	0	0
Sharman	1,945	0	0
Burden	1,920	0	0
Lewis	1,898	0	0
Amended estimates with reductions.			
Sharman	1,705	0	0
Lewis	1,680	0	0
Burden, Chipping Norton (*accepted*)	1,638	0	0

DEVIZES (WILTS).

For hot-water heating of the Corn Exchange, Devizes, for the Corporation. Mr. F. C. Billingham, borough surveyor.

Parker	£278	10	0
Hine & Collinson	277	0	0
Fryer	258	16	0
Dinning & Cooke	239	0	0
Haden & Sons	230	0	0
Skinner & Co.	222	0	0
Heating and Engineering Co.	224	10	0
Spencer	219	0	0
Gardiner & Sons	216	0	0
Alger & Sons	215	0	0
Freer	214	14	0
Spry & Co.	212	5	0
Rendell	211	15	4
Kinnell & Co.	209	0	0
Hampton & Co.	205	0	0
Melksham Engineering Co.	204	0	0
Weech & Sons	199	10	0
Skinner, Board & Co.	199	0	0
Lott & Sons	198	18	0
Ashwell & Nesbit	198	10	0
Dawson & Co.	196	0	0
Watkin & Son	195	16	0

DEVIZES—*continued.*

Ashworth & Sons	180	0	0
Rendell & Sons	173	0	0
Walters, Devizes (*accepted*)	168	18	6

EASTHAM (CHESHIRE).

For the construction of sewers and appurtenant works in Church Lane and Stanley Road, in the township of Eastham, for the Wirral Rural District Council. Messrs. Priest & Ellis, M.I.C.E., engineers, 13 Harrington Street, Liverpool.

Jowett	£542	10	7
Meikle	486	3	5
Chadwick	450	0	0
Harris	413	18	4
Warren, St. Paul's Road, Seacombe (*accepted*)	353	0	0

GLOUCESTER.

For additions to the Shire Hall for the County Council. Mr. R. Phillips, consulting surveyor, Gloucester.

Ash	£17,270	0	0
Sabey & Sons	16,993	0	0
Willcocks & Co.	16,975	0	0
Stephens & Bastow	16,878	0	0
Sapcote & Co.	16,877	0	0
Collins & Godfrey	16,788	0	0
Bloxham & Co.	16,313	0	0
Lovatt	16,272	0	0
Cowlin & Son	16,181	0	0
Rowse	16,140	0	0
Nicholson & Son	16,000	0	0
Walters & Sons	15,987	0	0
Byard & Sons	15,885	0	0
Estcourt & Son	15,838	0	0
Jones	15,770	0	0
Bovey & Son	15,692	0	0
Coles	15,541	0	0
Colborne	15,394	0	0
Bowers & Co.	14,982	0	0
Long & Sons	14,980	0	0
Nicholls & Son	14,949	0	0
Pethick Bros.	14,144	0	0
Crane & Co., Nottingham (*accepted*)	13,857	0	0

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ILLUSTRATIONS.

ST. BARNABAS CHURCH, MITCHAM, SURREY.—SOUTH-EAST VIEW.

HOUSE IN HEATH DRIVE, HAMPSTEAD.

DESIGN FOR A BANK.—FRONT ELEVATION.

SEDGWICK MEMORIAL MUSEUM, CAMBRIDGE.—PRINCIPAL ENTRANCE.

DETAILS OF KIRBY HALL, NORTHANTS.

GOSPORT.

For asphalting North Street.

BRADSHAW & SONS, Portsmouth (*accepted*)	£643 2 6

For paving the footpath in Anglesey and Foster Roads.

BRADSHAW & SONS (*accepted*)	£496 13 9

HASLINGTON.

For erection of new chancel, vestry and heating vault at Haslington Church, near Crewe. Mr. R. T. LONGDEN, architect, Burslem and Leek.

Godwin	£1,617 0 0
Jones	1,578 0 0
Williams & Sons	1,479 18 0
Colley & Lindop	1,400 0 0
W. Cooke	1,391 0 0
Micklewright & Sons	1,345 10 0
Birchall Bros.	1,321 8 6
Moirey	1,318 3 0
Matthews	1,284 0 0
Gresty & Co.	1,240 0 0
STRINGER, Sandbach (*accepted*)	1,230 0 0
J. Cooke	1,200 0 0

HASLEMERE (SURREY).

For erecting a house at Haslemere. Messrs. FREDERICK J. HODGSON & WILLIAM SYMMONDS, architects, Guildford and Haslemere.

Cæsar & Son	£716 10 0
Haslemere Builders	672 10 0
Fry	661 0 0
SMITH, Haslemere (*accepted*)	615 0 0
Milton & Sons	609 0 0
Marshall	597 10 0

ILKESTON.

For sewage-disposal works. Messrs. WILLCOX & RAIKES, engineers, Birmingham.

Brebner & Co.	£33,939 0 0
Hawley & Sons	31,487 0 0
Cottle	28,462 15 0
Firth & Co.	28.000 0 0
Goodwin	27,800 0 0
Cox & Co.	27,570 17 4
Vale & Sons	27,363 0 0
Graham & Sons	26,995 0 0
Price & Co.	26,970 2 10
Mackey	26,879 2 4
Willson & Sons	26,802 5 0
Osman	26,748 0 0
Lowe & Sons	26,496 0 0
Tomlinson	25,890 0 0
Parker & Sharpe	25,470 10 0
Cunliffe & Sons	25,347 16 7
BELL & SONS, Manchester (*accepted*)	25,326 18 10

KING'S LYNN.

For making up, &c., of Mount Street, Park Avenue, Avenue Road Estate. Mr. H. T. TILSON, architect and surveyor, Lynn.

BONE, King's Lynn (*accepted conditionally*)	£1,288 14 0

LONDON.

For the supply of overhead electrical equipment in the reconstruction, on the overhead trolley system, of the tramways in Bow Road between Burdett Road and Bow Bridge and for the line to the Bow tramways car-shed.

Blackwell & Co.	£2,666 6 4
British Insulated and Helsby Cables	2,612 10 9
Dick, Kerr & Co., Abchurch Yard, E.C., (*recommended*)	2,511 5 2
Chief Officer of Tramways estimate	2,500 0 0

For fixing movable glazed sashes to four sides of the band-stand at Horniman Gardens.

Smith & Sons	£172 0 0
Akers & Co.	122 0 0
J. & C. Bowyer, Upper Norwood (*recommended*)	117 0 0

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LONDON—*continued.*

For the erection of the first portion of the Abbey Wood tramways car-shed required for the working of the Beresford Square to Abbey Wood lines.

Roberts & Co.	£20,560	0	0
Patman & Fotheringham	19,971	0	0
Lawrance & Sons	18,789	0	0
McCormick & Sons	17,971	0	0
Friday & Ling	17,747	15	5
Kerridge & Shaw	17,741	10	0
Lovatt	17,671	0	0
Rowley Bros.	17,615	0	0
J. & C. Bowyer	17,591	0	0
Holloway	17,400	0	0
Mowlem & Co.	17,395	0	0
Holloway Bros.	17,300	0	0
Wall	17,250	0	0
Kirk & Randall	16,995	0	0
F. & G. Foster	16,982	0	0
Architect's estimate	17,200	0	0

The amounts of the tenders are for comparative purposes only and do not represent the estimated value of the work to be executed, which will be measured and valued on the detailed prices in the schedule of the accepted tender. The cost of the first portion of the building, including incidentals, is estimated not to exceed 11,000*l*., and after adjusting the quantities so as to make them applicable to the erection of the car-shed in question, it is found that the lowest offer is that submitted by Messrs. Kirk & Randall. It is proposed, therefore, that the offer of this firm be accepted.

For the heating and ventilation of the painting shop to be provided at the Holloway tramways car-shed.

Davidson & Co.	£674	5	0
Do. (alternative)	525	0	0
Sturtevant Engineering Co.	647	2	6
Musgrave & Co.	614	3	6
Do. (alternative)	504	1	0
Matthew & Yates	524	1	0
Standard Engineering Co., Queen Victoria Street, E.C. (*recommended*)	446	10	0
Architect's estimate	525	0	0

LONDON—*continued.*

For municipal buildings for Bethnal Green Borough Council. Mr. E. E. Finch, borough engineer and surveyor, Bethnal Green, N.E.

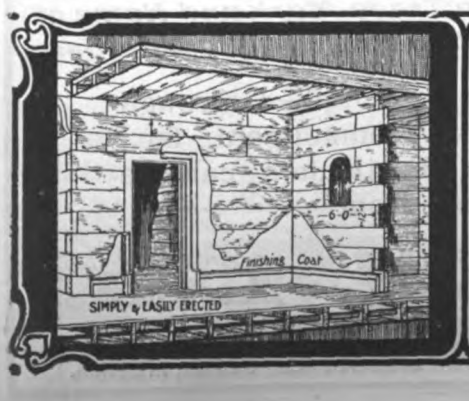
Wall	£29,700	0	9
Appleby & Sons	29,225	0	0
Nicholson & Son	28,571	13	11
Spencer, Santo & Co.	27,412	0	0
Parker & Sons	27,174	0	0
Nightingale	27,078	0	0
McCormick & Sons	26,942	0	0
Todd & Newman	26,900	0	0
Higgs & Hill	26,460	0	0
Holloway	26,387	0	0
Stapleton & Sons	26,350	0	0
J. & M. Patrick	26,273	0	0
Hammond & Son	26,257	0	0
Pasterfield & English	26,238	0	0
Shurmur & Sons	26,151	0	0
Perry & Co.	25,980	0	0
Hammond & Miles	25,831	1	0
Monk	25,827	0	0
Coles	25,808	0	0
Allen & Sons	25,784	0	0
F. & G. Foster	25,596	0	0
Williams	25,527	0	0
Maddison	25,449	0	0
Armitage & Hodgson	25,388	0	0
Lawrence & Son	25,278	0	0
Kearley	25,203	0	0
Jerram	25,197	0	0
Pattinson & Son	24,991	0	0
Lowe & Co.	24,900	0	0
Minter	24,490	0	0
Brand, Pettitt & Co., Tottenham (*accepted*)	24,450	0	0
Fryer & Co.	23,407	3	9

For repairs and painting, externally and internally, to thirty-five houses in Folkestone and Lawrence Roads, Edmonton. Messrs. Stanley Parkes & Brown, surveyors, Tottenham, Enfield and Hornsey.

Groves & Son, Tottenham (*accepted*)	£883	15	0

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LONDON—*continued.*

For the erection on the Lauriston Road site, Hackney, of a school for the accommodation of 320 children.

Price	£9,009 0 0
McLaughlin & Harvey	8,816 15 10
Johnson & Co.	8,814 0 0
Harris	8,708 0 0
Dabbs & Son	8,649 0 0
McCormick & Sons	8,587 0 0
Perry & Co. (Bow)	8,485 0 0
Roberts & Co.	8,471 0 0
Leng	8,372 0 0
F. & T. Thorne	8,366 0 0
Lawrance & Sons	8,287 0 0
Shurmur & Sons	8,217 0 0
Galbraith Bros., Camberwell Green (*recommended*)	8,140 16 0
Architect's (Education) estimate	8,620 0 0

For external repairs at the workhouse, Marloes Road, Kensington, for the Kensington Guardians.

Gardiner Bros.	£900 0 0
Spencer, Santo & Co.	489 0 0
Rowley	337 15 9
Richardson & Sons	299 10 0
Deacon & Son	295 0 0
Constable	268 0 0
Stone	250 10 0
Robinson	239 0 0
Dean & Perkins	235 0 0
SQUIRE, Bow, E. (*accepted*)	232 12 0

For renewing a portion of footway paving in Dynestor Road, for the Stoke Newington Urban District Council.

Griffiths & Co. (*recommended*), 2*s.* 6*d.* per yard super.

For renewal of slating, relaying of gutters, &c., to blocks L and M of the lairs at the Foreign Cattle Market, Deptford, S.E., for the City Corporation.

Williams & Co.	£790 0 0
Adlard & Co.	783 0 0
BINGLEY, SON & FOLLET (*accepted*)	769 0 0

For installing the electric light in the Kensington workhouse chapel and Guardians' offices.

NEWBALD & Co., Sutton (*accepted*)	£169 4 0

LONDON—*continued.*

For repairs and external painting to Nos. 621 to 637 (odd) High Road, Tottenham. Messrs. STANLEY PARKES & BROWN, surveyors, Tottenham, Enfield and Hornsey.

PORTER, Tottenham (*accepted*)	£145 0 0

LONGBRIDGE (WARWICK).

For the erection and completion of a block of three cottages at Longbridge, near Warwick. Mr. C. M. C. ARMSTRONG, architect, Warwick.

Fincher & Co.	£818 6 6
Cashmore & Sons	678 16 0
Harris	653 0 0
Smith & Sons	647 0 0
Bailey & Co.	618 0 0
Commander	598 17 6
Bowen	598 0 0
SHEASBY, Barford (*accepted*)	587 10 0

NORTH WITCHFORD (CAMBS).

For alterations to the infirmary, for the Guardians.

Love & Freear	£292 0 0
Redhead	289 0 0
Papworth	255 0 0
Dack	249 0 0
Dunham	240 0 0

PLYMOUTH.

For annual supply of ironwork, &c., for the waterworks committee. Mr. F. HOWARTH, M.I.C.E., water engineer.

Ironwork (general).

ELLACOTT & SON (*accepted*)	£119 13 0

Ironwork (special castings).

STANTON IRONWORKS Co. (*accepted*)	218 0 0

Sluice valves.

BLAKEBOROUGH & SONS (*accepted*)	145 16 0

Stop cocks, &c.

ADLAM & SONS (*accepted*)	127 4 3

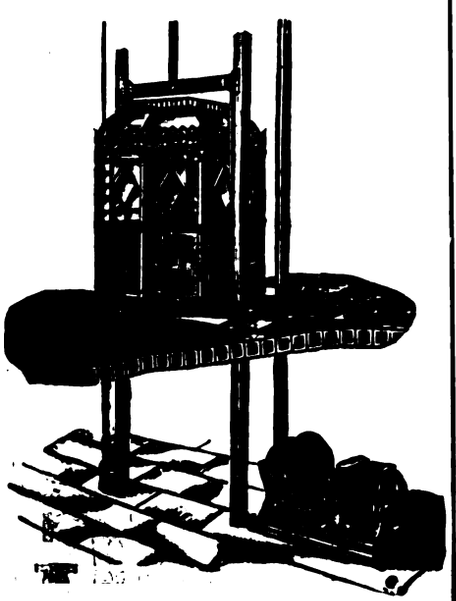
Lead pipe, &c.

T. & W. FARMILOE (*accepted*)	279 4 11

Hydrants.

BLAKEBOROUGH & SONS (*accepted*)	1 2 0

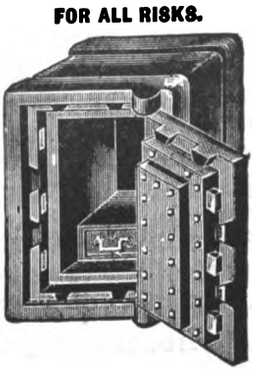
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OKEHAMPTON.

For carrying out the South Zeal waterworks.

Crockerell	£1,245 3 5
Lester	1,219 3 6
Sheen	1,068 5 2
Brembuers & Co.	1,052 17 2
Ellis	1,040 8 6
Jenkinson	1,038 0 0
Shaddock	1,015 14 2
Honey, Church & Co.	999 12 2
Wickstead & Beardsell	957 15 8
Steer & Pearce	905 11 6
Avery	893 13 0
Bennett	882 16 9
Glunfield	830 8 0
Blatchford & Dawe	796 17 0
Counter	789 6 0
Finch Bros.	775 4 0
Furse & Son	663 7 10
Cornish	642 10 3

SOUTH SHIELDS.

For new Y.M.C.A. building, Fowler Street and Burrow Street. Mr. J. H. Morton, F.R.I.B.A., South Shields and Newcastle-on-Tyne.

Foster	£5,336 0 0
Ridley	5,320 0 0
Jennings	5,298 0 0
Bewley	5,114 0 0
J. & W. Lowry	5,065 0 0
Thornton	4,987 0 0
Parkinson & Sons	4,913 0 0
Lumsden	4,900 0 0
Young	4,891 0 0
Sheriff & Sons	4,862 14 7
Fenwick & Co.	4,830 0 0
Hall	4,815 15 0
Craven	4,796 0 0
Kennedy	4,780 0 0
Robertson & Sons	4,766 0 0
Middlemiss Bros.	4,753 16 7
Davidson & Miller	4,685 10 8
Allison, Whitburn (*accepted*)	4,285 0 0

SCOTLAND.

For erection of a concrete and steel bridge of 18-foot span over the Lochinvar Burn at Millmark. Mr. J. D. Smith, C.E., county road surveyor, Dalbeattie.

P. & R. Fleming & Co.	£312 0 0
Johnstone & Clark	307 0 0
Dennistion	284 0 0
J. & R. Tait	282 10 0
Wilson, Moncaire (*accepted*)	215 10 0

STALYBRIDGE.

For the plumbing, glazing and painting in connection with the higher elementary and technical school at Waterloo Road. Mr. George Rowbottom, architect, Stalybridge.

Braithwaite	£1,075 0 0
Marland	1,071 0 0
Clayton Bros.	1,056 0 0
Exors. of J. Arundel	1,052 0 0
Moss & Sons	1,042 0 0
Storrs, Sons & Co.	1,029 0 0
Marsden & Son	999 18 0
Bateman	998 0 0
Mee	985 0 0
Ford	983 10 0
Lees & Sons	965 0 0
Rigby	962 0 0
Burgess & Son, Stalybridge (*accepted*)	930 0 0
Higginbottom & Sons	900 0 0

For building a higher elementary and technical school at Waterloo Road, Stalybridge (except plumbing, glazing and painting). Mr. G. Rowbottom, architect, Stalybridge.

Wellerman Bros.	£13,994 0 0
Wilson & Sons	10,377 0 0
Moss & Sons	10,360 0 0
Ridyard	9,960 0 0
Storrs, Sons & Co.	9,929 0 0
Shuttleworth Bros.	9,920 0 0
Gerrard & Sons	9,800 0 0
Marshall & Sons	9,469 0 0
Saxon Bros. & Co., Stalybridge (*accepted*)	9,452 0 0
Clayton Bros.	9,396 0 0

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For Index of Advertisers, see page X.

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SHEFFIELD.

For the construction of weighbridge office, steel roof to tipping dock, 60 feet by 39 feet, entrance gates, wall, fences and other contingent works at the Olive Grove depôt, Myrtle Road, Sheffield.

WELLERMAN BROS., Hyde, near Manchester (*accepted*)	£798 0 0

TEWKESBURY.

For the extension of the water main from Bredon to Bredon's Hardwick.

Wilkes	£422 17 0
Ambrose	415 0 0
Walker	412 10 0
Riley	382 3 6
COLLINS & GODFREY (*accepted*)	363 0 0

TWICKENHAM.

For making-up roads for the Urban District Council.

Bonser Road.

Free & Co.	£979 14 6
Iles	673 13 3
Lear	661 14 10
Blaker	619 10 7
Mowlem & Co.	614 0 0
Kavanagh & Co.	591 10 4
Shepherd & Sons	587 7 9
Mears	581 0 0
Rhodes	553 18 9
Surveyor's estimate	634 15 8

Holmes Road.

Free & Co.	1,006 15 9
Iles	696 19 6
Lear	679 15 6
Blaker	636 12 9
Mowlem	632 0 0
Kavanagh & Co.	609 10 4
Mears	605 0 0
Shepherd & Son	604 4 6
Rhodes	569 11 1
Surveyor's estimate	656 4 6

WALES.

For laying out and building a new cattle-market place, drainage, water supply, sheep, cattle and pig pens, town yard, stable, &c., new street and sewerage, &c., for the Builth Wells Urban District Council. Mr. TELFER SMITH, M.S.A., architect, Market Buildings, Builth Wells.

Meredith	£4,187 0 0
Davies	4,004 9 3
Smith	3,934 0 0
Macnab	3,869 0 0
Lewis & Co.	3,650 0 0
Willis	3,582 18 11
Jones & Sons	3,550 0 0
Lant	3,416 12 0

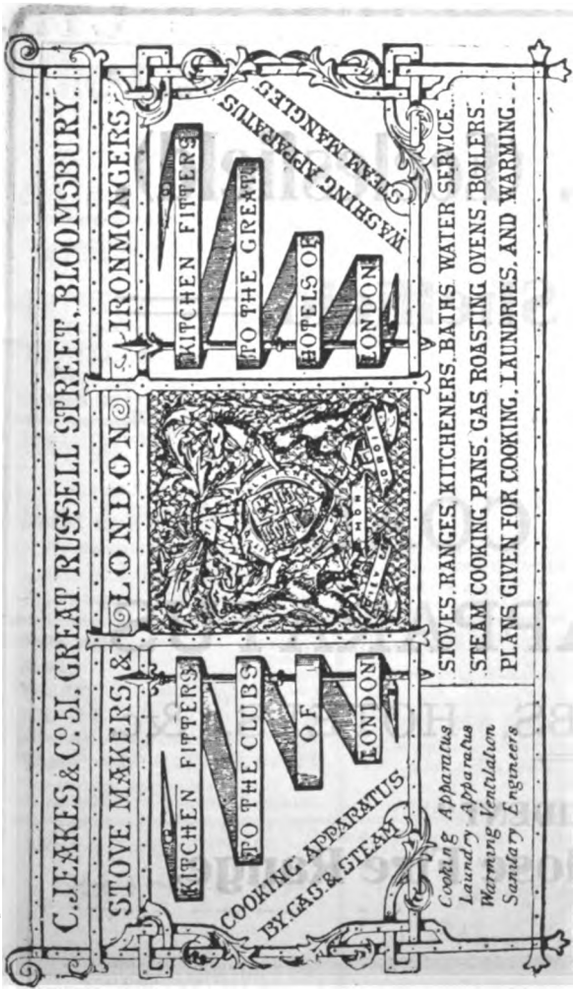
WEST BILNEY (NORFOLK).

For alterations and additions to the Beeches. Messrs. W. JARVIS & SON, architects, King's Lynn.

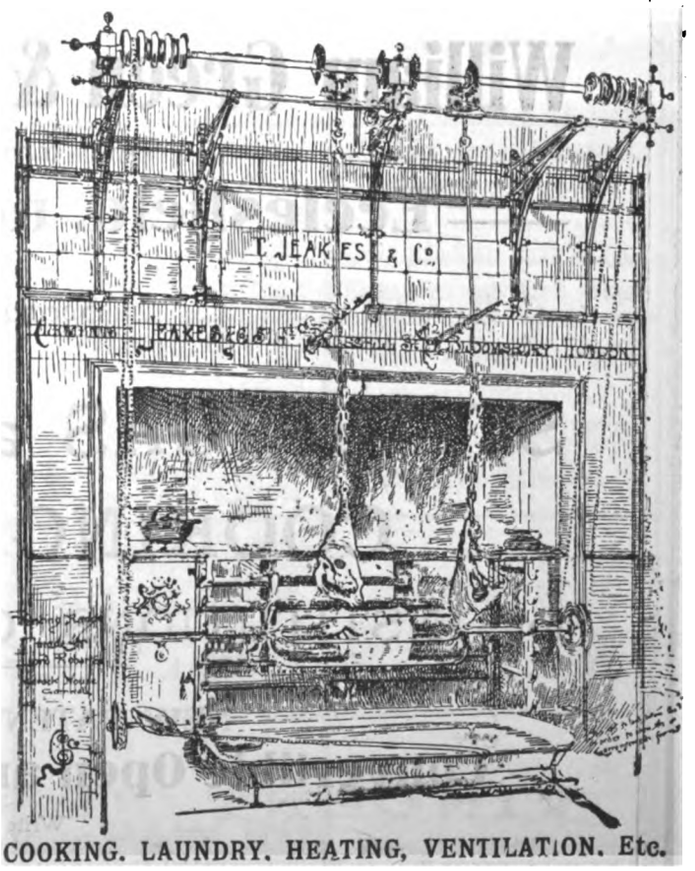
Jeffries	£499 0 0
Medwell	460 0 0
Barnes & Co.	451 0 0
Dye & Allen	449 0 0
Ives & Sons	448 0 0
Ashby	441 19 0
Tash & Langley	439 10 0
F. & S. DICKERSON, King's Lynn (*accepted*)	406 19 0

MR. J. E. HARTLEY, of Messrs. Hartley & Sugden, Ltd., welded, riveted and cast iron boiler makers, Halifax, has decided to reside in London in order to take personal control. He puts himself at the disposal of customers who desire information concerning the firm's goods, and on notice being sent to 52 Gray's Inn Road, Holborn.

THE *Draper* of May 15 gives an excellent full-page photograph of Mr. T. H. Armstrong, the general manager of Messrs. Parnall & Sons, Ltd., the well-known shop-fitters of Bristol and London, and under whose supervision the entire works of the firm have been reorganised and brought to their present high degree of excellence.



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TRADE NOTES.

MESSRS. WM. POTTS & SONS, LTD., clock manufacturers, Leeds and Newcastle, have received orders to make and fix a new illuminated turret clock with four large dials at the Royal Free Grammar School, Newcastle-on-Tyne, from the late Lord Grimthorpe's designs. The clock will be a gift from the "Old Boys."

THE City of London workhouse infirmary, Homerton, is being warmed and ventilated by means of Shorland's double-fronted patent Manchester stoves with descending smoke flues, Manchester grates, exhaust roof ventilators and patent hygienic inlet ventilating panels, supplied by Messrs. E. H. Shorland & Brother, of Manchester.

THE London office and showrooms of the Marsden Tiles, Ltd., are at 23 Farringdon Avenue, E.C. Here are on view all the usual and some unusual kinds of tiles as employed for walls, floors, stoves, hearths, &c. Some of the effects attained are so dissimilar that it is difficult to believe that identically the same raw material served for them. It is pleasant to see the steady development on artistic lines that is constantly going on, and the ability of science to keep pace with the demands for improvement. It is hardly necessary to say that the clay, from the time when it leaves the pit till it is offered to the architect as finished faience, passes through many processes, which are sometimes complicated and sometimes simple. To achieve success scrupulous care has to be observed throughout, more especially in the attainment of those finer effects through which tiles are winning a high place in the opinion of architects. Marsden Tiles, Ltd., are now making a special bid for the favour of the profession, and to increase their already high reputation, by the production of work of high artistic merit.

THE fire protection arrangements at the Bath and West and Southern Counties Agricultural Show, which opens at Exeter on May 26, have again been entrusted to Messrs. Merryweather & Sons. Their fire station in the yard will be equipped with motor and horsed fire engines, while fire-main piping will be laid down through the grounds, with hydrants at various points; and in addition there will be hand fire-pumps and other appliances for "first aid." A detachment of the Merryweather Fire Brigade will be on duty day and night.

GUIDE BOOKS.

THE Homeland Association, Ltd., have issued two more handbooks—(1) Littlehampton, Arundel and Amberley, and (2) Chelmsford. The first named is, however, the third edition, and it has been brought up to date in many minor details. The letterpress is, of course, admirable; the same cannot be said of many of the half-tone illustrations, which lack sharpness. But this can be easily corrected in the fourth edition. The area embraced is wide, and it is full of interest and beauty. Chelmsford is a town of importance. The opening paragraph of the handbook may be quoted:—"Chelmsford is often cited as an example of a town that has elected to dispense with antiquities; but this is only half true. Its monuments to history must be sought for in the libraries and museum rather than in its streets, for Chelmsford has always preferred to rebuild rather than to bolster up decay. It has steadily refused to sacrifice its present for the preservation of its past. So we look almost vainly for that jostling of the ages among its landmarks which often quite spuriously passes for the essence of the picturesque. Buildings at best are a poor substitute for the spirit of a town." Fortunately there were one or two people who left a few old buildings standing. The neighbourhood also has had much spared which recalls other times and other ways. A third book recently brought out by the Homeland Association, Ltd. (and which like the majority of the series of seventy is sold with covers of paper for 6*d*., and of cloth for 1*s*.), is "Stamford." In this work the importance of the present as against the past is rightly suggested by devoting Chapter I. to "Stamford of To-day: Its advantages as a residential town and holiday centre." The eventful history of the town and neighbourhood is then set forth. A special chapter has been contributed by Mr. E. W. Lovegrove, M.A., M.R.I.A., on "The Churches of Stamford." One of the neighbouring show-places is Burghley House, where the ubiquitous Cromwell left his mark.

The 1909 edition of the Great Eastern Railway Company's "Tourist Guide to the Continent" comes at an opportune period, and it may help many people to put an end to their indecision as to whether or not to go to the Continent this year. The guide is again edited by Mr. Percy Lindley. It gives a "taste" of what awaits the tourist to

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Holland, Germany, Belgium, the Tyrol, Switzerland and (a very small taste) Norway, Denmark and Sweden. One addition to the 1909 issue is eight pages of travel-talk in English, French and German. It is unfortunate the replies could not be included to such questions as "Where does this street lead to?" or "Which is the way out?" The answers given by a fluent native are certain to be bewildering.

WHITSUNTIDE ARRANGEMENTS.

To obtain benefit from your holidays there is no doubt that a change of air is essential. The country is now looking its best, and the various facilities for comfortable and expeditious travel should be a further inducement to spend the Whitsun recess away from home. We have just received a copy of the A B C programme issued by the Great Central Railway Company. There are over 300 seaside and inland health resorts in the Midlands and the North, including Liverpool, Isle of Man and West Coast, Cleethorpes, Scarborough and East Coast, which can be reached in quick time at very low fares, and the choice of destination stretches from the Midland counties to the far North of Scotland. To those not wishing to go so far away the Vale of Aylesbury, Chiltern Hills and Stratford-on-Avon should appeal. Those wishing to undertake a walking or cycling tour, visiting the beauty spots of Middlesex, Herts and beechy Bucks, are given a wide range of tours at low fares. Express corridor trains, with buffet-car accommodation, will leave Marylebone on Friday, Saturday, Sunday and Monday, May 28, 29, 30 and 31, and full particulars of times of departure, fares and other information are contained in this programme, which may be obtained free at Marylebone station, any of the company's town offices and agencies, or by post from Publicity Department, 216 Marylebone Road, London, N.W.

RETURN tickets at reduced fares, available for eight days, will be issued to Brussels May 26 to 29 and 31, viâ Harwich and Antwerp. Passengers leaving London in the evening reach Brussels next morning after a comfortable night's rest on board the steamer. For visiting The Hague, Scheveningen and Amsterdam for the cities of the Zuyder Zee special facilities are offered viâ the Great Eastern Railway Company's British Royal Mail Harwich-Hook of Holland route. A corridor train, with vestibuled carriages, dining and breakfast cars, is run on the Hook of Holland service between London and Harwich. From the Hook of Holland through carriages and restaurant cars are run to The Hague and Amsterdam in the North and South German express trains to Cologne, Bale and Berlin, reaching The Hague and Amsterdam early next morning, Cologne at noon, Bale and Berlin in the evening. For the convenience of passengers tickets dated in advance can be obtained at the Liverpool Street station, Continental Inquiry and Booking Offices. The Danish Royal Mail steamers of the Forenede Line of Copenhagen will leave Harwich for Esbjerg (on the West Coast of Denmark) on Thursday, May 27, and Saturday, May 29, returning Tuesday, June 1, and Wednesday, June 2. The General Steam Navigation Company's steamers will leave Harwich for Hamburg on Wednesday, May 26, and Saturday, May 29, returning Sunday, May 30, and Wednesday, June 2.

ON Whit Sunday, Monday and Tuesday, May 30 and 31 and June 1, cheap return tickets for Leigh-on-Sea, Westcliff and Southend-on-Sea will be issued by the London, Tilbury and Southend Company's direct route. The fares are:—First class, 5*s.*; third class, 2*s.* 6*d.* Cheap tickets will also be issued to Gravesend. Friday or Saturday to Wednesday tickets will be issued to Leigh-on-Sea, Westcliff and Southend-on-Sea. Through tickets will be issued on Whit Sunday, Monday and Tuesday to Southend-on-Sea.

THE paving committee of the Dublin Corporation have issued a statement regarding the expenditure on the maintenance of the streets for the past nine years. In the "old city" the expenditure in 1900 on paving, macadamising, flagging, asphalting and concreting, and cleaning monuments was 20,852*l.* 3*s.* 3*d.*, it went down to 12,296*l.* 1*s.* 1*d.* in 1903, and has since risen steadily till it is this year 29,775*l.* 7*s.* 7*d.* The total expenditure under all heads in 1900 was 23,721*l.* 13*s.* 5*d.* It fluctuated during the period, and this year it stands at 39,341*l.* 8*s.* 9*d.* The sum available this year—the estimates having been reduced by the Council—is 20,519*l.*

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VARIETIES.

A HOTEL with about seventy bedrooms is to be erected in the centre of the Marine Drive at Barton-on-Sea, in Hampshire. The promoter is Mr. Humpage.

THE Newport Corporation works committee have decided to purchase a tar-spreading apparatus for the roads, which will cost from 80*l.* to 100*l.*

THE Sheffield master builders are making arrangements for the entertainment of a party of builders from various Belgian towns in August next. Last summer the Sheffield Association paid a highly successful visit to Belgium.

THE Directors of Perth Infirmary have appointed a sub-committee to negotiate with the Glover Incorporation for the purchase of a site at Western Avenue, extending to eleven acres, for a new infirmary.

THE plant used by the Works Department of the London County Council was sold by auction at the Battersea depôt on Tuesday. About 250 lots were arranged and ticketed in the yard and offices, while six barges, of from 28 to 62 tons register, were moored along the river wharf. The total realised was about 2,000*l.*

A SPECIAL meeting of the York City Council was held on Wednesday to receive the recommendation of the tramways committee to accept the tender of Dick, Kerr & Co., Ltd., for the construction and electrical equipment of new lines at a cost of 78,827*l.* After a sitting of three and a half hours the meeting was adjourned till June, in order that further information may be obtained.

MR. HUDSON, the Commissioner appointed by the Board of Trade to act as arbitrator in the dispute between the St. Helens master painters and their employés, which was referred to the Board for settlement, has issued his award. The terms are favourable to the men, though the masters succeed in gaining the point which gave rise to the differences. Mr. Hudson allows that the men should start at 7.30 in the morning, which is an hour and a half later than usual, and which was what the masters desired, their contention being that it was extremely inconvenient to customers to have painters entering their premises so early as 6 A.M. There will in future be no breakfast interval, and in the aggregate the men will work four hours less in the week than heretofore, as the finishing time will remain the same, but as compensation for that loss of time the men are granted a halfpenny per hour extra in wages.

THE Manchester Steam Users' Association have regular and careful inspection made of the boilers at their works. In the year there were as many as 9,044 examinations made of one kind or another. "No boiler under the Association's care burst during the year," the report says, "and at the end of fifty-four years' working the committee with pleasure again place on record the fact that no guaranteed boiler has ever exploded, and that no life has been lost from any cause which the Association could or ought to have prevented." Outside its ranks, however, the Association regretfully records the occurrence of sixty-eight explosions, killing twenty-six persons and injuring forty others. Thirty were boiler explosions proper, and the rest were "miscellaneous," arising from steam pipes, stop valves, drying cylinders, and so on. In addition to the above, seven explosions arose from the bursting of hot-water or kitchen boilers, killing one person and injuring two.

A NEW church is nearing completion at the junction of four roads at Prenton. When completed the church buildings will consist of nave, transepts, chancel, ministers' and deacons' vestries, church parlour, and several classrooms. The walls internally and externally are faced with white Storeton stone, the internal dressings being of red Runcorn stone. The choir is placed in the chancel, the pulpit being on the left and organ in a chamber behind the pulpit. The roof principals, ceilings, internal fittings, doors, screens, &c., are of oak. The church, when completed, will accommodate about 550. The estimated cost of the completed church is about 6,500*l.*, the nave, however, only has been erected at present at a cost of 4,500*l.*, accommodating about 400. The work is being carried out by Messrs. W. H. Forde, Ltd., contractors, of Birkenhead, from the designs and under the superintendence of Mr. T. W. Cubbon, architect, of 54 Hamilton Street, Birkenhead, whose designs were placed first in competition when the existing school chapel was erected.

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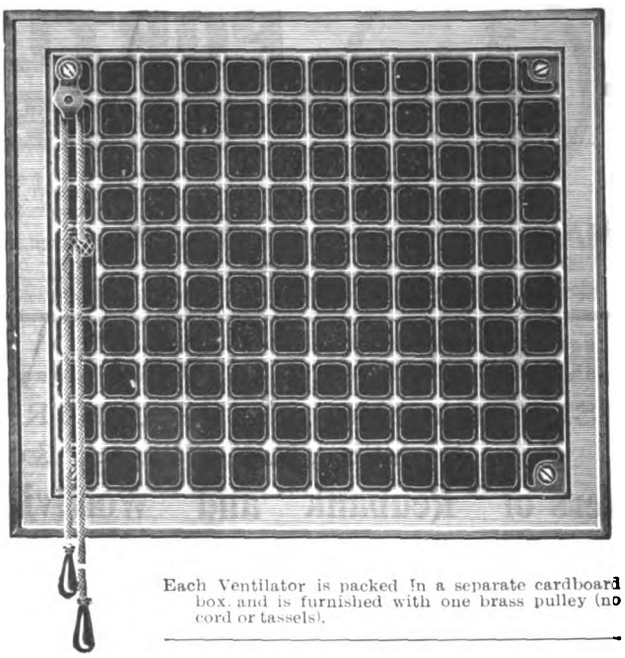
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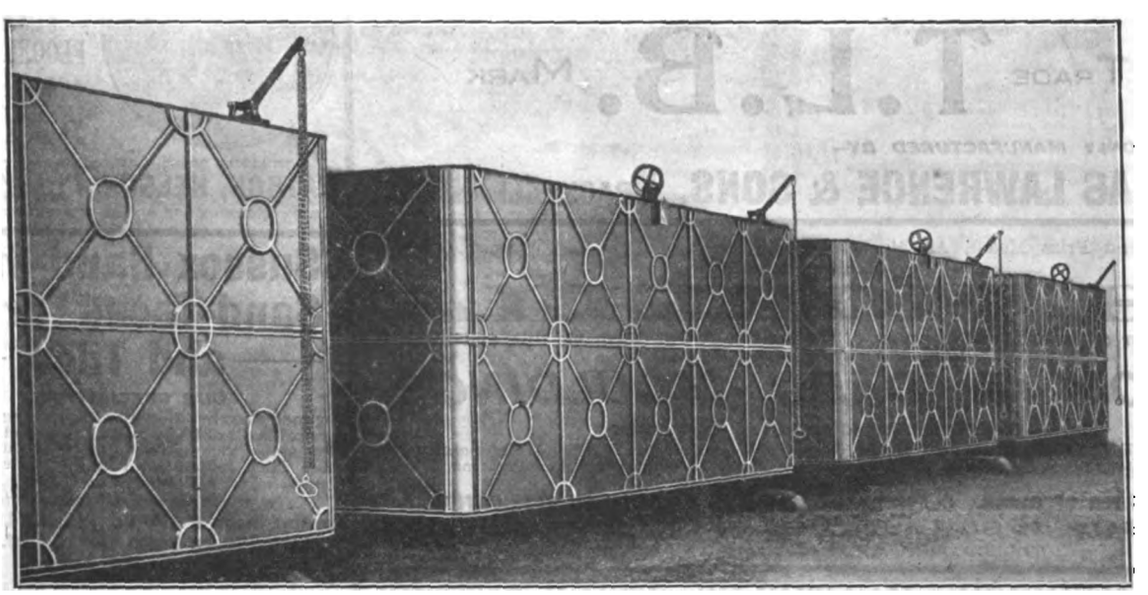
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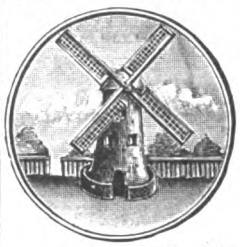
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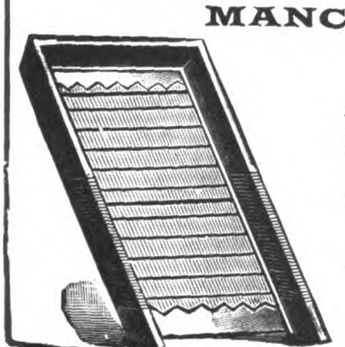
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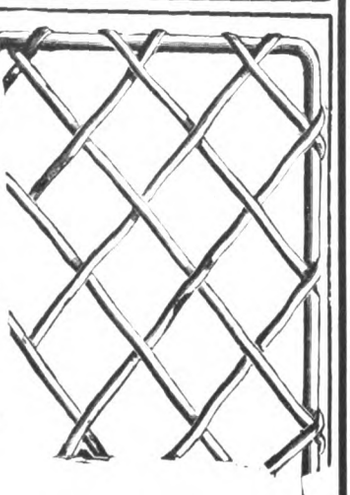
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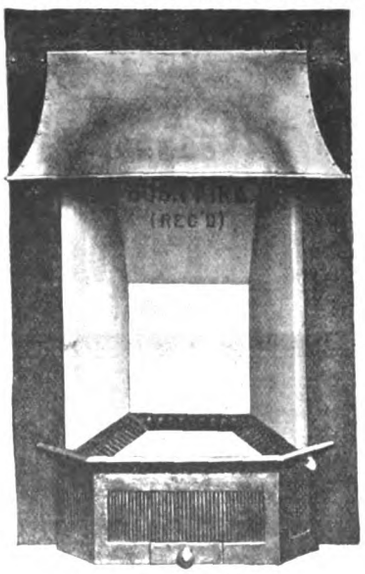
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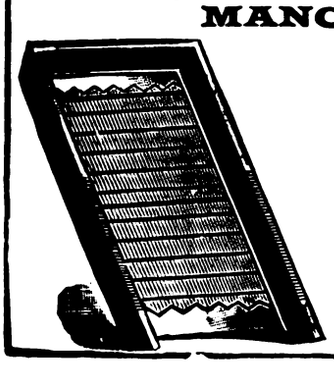
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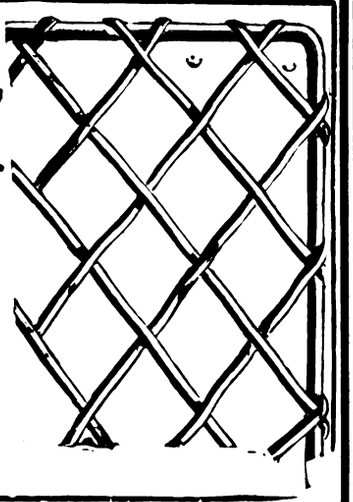
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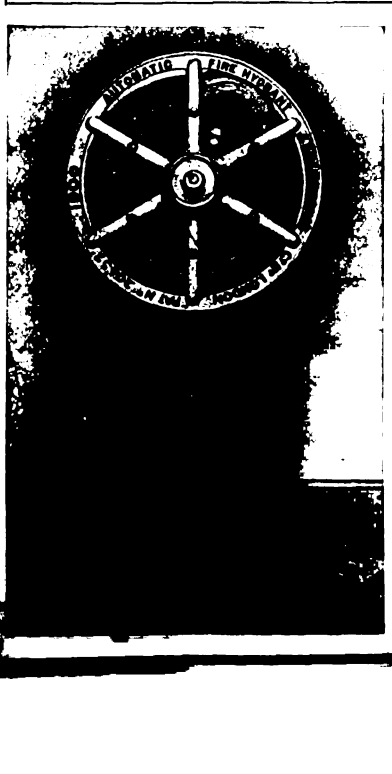
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Under no circumstances whatever can the Proprietors of this Journal guarantee alteration of copy if received after the first post on Tuesday mornings, and no proofs can be submitted if copy arrives later than first post on Saturday mornings.

EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

*** *As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

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GLASGOW.—July 31.—The patrons of the Royal Incorporation of Hutchesons' Hospital invite designs for laying out for feuing and building about 195 acres of their lands of Thornliebank, Eastwood. Premiums of 100*l.*, 75*l.*, 50*l.* and 25*l.* will be awarded. Deposit 3*l.* 3*s.* Messrs. Hill & Hoggan, 194 Ingram Street, Glasgow.

GRIMSBY.—July 30.—For the extension of the town hall, at an estimated cost of 26,000*l.* Premiums of 250*l.*, 150*l.* and 100*l.* will be awarded. An eminent architect will act as assessor in conjunction with the borough engineer. Deposit 2*l.* Apply to Mr. H. Gilbert Whyatt, A.M.I.C.E., borough engineer, Town Hall, Grimsby.

IRELAND.—June 7.—The Athy Urban District Council offer a prize of 5*l.* 5*s.* for the best plans of three kinds of artisans' houses, to cost 100*l.*, 150*l.* and 200*l.* each. The successful competitor will be offered the carrying out of the scheme at 2½ per cent. on the total cost. Mr. J. A. Lawler, clerk, Town Hall, Athy.

MOLESEY.—June 1.—The East and West Molesey Urban District Council invite plans, with specifications and estimates, for an isolation hospital. Mr. D. Cann, Clerk, Council Offices, East Molesey.

READING.—June 15.—The Berkshire County Council invite designs for offices, committee rooms, &c., on the For-

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bury, Reading. Mr. Mervyn Macartney, F.R.I.B.A., assessor. Premiums of 100*l*., 75*l*., and 50*l*. Deposit 1*l*. 1*s*. Apply to Mr. J. Fred Hawkins, county surveyor, Bank Chambers, Cross Street, Reading.

STOKE-UPON-TRENT.—July 9.—For additions to the town hall, including hall to seat 3,000 people, and police court. Premiums of 100*l*. and 50*l*. for designs placed second and third. Mr. J. B. Ashwell, town clerk, Town Hall, Stoke-upon-Trent.

WALES.—June 3.—The Abertillery U.D.C. education committee invite competitive plans for an elementary school to be built on the Ty'r Graig site, near Aberbeeg, Mon., providing accommodation for 320 infants on the ground floor, and 430 boys and girls (mixed) on the first floor. Apply to Mr. N. J. Llewellyn, secretary, Council Offices, Abertillery.

CONTRACTS OPEN.

AWBRIDGE.—June 7.—For erection of a class-room for forty children, and a cloak-room, at Awbridge Council school, Hants. Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

BACUP.—June 19.—For extensive alterations and additions to the St. Saviour's Council school. Deposit 2*l*. 2*s*. The Borough Engineer, Municipal Buildings, Bacup, Lancs.

BARBY.—June 1.—For alterations and additions at the Barby school, Northants. Mr. J. T. Blackwell, architect, 53 High Street, Kettering.

BELFAST.—June 16.—For additions and alterations to the General Post Office, Belfast. Deposit 3*l*. The Office of Public Works, Dublin, or Mr. Samuel C. Hunter, quantity surveyor, 2 Wellington Place, Belfast.

BRIDLINGTON.—June 7.—For extension of the Bridlington High School for Girls. Deposit 1*l*. Mr. John Bilson, architect, 23 Parliament Street, Hull.

BRISTOL.—June 16.—For the construction and maintenance for twelve months after completion of a passenger station at the Royal Edward Dock, Avonmouth, for the docks committee. Deposit 5*l*. Mr. W. W. Squire, engineer, Cumberland Road, Bristol.

BUCKLEY.—June 3.—For erection of an isolation hospital at Dob's Hill, near Buckley. Deposit 2*l*. 2*s*. Messrs. John H. Davies & Sons, architects, 14 Newgate Street, Chester.

BURY.—June 2.—For erection of an electricity generating station at Chamber Hall, Bury, Lancs. Deposit 2*l*. Mr. Arthur W. Bradley, A.M.I.C.E., borough engineer and surveyor, Bank Street, Bury.

CASTLEFORD.—June 3.—For the execution of the various works required in erection of public baths, for the Castleford Urban District Council. Send names to Mr. H. H. Broadbent, clerk, Council Offices, Castleford.

CONSETT.—May 31.—For extensions to the Technical Institute at Consett, Durham. Sole tenders. Mr. J. A. L. Robson, secretary for higher education, Shire Hall, Durham.

COVENTRY.—June 7.—For erection of workshop, Dale Street. Mr. Herbert W. Chattaway, architect, Trinity Churchyard, Coventry.

DARTFORD.—June 15.—For the Kent education committee, for the erection of new secondary school to accommodate 200 girls. Plans and specifications prepared by the committee's architect (Mr. W. H. Robinson, M.S.A.) may be inspected at committee's offices on and after June 1. Names of tenderers and deposit of 2*l*. by May 28. Mr. Fras. W. Crook, secretary, Caxton House, Westminster, S.W.

DUBLIN.—June 2.—For erecting an addition to Fairview Post Office. Mr. H. Williams, secretary, Office of Public Works, Dublin.

DUNTON GREEN.—June 12.—For the Kent education committee, new school to accommodate 250. Plans and specifications, prepared by Mr. Wilfrid H. Robinson, M.S.A., the committee's architect, may be inspected after June 1. Applications and deposit of 1*l*. by May 28, to the secretary to the committee, Mr. Fras. W. Crook, Caxton House, Westminster, S.W.

EDINBURGH.—June 2.—For alterations at Bowl House, East Meadows. Mr. James A. Williamson, A.R.I.B.A., Public Works Office, City Chambers.

FAIRFIELD.—For erection of a farmhouse and buildings at Waterswallows, Fairfield, Buxton. Mr. Chas. Flint, architect and surveyor, 5 The Quadrant, Buxton.

GRAVESEND.—June 1.—For repairs at Cookery School. The Borough Surveyor, Town Hall, Gravesend.

HAMPTON-ON-THAMES.—June 1.—For alterations and repairs at River View, in Thames Street. Mr. F. G. Hughes, architect, the Estate Office, Hampton.

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HASTINGS.—June 7.—For building a public convenience in Fairlight Road, St. Helen's, and other works in connection therewith. Mr. P. H. Palmer, M.I.C.E., Town Hall, Hastings.

IRELAND.—June 1.—For the erection of a branch bank and residence at Abbeyleux, Queen's County. Deposit 2*l.* 2*s.* Mr. W. Butler, surveyor, 58 Mountjoy Square, Dublin.

IRELAND.—June 4.—For alterations and improvements to Donaghmore parish church, Castlefin. Messrs. R. E. Buchanan & Co., architects, Castle Street, Londonderry.

LISKEARD.—June 12.—For erection of a workshop and cycle shed at the Liskeard County Council. Mr. J. Sansom, architect, Liskeard, Cornwall.

LONDON.—June 2.—For the new General Post Office (King Edward Building) third contract, comprising plastering, joinery, glazing, brick and other partitions, steel framing and sashes, sanitary work, &c. Deposit 1*l.* 1*s.* The Principal Architect, H.M. Office of Works, Storey's Gate, London, S.W.

LONDON.—June 2.—For carrying out such alterations and additions as are required to adapt, alter, and convert to the "Open Access System" the lending department of the Central Public Library, Hammersmith, W. Mr. H. Mair, borough surveyor, Town Hall, Broadway, Hammersmith, W.

LONDON.—June 3.—For erection of vagrant wards at Hollybush Gardens, Bethnal Green Road, N.E. Deposit 5*l.* Send names to Mr. D. Thomas, clerk, Guardians' Office, Bishop's Road, Victoria Park, N.E.

LONDON.—June 9.—For building a postal sorting office at New Southgate, N. Deposit 1*l.* 1*s.* Mr. J. Wager, A.R.I.B.A., H.M. Office of Works, Westminster.

LONDON.—June 10.—For new Western District Post Office, Wimpole Street—second contract. The work comprises masonry, plastering, joinery, glazing, plumbing, &c., the existing building being of ferro-concrete. Deposit 1*l.* 1*s.* Mr. J. Wager, A.R.I.B.A., H.M. Office of Works, Westminster.

MARYTAVY.—June 9.—For extensive alterations and additions to North Warne farmhouse, near Tavistock. Mr. Morley B. Collins, architect, Clinton Road, Redruth.

NELSON.—June 5.—For erection of three shelters in Victoria and Walverden Parks. Mr. B. Ball, A.M.I.C.E., borough engineer and surveyor, Nelson, Lancs.

NELSON.—June 5.—For the construction of a retaining wall near the sewage works. Mr. B. Ball, A.M.I.C.E., borough engineer and surveyor, Nelson, Lancs.

PORTSLADE-BY-SEA.—June 1.—For erection and completion of a fire-brigade station. The Surveyor, 46 St. Andrew's Road, Portslade-by-Sea, Sussex.

PORTSMOUTH.—June 14.—For erection of a teachers' room and a cloak-room at the George Street Council school (girls' department). Mr. A. H. Bone, surveyor, Cambridge Junction, Portsmouth.

RAVENSTHORPE.—June 7.—For building a club and caretaker's house in Foundry Street, Ravensthorpe, Yorks. The caretaker of the Ravensthorpe Liberal Club, 238 Huddersfield Road, Ravensthorpe.

REDGRAVE.—June 29.—For the enlargement of the school. Rector, Redgrave, Suffolk.

RUGBY.—June 4.—For the enlargement of the Head Post Office. Deposit 1*l.* 1*s.* Apply to the Postmaster of Rugby.

SCOTLAND.—June 1.—For the mason, carpenter, slater, plasterer, plumber and painter works of a cottage and two blocks of semi-detached houses to be built in Merryton Road, Nairn. Mr. G. Logie, architect, Inverness.

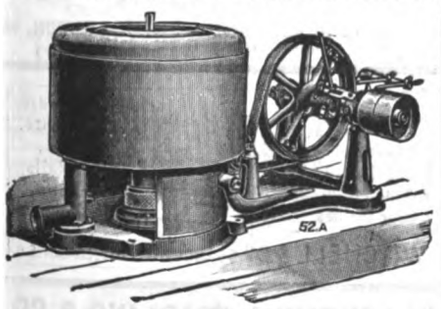
SCOTLAND.—June 5.—For the erection of an isolation hospital at Bangour Village, Uphall. Mr. Hippolyte J. Blanc, R.S.A., 25 Rutland Square, Edinburgh.

SCOTLAND.—June 12.—For erection of a block of working men's dwellings in St. Magnus Street, Lerwick. Deposit 1*l.* Mr. Arthur Sandison, factor for the trustees for Feuars and Heritors of Lerwick.

SEDBURGH.—June 10.—For erection of a Wesleyan chapel and schools. Deposit 2*l.* 2*s.* Mr. A. E. Lambert, architect, 22 Park Row, Nottingham.

SITTINGBOURNE.—June 12.—For the Kent education committee, new school to accommodate 400 children. Plans and specifications, prepared by Mr. Wilfrid H. Robinson, M.S.A., the committee's architect, may be inspected on or after June 1. Applications and deposit of 1*l.* by May 28 to the secretary, Mr. Fras. W. Crook, Caxton House, Westminster, S.W.

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Skipton.—June 3.—For the mason, joiner, plumber and slater work and steel work (in the construction of roof principals, &c.), in connection with extension of the retort house at the Gas Works. Mr. J. Hartley, architect, Swadford Chambers, Skipton.

Solihull.—June 14.—For alterations and additions to the workhouse. Deposit 3*l.* 3*s.* Send in names by June 1 to Mr. W. H. Ward, architect, Paradise Street, Birmingham.

Southend-on-Sea.—June 1.—For alterations and additions to the London Road boys' Council school. Deposit 2*l.* 2*s.* Send names at once to Messrs. Cabuche & Hayward, architects, Hamlet Court Road, Westcliff, Southend-on-Sea.

Stanwell.—June 5.—For erection of a chapel in the cemetery, London Road, Stanwell, Middlesex. Deposit 1*l.* 1*s.* Mr. W. Ralph Low, architect, 10 Basinghall Street, E.C.

Truro.—June 3.—For execution of builder's work, including hot-water supply, at the hospital, Pydar Street. Mr. F. A. Barnes, A.M.I.C.E., city engineer and surveyor, Municipal Buildings, Truro.

Wakefield.—June 4.—The West Riding education committee invite whole or separate tenders for the following works:—Woodlands new school (two blocks), near Doncaster (builder, joiner, slater, plasterer, plumber, painter); Steeton provided school, closets and drainage (builder, joiner, slater, plumber, asphalter). Deposit 1*l.* each. The West Riding Architect, County Hall, Wakefield.

Wakefield.—June 4.—The West Riding education committee invite whole or separate tenders for the following works:—Ferry Fryston: Ferrybridge Provided school, conversion of closets (builder); Queensbury Catherine Slack Provided school, new cloak room, &c. (builder, joiner, slater, plasterer, plumber, painter). Deposit 1*l.* The West Riding Architect, County Hall, Wakefield.

Wales.—For erection of hotel and alterations and additions to premises at Llanwrtyd Wells. Send names to Mr. Alfred Swash, F.R.I.B.A., Midland Bank Chambers, Newport, Mon.

Wales.—June 1.—For erection of eight cottages (in two blocks of four each) at Mayhill, Swansea. Deposit 3*l.* 3*s.* Mr. Marcus Hoskins, F.S.I., borough estate agent, Coleridge House, Swansea.

Wales.—June 2.—For a church to be erected in St. John's parish, Canton, Cardiff, to seat over 700 persons. Mr. George E. Halliday, F.R.I.B.A., 19 Castle Street, Cardiff.

Wales.—June 3.—For carrying out alterations and additions to Cadoxton infants' school, Barry. Deposit 2*l.* 2*s.* Mr. G. A. Birkenhead, architect, Caledonian Chambers, St. Mary Street, Cardiff, and St. Nicholas Road, Barry.

Wales.—June 4.—For alterations to the workmen's hall at New Tredegar, Mon. Mr. George Kenshole, M.S.A., Station Road, Bargoed.

Wales.—June 4.—For erection of twenty artisans' dwellings at Penalltau, with new roads, &c. Mr. George Kenshole, M.S.A., Station Road, Bargoed.

Wales.—June 4.—For erection of an official's house at Penrhiwceiber. Mr. George Kenshole, M.S.A., Station Road, Bargoed.

Wales.—June 4.—The committee of management of the Royal National Lifeboat Institution are prepared to receive tenders for the construction of a lifeboat house and slipway at Porth Lydan, Moelfre, in the county of Anglesey. Major Lawrence Williams, Parclau, near Moelfre, Anglesey; or Mr. W. T. Douglass, M.I.C.E., engineer and architect to the Royal National Lifeboat Institution, 15 Victoria Street, Westminster, S.W.

Wales.—June 5.—For erection of a house adjoining the Park Wood, Tregare, Abergavenny. Mr. B. J. Francis, architect, Abergavenny.

Wales.—June 7.—For erection of a hall in connection with St. James's Church, Pontypool. Mr. D. J. Lougher, architect, Bank Chambers, Pontypool.

Whiston.—June 10.—For erection and completion of a block for male mental cases at the workhouse, Whiston, Prescot, Lancs. Mr. Jas. Gandy, architect, Masonic Buildings, St. Helens.

Winchester.—June 23.—For erection of new secondary school for 160 girls. Deposit 5*l.* 5*s.* Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

Workington.—June 9.—For erection of a house on the Seaton Road. Messrs W. G. Scott & Co., architects and surveyors, 2 Park Lane, Workington.

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ASHINGTON (NORTHUMBERLAND).

For building additions to the Isolation Hospital near North Seaton station, for the Ashington Urban District Council. Mr. A. WOOD, surveyor, Council Chambers, Ashington.

Cooks Bros.	£199	10	0
McMillan	184	0	0
Walker	181	17	8
McKenzie Bros.	164	13	0
GORDON BROS., Stakeford, Morpeth (*accepted*)	158	10	0

BRAINTREE (ESSEX).

For sewerage and sewage disposal works, for the Braintree Urban District Council. Messrs. SANDS & WALKER, engineers, Milton Chambers, Nottingham.

PEDRETTE, Enfield, London, N. (*accepted*)	£6,290	0	0

BROMLEY.

For erection of stables, &c., Church Road, Bromley, Kent. Mr. W. PAMPHILON, architect, 21 Finsbury Pavement, E.C.

Graty	£1,137	0	0
Pearce Bros.	1,125	0	0
Hill & Gurr	1,10[illegible]	0	0
Arnaud & Son	1,095	0	0
Crossley & Son	1,057	0	0
Deadman	1,015	0	0
Duthoit	957	0	0

BUSHEY (HERTS).

For alterations and additions to the Hull Road pumping-station. Mr. E. E. RYDER, engineer, Bushey.

Bliss	£2,550	12	6
Cunliffe & Sons	2,303	18	9
Jaggard	2,200	0	0
W. & D. Wilkins	2,159	0	0
BAILEY & SONS, Bushey Heath (*accepted*)	2,098	0	0

CHESHUNT.

For alterations and additions to Bishop's College. Mr. A. BLOMFIELD JACKSON, F.R.I.B.A., 3 New Square, W.C.

Sheppard Bros.	£4,559	16	0
Archer	3,960	0	0
Chessum & Sons	3,610	0	0
Fairhead & Son	3,599	0	0
Hunt	3,498	0	0
HOLLIDAY & GREENWOOD, London (*accepted*)	3,488	0	0

CROMER.

For the erection of a Wesleyan church. Mr. A. F. SCOTT, architect, Norwich.

Lines	£3,009	14	6
Girling & Smith	2,935	0	0
Porter	2,776	10	1
Youngs	2,745	0	0
BULLEN, Cromer (*accepted*)	2,535	0	0

DEVONPORT.

For erection, exclusive of internal plastering to walls, of Sunday-school at St. Mark's Church, Ford. Messrs. HINE, ODGERS & MAY, architects, Plymouth.

STANBURY, Devonport (*accepted*)	£970	16	8

DAVENHAM.

For additions and alterations to C.E. school. Mr. A. E. POWLES, architect, Northwich.

TAYLOR & SONS, Northwich (*accepted*)	£1,233	0	0

ELY.

For erection of a brick and steel bridge of 100-feet span over the River Ouse at Ely. Mr. R. S. W. PERKINS, county surveyor.

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Moss & Co.	£4,369	0	0
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Lane & Harvey	4,283	0	0
Newman	4,253	0	0
L. & W. H. Patman	4,190	0	0
Sabey & Son	4,140	0	0
Webster & Son	4,129	0	0
Brand, Pettit & Co.	4,100	0	0
Myall & Upson	4,100	0	0
Porter	4,099	0	0
Jennings & Grenfell	4,020	0	0
Kearley	4,000	0	0
Spencer, Santo & Co.	4,000	0	0
Castle & Son	3,978	0	0
Fitch & Cox	3,976	0	0
Guttridge & Sons	3,960	0	0
Hyde & Co.	3,953	0	0
Nightingale	3,930	0	0
F. & A. Willmott	3,910	0	0
F. & G. Foster	3,892	0	0
Fairhead & Son	3,794	0	0
Lawrence & Son	3,782	0	0
Monk	3,774	0	0
KNIGHT & SON (*accepted*)	3,650	0	0
Oram & Son	3,500	0	0

HANDSWORTH (STAFFS).

For making College Road and Stockwell Lane, and improvements in Oxhill Road, Friary Road, Holyhead Road and Aldridge Road. Mr. H. RICHARDSON, A.M.I.C.E., surveyor.

Taylor & Co.	£3,601	13	0
Currall, Lewis & Martin	3,548	14	8
Hill & Co.	3,380	0	0
Thorpe	3,370	10	3
TRENTHAM, Birmingham (*accepted*)	3,128	0	0

EVENWOOD (DURHAM).

For erection of a billiard-room at Evenwood, for the Workmen's Club and Institute. Mr. C. JOHNSTON, architect, Bishop Auckland.

SMITH, West Auckland (*accepted*)	£565	4	10

HARROGATE.

For extensions to the Royal Baths.

Accepted tenders.

Mason's work.

KERSHAW & HILL, Harrogate	£2,685	6	0

Joiner.

RHODES BROS., Shipley	627	0	0

Plumber and glazier.

BRAITHWAITE & Co., Harrogate	199	0	0

Slater.

RAYNER, Harrogate	220	5	6

Plasterer.

CALVERLEY, Harrogate	624	0	0

Painter.

DECORATIVE SUPPLY Co., Harrogate	126	10	0

LONDON.

For the erection, on the Shelburne Road site, Islington, of a public elementary school for 492 children, and of the proposed housewifery centre.

Downs	£11,827	0	0
Patman & Fotheringham	11,645	0	0
Marsland & Sons	11,626	0	0
L. H. & R. Roberts	11,559	0	0
Leslie & Co.	11,405	0	0
Price	11,365	0	0
Grover & Son	11,133	0	0
Godson & Sons	11,084	0	0
C. P. Roberts & Co.	11,056	0	0
McCormick & Sons	11,043	0	0
McLaughlin & Harvey	10,863	2	7
Lawrance & Sons	10,739	0	0
Treasure & Son, Upper Holloway (*recommended*)	10,710	0	0
Architect's (Education) estimate	11,117	0	0

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LONDON—*continued.*

For the construction of a sewer from the county boundary at Kilburn Lane to convey the sewage and drainage from the Brent area of the parish of Willesden into the middle-level sewer No. 2, at or near the junction at Formosa Street and Bristol Gardens, Paddington.

Nott	£42,459	19	1
Nuttall & Co.	40,523	12	3
Whyte & Co.	40,146	6	3
Nowell & Sons	38,302	13	0
Coles	37,831	1	3
Baldry & Yerburgh	36,816	8	11
Bentley & Son	36,402	11	6
Paterson	36,187	2	3
Shellabear & Son	36,127	10	8
Muirhead & Co.	35,998	4	0
Price & Co.	35,943	16	4
Westminster Construction Co.	34,599	8	8
Brebner & Co.	34,325	3	9
Nowell	33,815	5	11
Ford, Willesden Junction (*recommended*)	33,350	10	1
Chief Engineer's estimate	37,630	9	10

For providing and fixing two boilers and low pressure hot water heating apparatus in the Barrow Hill Road school, Marylebone.

Davis, Bennett & Co.	£970	0	0
Grundy	942	0	0
Wontner-Smith, Gray & Co.	938	0	0
Beeson & Sons	890	0	0
J. & F. May	876	0	0
Cannon & Sons	855	0	0
Burroughes & Sons	850	0	0
Korting Bros.	825	0	0
R. H. & J. Pearson	822	0	0
Strode & Co.	817	0	0
Turner & Co.	812	0	0
Cannon & Hefford	799	0	0
Davis	790	0	0
G. & E. Bradley	777	0	0
Comyn Ching & Co., Long Acre (*recommended*)	738	0	0
Architect's (Education) estimate	785	0	0

LONDON—*continued.*

For the partial reconstruction of the bridge carrying Highgate Road over the Tottenham and Hampstead branch of the Midland and Great Eastern Joint Railways at Highgate Road station, for the L.C.C.

Thorne & Sons	£1,768	10	6
Coles	1,659	3	11
Ground & Newton	1,600	6	11
Manders	1,557	4	9
Rowlingsons & Co.	1,552	17	3
Pattinson & Sons	1,500	0	0
Dick, Kerr & Co.	1,475	8	6
Muirhead & Co., Queen Victoria Street (*recommended*)	1,429	0	1
Chief Engineer's estimate	1,460	0	0

For structural improvements at the Marner Street school, Bow and Bromley.

Clarke & Bracey	£17,938	0	0
Garrett & Son	17,014	0	0
Davies	16,963	0	0
Johnson & Co.	16,366	0	0
Holloway	16,324	0	0
Wallis & Sons	16,186	0	0
F. & H. F. Higgs	16,165	0	0
Appleby & Sons	16,165	0	0
Marsland & Sons	16,105	0	0
Symes	15,978	0	0
Leng	15,916	0	0
J. & M. Patrick	15,901	0	0
McLaughlin & Harvey	15,870	14	7
Carmichael	15,786	0	0
Perry & Co. (Bow)	15,465	0	0
F. & T. Thorne	15,199	0	0
Lawrance & Sons	15,176	0	0
Kirk & Randall	14,923	0	0
Holliday & Greenwood, Brixton (*recommended*)	14,893	0	0
Architect's (Education) estimate	15,970	0	0



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LONDON—*continued.*

For the reconstruction of the bridge carrying the South-Eastern and Chatham Railway over Ravensbourne Street, Lewisham.

Bott & Stennett	£8,696 18 6
Fasey & Son	5,751 10 2
Mowlem & Co.	5,530 0 0
Dick, Kerr & Co.	5,343 14 6
Rigby	4,858 10 9
Muirhead & Co.	4,714 6 0
Aird & Sons	4,695 8 7
Pattison & Sons, Westminster (*recommended*)	4,678 0 0

MALDON.

For the erection of a pair of villas, Fambridge Road, Maldon, Essex. Mr. J. RUSSELL ROGERS, P.A.S.I., architect, Maldon.

Rayner	£1,262 15 0
Smith & Son	1,055 0 0
Ward & Son	1,055 0 0
GRIMWOOD & SONS, Sudbury (*accepted*)	998 0 0

MIDDLESBROUGH.

For alterations to the Sanatorium.

ROBSON & SONS, Middlesbrough (*accepted*)	£221 0 0

Painting.

TAYLOR & Co. (*accepted*)	142 0 0

For alterations to the Belle Vue Farm, Hemlington.

COATES (*accepted*)	£205 0 0

MORLEY.

For electric-light plant, for the Manor House, Morley, near Derby. Messrs. HANDCOCK & DYKES, consulting engineers, 1 Victoria Street, Westminster.

Baily, Grundy & Barrett	£460 10 0
Donnison, Sillem & Co.	439 4 6
Tyler & Freeman	435 0 0
Gent & Hurley	434 11 6
RATCLIFF & Co., London (*accepted*)	410 0 3

NEWBURY.

For pulling down and rebuilding premises at St. Mary's Hill. Mr. W. H. BELL, architect, Newbury.

Hoskins Bros.	£1,253 0 0
G. Elms	1,250 0 0
H. Elms	1,229 0 0
Plumb	1,230 0 0
Hedges Bros.	1,212 0 0
Brazier	1,198 12 0
Houghton & Hitchman	1,170 0 0
Ash	1,139 0 0
CHIVERS, Newbury (*accepted*)	1,100 0 0

PLYMOUTH.

For additions to the Grammar School, North Road.

TURPIN, Plymouth (*accepted*)	£1,146 0 0

SHEFFIELD.

For widening Lady's Bridge, the Wicker, Sheffield. Mr. C. F. WIKE, city engineer.

WELLERMAN BROS., Hyde, near Manchester (*accepted*)	£1,695 0 0

WALES.

For erection of a new vicarage at Tregare, Monmouth. Mr. E. G. DAVIES, M.S.A., architect, Hereford and Monmouth.

Moon	£1,650 0 0
Jenkins	1,300 0 0
Smith	1,287 0 0
Powell	1,153 0 0
HALL & HARDING, Monmouth (*accepted*)	1,121 0 0
Bolt	1,100 0 0

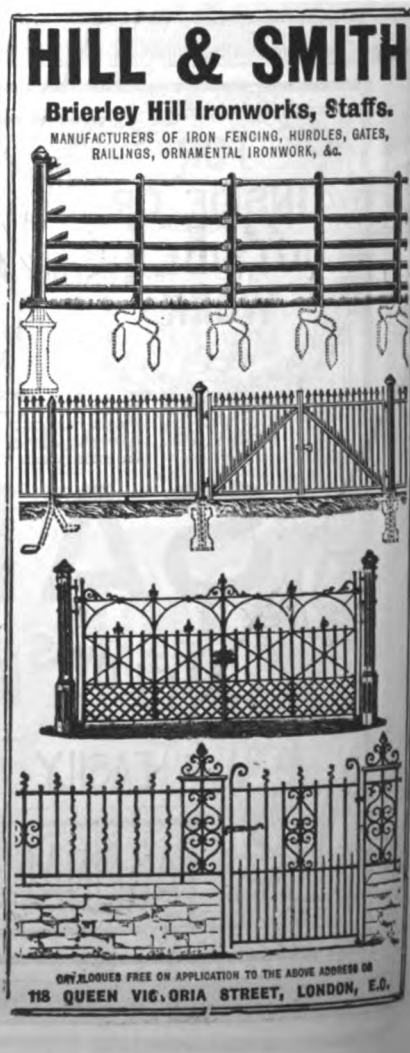
For rebuilding, new seating and new schoolroom at Wesleyan chapel, Amlwch, Anglesey. Mr. W. F. BRINDLE, architect, Mona Street, Amlwch, and Llangefni.

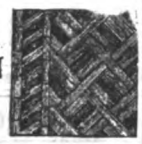
Hughes	£1,999 0 0
THOMAS, Amlwch (*accepted*)	1,180 0 0
Owens & Williams & Co.	1,150 0 0
Thompson	1,136 0 0
Prytherch	1,002 0 0

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UPPER EDMONTON.

For transformer-house, switch-room, coal-shed and book-store, at the workhouse. Mr. STUART HILL, architect, 106 Cannon Street, E.C.

Mason	£1,224	10	0
Fitch & Cox	1,180	0	0
Calnan & Son	1,134	7	3
Pavitt & Sons	1,131	7	7
Woollaston & Co.	1,130	0	0
Hyde & Co.	1,123	0	0
Parren & Son	1,116	9	0
Jacobs	1,061	15	9
Lawrence & Son	1,043	0	0
F. & G. Foster	1,042	0	0
NIGHTINGALE (*accepted*)	1,038	0	0

WALLINGFORD (BERKS).

For erection of a cottage. Mr. EDWIN G. HEARNESS, architect, Wallingford.

Brasher & Sons	£325	0	0
Bartlett	237	0	0
NAISH & SON, Wallingford (*accepted*)	230	0	0

WALSALL.

For alterations to boys' school. Messrs. THACKER & JEFFRIES, architects, Walsall.

Brockhurst & Wood	£995	0	0
Wistance	957	0	0
Kendrick & Son	952	0	0
WOOTTON, Bloxwich (*accepted*)	930	0	0

TRADE NOTES.

THE Stoke-on-Trent Board of Guardians have just accepted the tender of the Brightside Foundry and Engineering Co., Ltd., of Birmingham and Sheffield, for a combined system of water softening and heating apparatus, whereby the water is first passed through a specially constructed water softener (heat principle), and where it is heated by the exhaust steam from the engine and pumps, after which it is circulated through a system of pipes by means of circulating pumps, and the whole of the institution is served with hot water for baths and lavatory purposes and also for heating apparatus. The return water, which is still at a considerable temperature, is then used for boiler-feed purposes, and thus the maximum of economy is effected. Messrs. Edwards & Shaw, of Colmore Row, Birmingham, are the consulting engineers.

THE annual competitions of the South Midland District branch of the National Fire Brigades Union were carried out in brilliant weather, and before a large assembly, in the grounds of Kenton Grange, near Harrow (kindly lent by John Gwynne, Esq.), on Saturday last. Some interesting displays were given with the "Dennis-Gwynne" Petrol Motor Fire Engine, which supplied the water for the competitions by means of the turbine pump; and with the Featherstone Automatic Adaptor for fire hydrants, which attracted considerable attention from the officials, competitors, and spectators alike.

THE parishioners of Barton-under-Needwood, Staffordshire, are erecting a memorial in the church to the late Lord Burton, and part of the scheme is to be an enlargement of the present clock by the addition of a dial on the south side. The work has been placed in the hands of Messrs. John Smith & Sons, Midland Clock Works, Derby, who made the clock itself fourteen years ago.

THE Rye Rural District Council have received the sanction of the Local Government Board and other authorities to carry out a sewerage scheme for Rye Harbour, prepared by Mr. T. J. Moss-Flower, C.E., of 28 Victoria Street, S.W., and Bristol. The matter has been under consideration for some years, and several schemes had been prepared prior to Mr. Moss-Flower being called in a few months ago. The drainage of the district is to be brought to a central spot, passed through a screening chamber, and then raised by centrifugal pumps to a brick and concrete tank sewer on the fore shore. The sewage will be discharged into the sea at convenient states of the tide, through a cast-iron outfall sewer supported on concrete and piles. Owing to the subsoil of the district chiefly consisting of water-logged sand, the ordinary methods of sewer construction could not be followed, and for the most part iron pipes supported on piles driven in on both sides of the trenches will be used. Ventilation will be by means of cast-iron columns and shafts. The work is to be commenced forthwith.

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VARIETIES.

The old parish church at Madeley is to be renovated at a cost of 2,000*l.*

Mr. C. Curtis Grey, of Hayes, Middlesex, has been appointed engineer and surveyor to the Scunthorpe Urban Council at a salary of 250*l.*

A large coloured picture, 32 inches by 16 inches, of the great east window at York Minster, reproduced from a drawing by John Haynes in 1736, is now on sale at the office of the *Yorkshire Herald* at 2*s.* 6*d.* each.

The Chelmsford Rural Council have instructed their engineer to prepare plans and estimates for a covered reservoir at the Great Baddow Works to hold from 60,000 to 70,000 gallons.

The Grimsby Board of Guardians have decided to erect temporary buildings at the workhouse, in accordance with plans which have been submitted to the Local Government Board. An expenditure of a sum not exceeding 833*l.* was agreed to for the above purpose.

Messrs. Young & Co., Ltd., Glasgow, have secured the contract for the construction of a sewer from Pittodrie to Victoria Bridge, Aberdeen, which will complete the Aberdeen general sewerage scheme that has been in progress for the past ten years. The contract amounts to 35,578*l.*

A scheme is on foot to restore the historic West Church in Stirling. The Stirling Presbytery and the General Session of the parish of Stirling have approved of it. The Stirling Town Council have agreed to give a donation of 500*l.* towards the work of restoration.

The Association of Water Engineers will hold their fourteenth annual meeting at Durham on June 10, 11 and 12, under the presidency of Mr. R. Askwith, M.I.C.E. Four papers have been promised, including "The Selby New Waterworks" and "Public Water-supply for Fire Extinguishing."

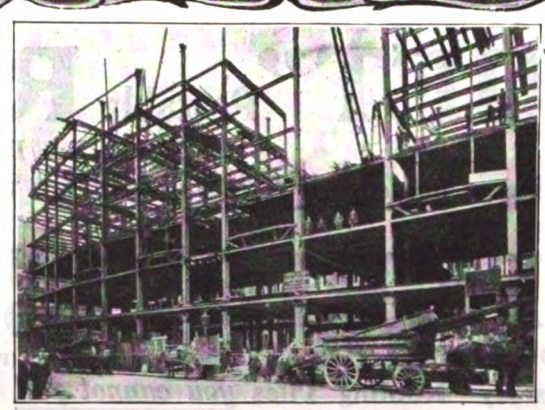
Mr. A. A. Hudson, who was appointed by the Board of Trade to arbitrate in the wages dispute between the masters and the house joiners in Glasgow and the West of Scotland, has fixed the rate at 9*d.* per hour, being ¼*d.* under the present rate. This reduction, which will take place from July 1, is the third in four years, the total reduction amounting to 1*d.* per hour.

The Hull Corporation propose to lease three acres of land (forming part of the old Stoneferry waterworks estate) to the Digit Disinfecting Company, who intend to lay down plant there and establish their works. The company have the option of purchasing the land at 3,500*l.* within three years from the commencement of the twenty-one years' lease, and at 4,200*l.* at any time during the remainder of the term. The town clerk is of opinion that the sanction of the Local Government Board will have to be obtained for the sale, and application is to be made at once.

The Worcestershire education committee on May 22 considered a report of the general purposes sub-committee, which stated that eighteen tenders were submitted for the building of the new school in Golden Hillock Road, Yardley, and recommended that the tender of Mr. W. H. Gibbs, King's Heath, amounting to 13,380*l.*, be accepted. In the discussion a member pointed out that it had been resolved that, all things being equal, the lowest tender should be accepted, and in this case the lowest tender was 13,241*l.*, that of Messrs. Pattison & Sons, of Birmingham and Lincolnshire. It was finally agreed that Messrs. Pattison's tender be accepted.

The Essex education committee on Monday adopted various reports. The plans prepared by Mr. C. M. Shiner for the erection of a new school at Laindon for 156 children, at a cost of 1,633*l.*, were approved. Plans for a new building at the Braintree Cookery and Handicraft Centre, the approximate cost of which was 800*l.*, excluding fencing and drainage, were approved. Plans prepared by Mr. Whitmore for the erection of the new Council school for 264 children, at an approximate cost of 3,215*l.*, were approved on the accommodation to be provided being reduced to 200, with provision for extension. It was also reported that the Board of Education had approved the plans for a new county high school at Romford.

The Surveyors' Institute, at their forty-first annual meeting on Monday in London, were informed that the proposals for establishing Imperial reciprocity for surveyors had proceeded a step further, and at the request of the Colonial Secretary the Council had drawn up a memorandum comparing the requirements of the several colonies and suggesting a conference of surveyors generally to be held at the Institution.

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This had been forwarded by Lord Crewe to the officers administering the Colonial Governments, with a covering despatch expressing the hope that it would be possible for them to accept the suggestion and to make arrangements for the attendance of one or more representatives. The report showed a total membership of 4,229. Mr. Alexander Rose Stenning, F.R.I.B.A. (surveyor to Christ's Hospital), was elected president for the year; Mr. Leslie R. Vigers, Mr. W. Edgar Horne, Mr. John Farrer, and the Hon. E. G. Strutt being elected vice-presidents; and Mr. T. Silk Wilson and Mr. J. H. Hanson were added to the Council.

THE CARPENTERS' COMPANY.—The following prizes were awarded by the judges for the competitions in connection with the lectures recently delivered on the arts connected with building at Carpenters' Hall:—1. A design for a simple building to accommodate 200 people:—2nd prize, two guineas, Kershaw Peters; 3rd prize, one guinea, Rupert Midworth. 2. "Woodwork":—2nd prize, two guineas, F. J. Bradbeer; 3rd prize, one guinea, J. R. Shackleton. 3. Design for a dining-room:—1st prize, four guineas, F. H. Luhmann; 2nd prize, two guineas, R. H. Flint. The foregoing competitions were open to craftsmen only. 5. Design for a lounge hall:—Prize, four guineas, George Eldridge; extra prize, two guineas, Wm. Park; extra prize, one guinea, Paul Faraday. 6. Essay, with sketches, on timber-built houses of the fifteenth and sixteenth centuries:—Prize, four guineas, Elfric H. Smith; extra prize, three guineas, W. Gandy; extra prize, two guineas, H. J. Chetwood. The two latter competitions were open to all.

THE annual report of the Metropolitan Water Board states that the income for the year ended March 31, 1908, was 3,582,578*l.* and the expenditure 3,197,536*l.* The capital debt of the Board on April 1, 1908, was 47,392,664*l.*, upon which an annual interest charge of 1,425,977*l.* is equivalent to 4.3*d.* per 1,000 gallons supplied. For the whole area the average daily supply per head was 31.55 gallons, or 2.5 cwt. in weight, varying from 33.08 gallons in the western district to 24.48 gallons in the eastern district. Approximately, 51.5 per cent. of the population was supplied from the Thames, 23 per cent. from the Lea, and over 25 per cent. from wells and springs. With regard to the future supply, it is recorded that as the increase in population will eventually render resort to some other source than the Thames watershed imperative, the board views with great alarm the increasing tendency of authorities throughout the kingdom to appropriate water-supplying areas for their particular use, and in these circumstances desires to urge upon Parliament the necessity for regulating the appropriation of water-supplying areas, so that the needs of the metropolis as well as of other populous places may receive due consideration.

AT the last meeting of the Southend Town Council the education committee reported that they had accepted the tender of Messrs. J. S. Hammond & Son, of Romford, at 5,358*l.*, for the erection of a senior mixed department of the Bournemouth Park Road school. The Southend Builders' Merchants' Protection Association wrote protesting against the acceptance of the tender on the ground that three substantial Southend firms had sent in lower tenders. The tenders were:—F. E. Whur, 5,354*l.*; W. E. Davey, 5,321*l.*; H. W. Grainger, 5,184*l.* The committee state that having regard to the fact that Messrs. Hammond had carried out similar work at Southend, they were of opinion that that was sufficient reason for giving them the present contract. The Mayor said he was advised by the Town Clerk that the committee had no power to accept the tender without first coming to the Council, and that they could not incur an expenditure beyond 100*l.* It was moved that the lowest tender be accepted, and a councillor said the builder with the lowest tender had carried out good work in the town. Eventually the whole matter was referred back to the education committee.

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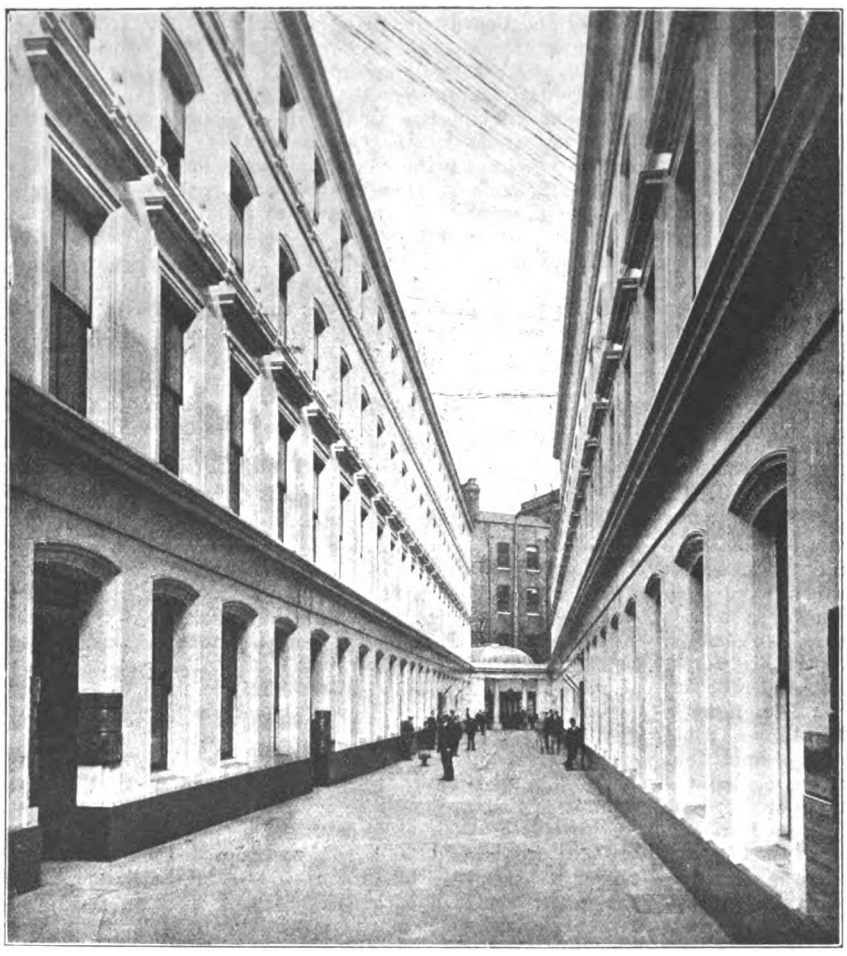
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EXTERIOR PAINTS.



THE law of evolution may be studied in decorators' materials no less than in higher branches of study, that is to say, there is a constant development or improvement in progress. A most important development, it will generally be conceded, has taken place in connection with enamels. These have been used for many years, but the specimens which still occasionally survive in the interior woodwork of old mansions were the product of seven to ten coats, each being carefully rubbed down, and the whole finally covered with a very expensive varnish. All that is changed now, and enamels are obtainable at a price that permits of their use in the pantry as well as in the salon. Another line of progress is in the variety of uses to which it may be applied, more particularly for exteriors. For use on plaster it possesses the great merit that the surface may be washed down frequently without causing any injury to the surface. Something like a triumph for enamels has been achieved in the East India Avenue, London, E.C., which we illustrate. This was decorated in 1907 with Sanalene white enamel (Aspinall's Enamel, Ltd., New Cross, E.C.), and has just been cleaned down. The following is the report:—"The surface, after cleaning, is as good as new, and will wash again in two years' time with the same satisfactory result." Those who are best qualified to judge have for some few years been confident that enamels would become more and more frequently used for exteriors. The chief obstacle has been the initial ex-

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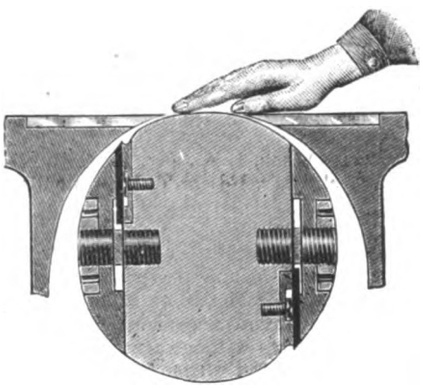
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pense, which has daunted householders from using a material for which they expressed unqualified admiration. But this latest test or proof shows that the outlay once incurred is not likely to occur again for an indefinite number of years, and that the surface may be constantly made as good as new at practically no expense. In a narrow avenue such as the one in our photograph the question of light to the offices is of very great importance. The brilliant surface of the enamel, by reflection, increases the amount of light in the rooms considerably. Aspinall's Enamel, Ltd., have therefore good reason to be proud of their "Sanalene," when it can withstand uninjured the chemical-laden atmosphere of the heart of London.

NEW PATENT SAFETY CIRCULAR CUTTER BLOCK.

THE hand planer is doubtless a most valuable machine, and were it not for the danger of using it the value would be still greater, for even the best guard made diminishes the danger but little. The usual practice has been for the



makers to supply square cutter blocks, upon the flat surface of which the plane irons are bolted, and the risk of maiming is of necessity considerable. But with the patent "Ideal" safety circular cutter block (made as illustrated by M. Glover & Co., sawmill engineers, of Leeds) it is practically impossible for any person to incur much damage. Even if the hand should slip upon the round cutter block, it provides its own guard, which revolves with it and which renders it impossible for the hand or fingers to become seriously hurt, because the members cannot become trapped or ensnared by any low places or gaps such as are inherent in the usual square cutter blocks. For reasons of safety alone it deserves the consideration of everyone employing hand planing and moulding machines. But among other advantages are (1) as thin steel strips only are necessary as knives, a great saving in steel and expense is effected; (2) perfect pressure being brought to bear right up to the cutting edge, these blades cut sweeter and with a much better finish; (3) these thin knives are much more quickly and easily sharpened, and are less liable to become unequally balanced; (4) an extra knife is provided (and which is adjustable) immediately underneath the cutting edge of the planer knife, and which serves as the back iron of an ordinary hand plane, and most perfect planing of soft or hard wood is secured. The patent circular cutter block is run with much less power because there is less resistance to the air offered, while it also obviates the humming noise, disturbance, and unpleasant vibration. Heavy cuts can be taken with perfect ease, such as would be a most dangerous proceeding with the ordinary square cutter block.

"THE Old Rectory" at Caversham is to be offered for sale by auction at the Mart on Wednesday. This old residence possesses many historical associations and is reputed to have been the gift of Henry VIII. to Cardinal Wolsey. There is a fine old gateway and an ancient porch of Norman design, surmounted by a carved figure of Cardinal Wolsey in niche, together with the high massive old stone wall, pierced with arrow slits. Previous to the dissolution of the Monasteries, the church and tithes of Caversham belonged to the Augustinian Abbey of Notley or Nutley, in the parish of Long Crendon, Bucks, and at the surrender of Notley in 1538 "The Old Rectory" passed into lay hands, and was owned by families named Browne and Alexander, and it was by the latter that a very interesting old oak staircase, bearing date 1638, which still remains, was presumably built.

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DEAR SIRS,—The "Villa Pattern Sine Qua Non" Range you made for us is a great success. It cooks perfectly, and we get any quantity of hot water for bath, lavatory, and sink, and the consumption of coal is very small indeed.
The rising bottom is easily manipulated, and as it lifts the fire bodily it converts it into a grilling stove, and, in my opinion, this is very much superior to the rising fire which hinges at the back. The use of the slow combustion arrangement not only saves a large amount of coal, but is a great comfort to the cook in protecting her from the heat of the fire and in keeping the kitchen cool. (Signed) J. T. GREEN.
This unsolicited testimonial, with many others, may be seen at, and Catalogues obtained on application to, the Sole Manufacturers,
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SATURATION EXPERIMENTS.

The Bombay Government recently carried out a series of experiments for the purpose of ascertaining the saturation of high embankments of storage tanks. *Indian Engineering* in reviewing the record of the results has selected from the several examples described and illustrated two typical ones to indicate respectively the effects of saturation on a bank without rear drainage and on a bank in which provision for drainage is made.

In the Matoba tank the dam is constructed of clayey material throughout, faced only with a thin moorum skin. Five pipes perforated at 1 foot intervals were sunk vertically into the bank and the levels recorded to which water rose in the pipes. A line connecting the highest levels indicates the line of saturation. Saturation attained its maximum on the up-stream face and also towards the base of the down-stream face three weeks after the highest rise of water in the tank. Towards the top of the down-stream face, however, saturation proceeded more slowly, reaching maximum thirty-five days later, by which time the water level had fallen 2.70 feet. It is recorded also that in the following year, 1907, it took sixty-two days for the line of saturation to be reached, indicating probably that a year's further consolidation of the bank had improved its impermeability. At the period of highest saturation there was only 2½ feet depth of dry material near the outer toe, and it is not therefore surprising to learn that on one occasion a slip has occurred here.

The Unkal tank dam has been constructed with selected material throughout, care being taken to have a good draining composition in the down-stream section. The central part of the dam has the most clay in its composition, while the down-stream section has the least. The line of saturation accordingly takes a special course. In the first section it begins with what would be a normal slope, but is deflected upwards as it approaches the line of junction with the middle section. This is obviously because the middle section containing the most clay is the most open to saturation. In the middle section itself the line approaches the horizontal in the first half, but in the second half dips to the junction with the third section. It is apparent that free drainage through the third section has kept the water level down, that the low water level at the junction of the middle and third sections has influenced the level in the second half of the middle section, and that the resulting line of saturation takes a dip instead of being more or less horizontal as in the first half. In the third section in consequence of good drainage the line of saturation keeps quite near the base; and as a fact it had been found to vary but slightly between June and December. Observation of the dates on which the highest water levels were reached in the various pipes shows that it took very little time to saturate the bank to its maximum.

The general results of these experiments may therefore be summed up as follows:—

1. Clay banks are more completely saturated than well-drained banks.
2. Clay banks are more slowly saturated and part more slowly with their water of saturation.
3. In high-banks it is unsafe to have nothing but clayey material, a down-stream section of well-drained material being essential.

The general purposes and building committee of the National Museum of Wales held last week a meeting at the House of Commons. The three assessors who will advise the Council with regard to the new buildings to be erected for the purposes of the Museum in Cathays Park were present. They are Sir Aston Webb, R.A., Mr. J. J. Burnet, of Glasgow and London, and Mr. Edwin T. Hall, nominated by the President of the Royal Institute of British Architects as third assessor. Draft conditions and instructions for the information of competing architects were carefully discussed, their further consideration being postponed until the assessors are in a position to meet the committee on the ground at Cardiff. When the final arrangements are completed, it is understood that architects without any reservation may send in sketch plans in black and white of the buildings required. From the competitors who send in designs not less than five and not more than ten will be selected by the Council with the advice of the assessors, and these will be invited to submit detailed plans on a larger scale, from which the final selection will be made.

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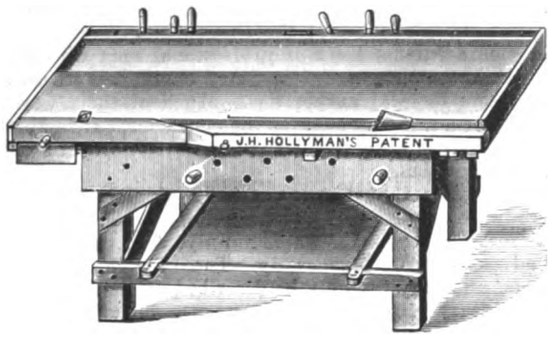
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THE "HOLLYMAN" PATENT WORK BENCH.

THE most striking improvement of the "Hollyman" patent work bench on the old type is the patent gripping attachment, which, with the front edge of the bench, forms a most useful and reliable instantaneous vice. It dispenses with the old bench screw, as all boards, battens, &c., after being clamped, are held in an upright position and are evenly and rigidly gripped on both sides and along their whole length. The action resembles that of a parallel ruler. When the work is inserted it becomes immovably fixed by the wedge-shaped front end of the sliding jaw being pushed forward (as illustrated) until it engages with a corresponding recess, while at the back end there is a projecting arm underneath, working in a slot in a direction parallel to the angular recess, which controls the movement of this sliding jaw.

Immediately under the front edge of the bench top, and at intervals, are wooden supports, each turning on a screw centre, which can be made to project below the opening of the vice to form a base for supporting work, thereby making it quite impossible for wood to slip down when under pressure of a plane, hammer and chisel, &c., even if the edges of two or more pieces are being simultaneously planed together.



The work is released by withdrawing the sliding jaw by a knob. Along the inner edge of this sliding vice is a rebate, convenient for supporting laths, mouldings and any work narrower than the thickness of the bench top. The projecting batten (at the back end of the bench, and on which the back end of the slide rests) has a step cut to prevent wood, when being planed backwards, from slipping out. The holes in the side are for taking pegs (supplied with the bench) to support boards of various widths when being planed, holes being bored, &c.

There are two bench stops, front and back. The front stop (Hollyman's improved, registered) is of conical shape, about 2¼ inches long, having teeth round the larger end. It revolves eccentrically upon a steel spindle let lengthwise into the bench and can be instantly adjusted to the desired height by moving it round with thumb and fingers. These rotary stops can be fitted to any bench. The back or tail stop (Hollyman's improved, registered) is used in conjunction with the sliding parallel vice. It is formed of a piece of T iron about 4½ inches long, the upper part having teeth at one end, while the "stem" is that part which the patent vice grips firmly at any required point along the bench.

There is a trough for tools, &c., and as the bottom of this is not a permanent fixture it can be brought flush with the bench top, thus widening bench. For holding tools there is a rack at the back, a tray below, and at the front end a drawer which, if an instantaneous grip metal vice be required to be fitted to the bench, should be removed for that purpose.

These benches are made in any size from 66 inches long, 24 inches wide and from 30 to 34 inches high. They should be particularly suitable for technical schools and institutes, for which double benches are constructed for two students to work at. They are installed already at the Acton and Chiswick Polytechnic (Middlesex education committee). A small bench top with the patent vice and the two stops is made for clamping to an ordinary bench or kitchen table for the use of amateurs.

The bench may be obtained from the inventor, Mr. J. H. Hollyman, at 457 Chiswick High Road, W.

MR. JOHN YOUNG, surveyor to the Ayr Dean of Guild Court, reports that the plans passed by the Court for the year to May 15 were valued at 31,797*l.*, as follow:—Dwellings (22), 7,245*l.*; business premises (25), 16,662*l.*; alterations (27), 4,790*l.*; minor warrants, 3,100*l.*

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THE STATUS OF THE MODERN SANITARY ENGINEER.*

(*Concluded from page* 24, *May* 14.)

Some of the old-established, high-class surveyors and valuers are no doubt qualified to undertake all kinds of survey work, and to advise on general sanitary improvements to property; but the ordinary house agent belongs to a different class altogether. Before being allowed to practise as professional sanitary engineers they should be obliged to pass a qualifying examination, and should then be debarred from doing the practical work in connection therewith. When they are builders they should not be allowed to do the professional work, but be compelled to prove that they are capable of undertaking the practical work before being allowed to do so, and that they employ fully competent men in each trade concerned in the work. Such a course would raise the status of the profession in the eyes of the public very considerably.

The profession of sanitary surveyor is still further degraded in the present day by plumbers and painters undertaking to survey and report on drainage arrangements. The extreme modesty of some of them is manifested by their circulars, in which they ask the small fee of from 5*s*. per house for doing this.

A few years ago the sanitary engineer was looked upon as a kind of "glorified" plumber; he still is so by those who are only acquainted with the counterfeit of him. Thanks, however, to the educating influences which have been at work the stigma now only applies to those who have not put themselves in the way of knowledge.

The great work done by the Royal Sanitary Institute during the past thirty years, both in educating the public mind and in training those engaged in sanitary work, cannot be overlooked or over-estimated whenever attention is directed to this aspect of our subject. They are not, however, an engineering body (although all the most prominent sanitary engineers of the past and present are, or have been, numbered among its members and supporters), therefore, its work concerns us only in this connection in the present case.

The Institute of Sanitary Engineers, founded in 1895, has also done much to gain for its members proper recognition, and to raise the profession generally to a higher level of efficiency. Unfortunately, in the early days of the Institute, while its promoters realised the advantages of such an association, they did not use discretion in admitting men to membership; the result was that many unqualified persons gained admission, and it appeared likely that the Institute would do little good. However, a few soon realised that if the Institute was to become a real power for good they must eliminate from their ranks those unqualified persons. And as far back as 1889 Mr. James Farley announced, at the annual dinner, "The present Council have no sympathy whatever with the actions of the promoters; we intend to have all that is good, and take out all that is bad." Since then the Institute has made steady progress, and by its efforts the title of sanitary engineer has become an honourable one, and one that is being recognised, when borne by a member of the Institution.

There is a further body of professional men who really come within the category of sanitary engineers; these are the engineers to local authorities. Much of their work is essentially of a sanitary engineering character. It is worthy of notice that this Institute now numbers many of these among its members.

There is also that important body of men in private practice who are engaged in designing and carrying out public works of sewerage, water supply, &c., and who act in an advisory capacity generally. These are the consulting engineers, and may fittingly be described as the aristocracy of the sanitary engineering profession. They include all the best talent and most expert minds engaged in public health work.

It is therefore evident that a great variety of interests are included in the term sanitary engineer at the present day. Broadly, they are divided into two classes—professional and practical—but, as has already been shown, they

* Abstract of a paper read before the Institute of Sanitary Engineers, at a meeting held on March 15, by Geo. W. Chilvers (Fellow and Vice-President).

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now so overlap each other as to be in many cases indistinguishable unless one has some acquaintance with the qualifications of the party concerned, or knows the kind of business he is engaged in. This is even then somewhat difficult.

Such a variety of talent ought to be flattering to the profession as showing how important their work is considered—in that it appears so attractive to all professions and trades. On the other hand, it indicates that the title must be one to conjure with in matters of business, otherwise all these people would not be so eager to adopt it. In fact, all kinds of trades have, and are still, adding sanitary engineering to their own. This is usually stated to be entirely a question of competition. Every one quite realises the keenness of competition in the present day. But in the cases referred to the desire evinced is not to secure a share of the food provided, but to steal the half loaf from a neighbour and leave him without bread. The professional sanitary engineer of to-day has not only to compete with others who are also in practice, but with practical men who also undertake professional work. His sphere in connection with public works is further restricted by local authorities, who, in many cases now, carry out their undertakings with their own staff. He has also against him those engineers and surveyors to local authorities who, in addition to their official duties, carry on a private practice as well.

One cause of the keen competition in the profession, and which also accounts in a great degree for the various classes found in it, is, that at the present time all kinds of men, or any firm, can style themselves sanitary engineers without any qualification whatever, either in profession or trade.

It is one of the objects of our Institute, and should be made more especially so than it now is, to alter this state of things, and secure by legislation, or otherwise, that only fully qualified persons shall be allowed to use the title.

The very pertinent question may be asked, Why should the sanitary engineer be allowed to practise in that which may prove to be against the public health without a proper qualification any more than the doctor who has to cure the patient?

One of the curious features connected with sanitary survey work is that not many years ago, when almost every place was in such a glaringly insanitary condition that the merest tyro could prove it so and safely condemn it, only men of experience and position were employed. Now, however, when the easily discovered defects are things of the past, and the dangers to health are of a more intricate nature, any one is called in, from the house agents' or builders' clerk to the plumbers' mate, and is considered qualified to make an inspection.

Another cause of the overcrowded and unsatisfactory condition of the profession is, no doubt, the misapplied system of technical education. Our educational bodies, by "teaching all things to all men" without discrimination or regard to the profession or trade the student is engaged in, or proposes to be engaged in, are the cause of a mediocrity among our young men; the system launches into the different professions and trades totally unqualified men. The result is these are either engaged by firms requiring cheap labour, or they set up in practice on their own account, with no other qualification than that of a certificate obtained in an elementary examination.

If technical and trade classes were confined to those actually engaged, or to be engaged, in the particular professions or trades they would be of far greater benefit to the students and to the community than they can possibly be under the present system of open classes and consequent indiscriminate and useless education. No doubt this is also the cause of much of the unemployment at the present time, not only among sanitary engineers, but other professions and trades as well. The competent man has to give place to inexperience and cheap labour.

With a body of men with such wide interests, and engaged in such comprehensive work as that of sanitary engineering, there should be some clearly defined lines upon which they may work together, and some means should be devised whereby the public may be able to discriminate between the sanitary engineer who designs a sewerage scheme and he who fits up a water closet.

It is also important that this Institute should more clearly define its own position among the professions, and secure that its members be classified in some way so that the particular qualification of each in the profession may be indicated.

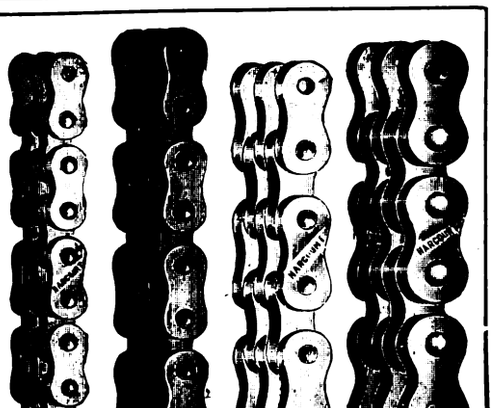
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To meet these views it appears desirable that graded examinations should be instituted, which all who wish to practise as sanitary engineers should be required to pass, and, having passed, certificates should be issued to them which will indicate to all the particular branch, or branches, in which they have qualified themselves. And no man should be allowed to practise in any other than those shown thereon.

If this were done the examinations would become recognised by Governments, local authorities and others as qualifying for particular appointments.

There is another matter affecting the status of the profession, and in which there is room for improvement: this is in the sanitation of buildings.

Much has been done in matters of both public and private sanitation, but much remains to be accomplished.

In public sanitation the sanitary engineer has carried out vast improvements, and if local authorities, in ordering these works, have created a large amount of public debt, the public themselves are as deeply indebted to the authorities for the increased health and lengthened life they enjoy as the result of the expenditure, while future generations will receive a double benefit therefrom in the greatly reduced mortality and the possession of works of lasting improvement.

The early pioneers took as their motto, "Take care of the houses and the towns will take care of themselves." In the present day this is to a great extent reversed. Men will advocate and vote for the expenditure of thousands of pounds sterling on matters of public sanitation, but refuse to spend 50*l.* in putting their own property in order.

There is no question but there still exists a large amount of property (besides that of the working classes) which is in an insanitary condition; and if the same system of sanitary inspection was extended to it as is carried out in some districts under the Public Health Acts, many insanitary arrangements would be revealed which, if existing in a poorer neighbourhood, would be at once condemned.

In urban and rural districts, especially, houses are built with just sufficient sanitation to comply with the local bye-laws. They are built for sale. To all outward appearance they conform to modern sanitary requirements, and to the uninitiated they appear to be desirable residences. On closer examination, however, the sanitation proves to be mostly outside show. Intending purchasers or tenants are told the builder is also a sanitary engineer, and that the drains, &c., have been passed by the local authority.

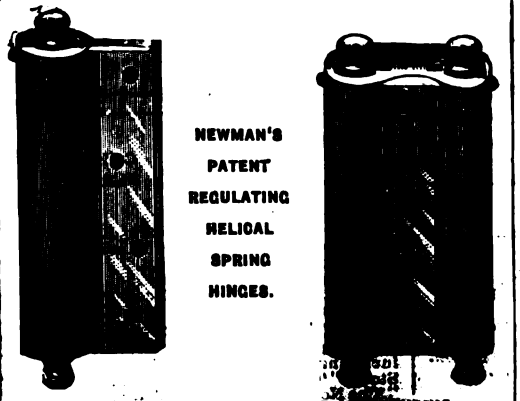
The unsatisfactory state of these in different districts frequently proves a great hindrance to the professional sanitary engineer in his work. He finds it very difficult to persuade his clients that anything beyond what is required by the bye-laws is necessary for the proper sanitation of his house.

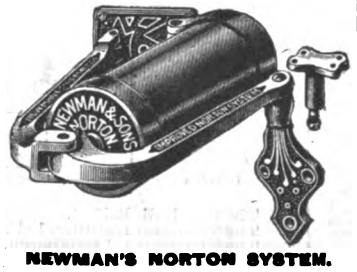
The public cannot realise that bye-laws represent the least amount of sanitation the law allows in the particular district to which they apply, and that it must necessarily be so from the fact that they have to apply alike to cottage and to mansion. Under these circumstances the engineer is debarred from making many desirable improvements, and unfortunately he is not assisted in many cases, by the local officials; on the contrary, they regard him as an intruder into their own preserves. Increased powers are therefore necessary under the Public Health Acts since the present bye-laws are insufficient to prevent bad work.

It is true the effect of stringent bye-laws is frequently to relieve many of that personal responsibility which it is only just that they should bear, but experience proves that there is no other way, in many cases, in which proper sanitary conditions can be obtained.

A systematic and periodical survey of every building could then be instituted, and if the premises were found in a proper sanitary condition and complying with the bye-laws, the cost of such survey should be paid for out of the public funds. If not, those responsible should be compelled not only to do what is necessary, but also to pay all charges incidental thereto, and, in addition, be mulcted in a fine in proportion to the rateable value of the premises. Such a measure would only affect the defaulters, while those who kept their premises in order would have the advantage of free surveys. Up to the present sanitary engineers have not taken the active part they should have done in public health legislation (not collectively at least). It is quite time that such an important body of men did so.

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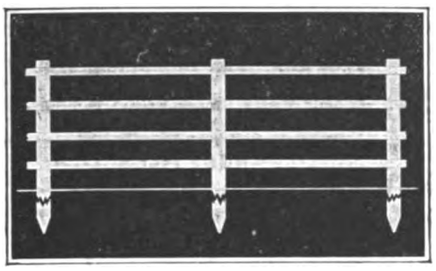


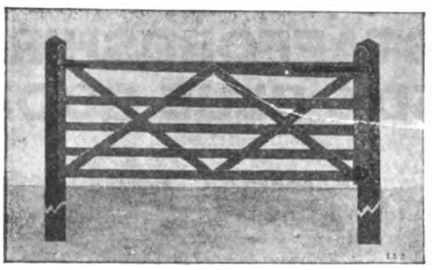
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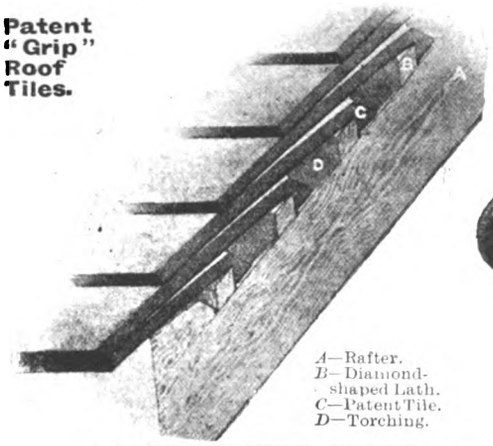
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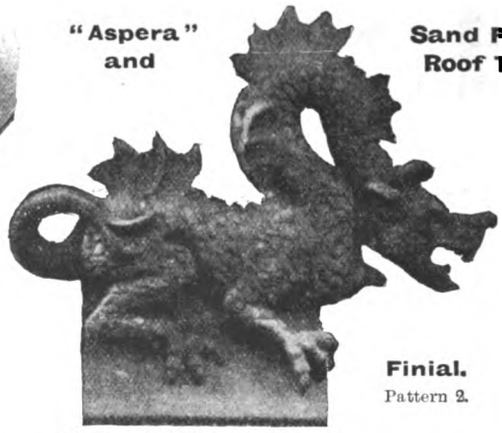
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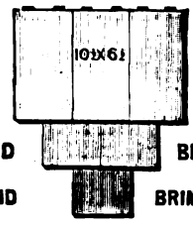
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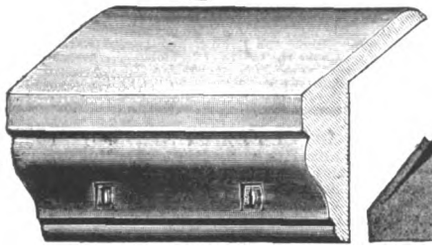
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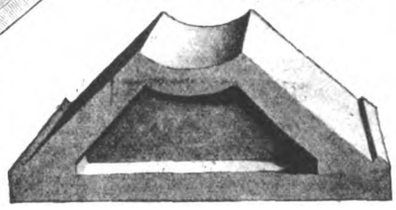


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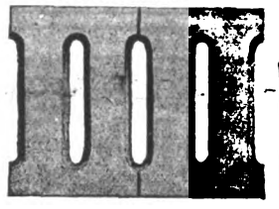
Patent "Barge Tile."



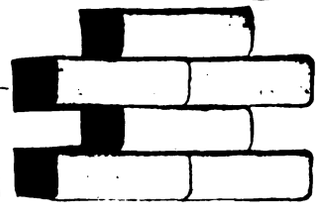
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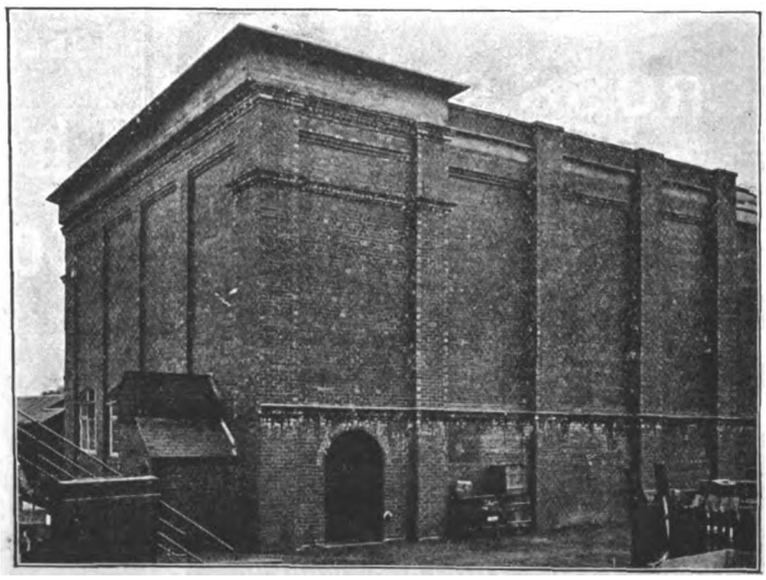
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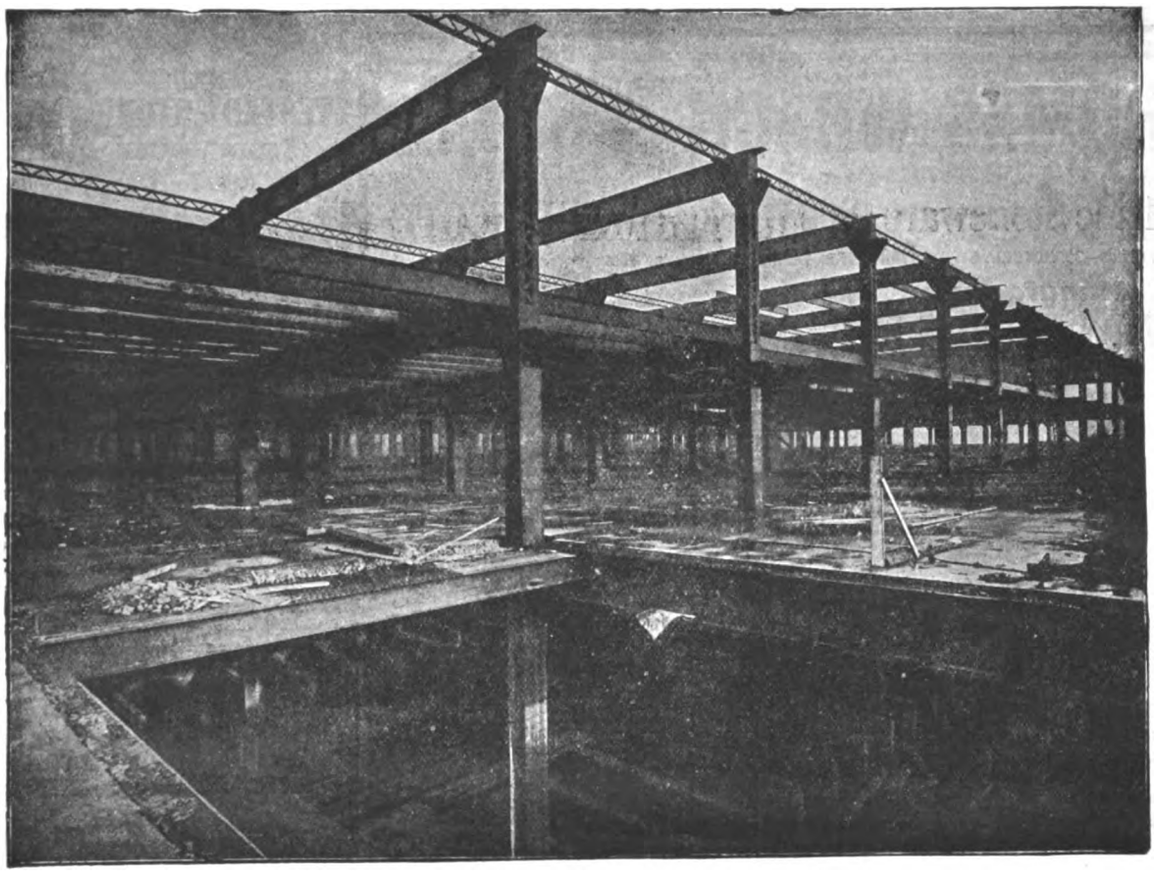
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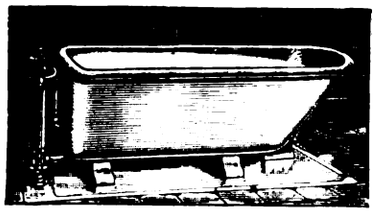
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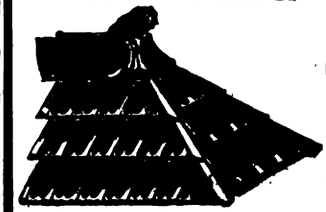
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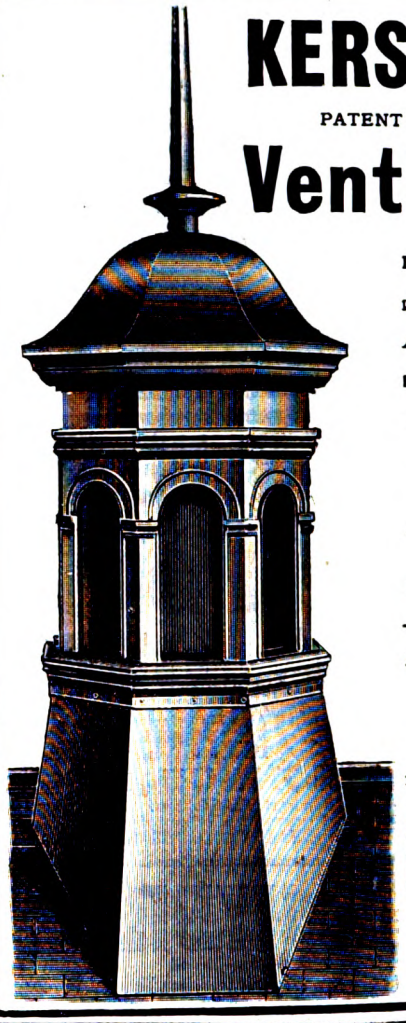
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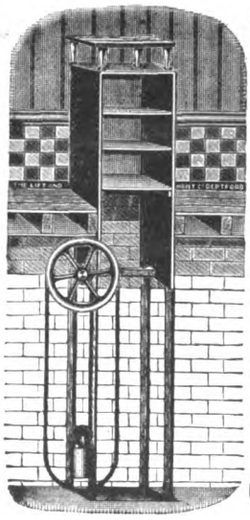
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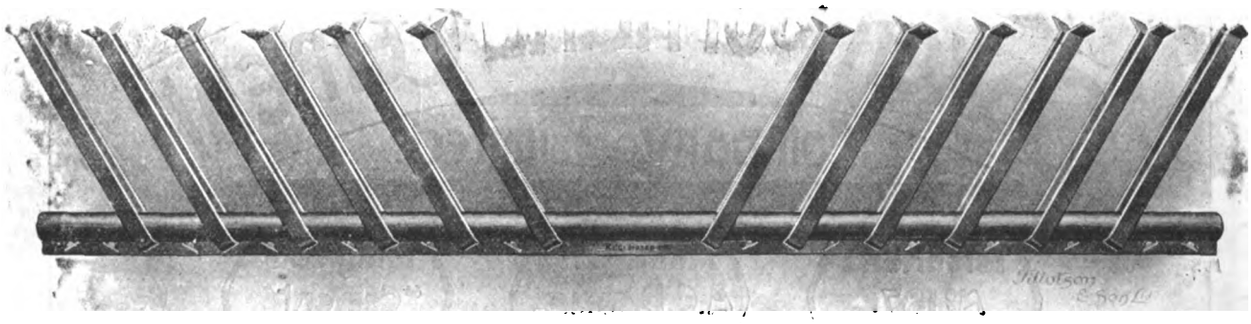
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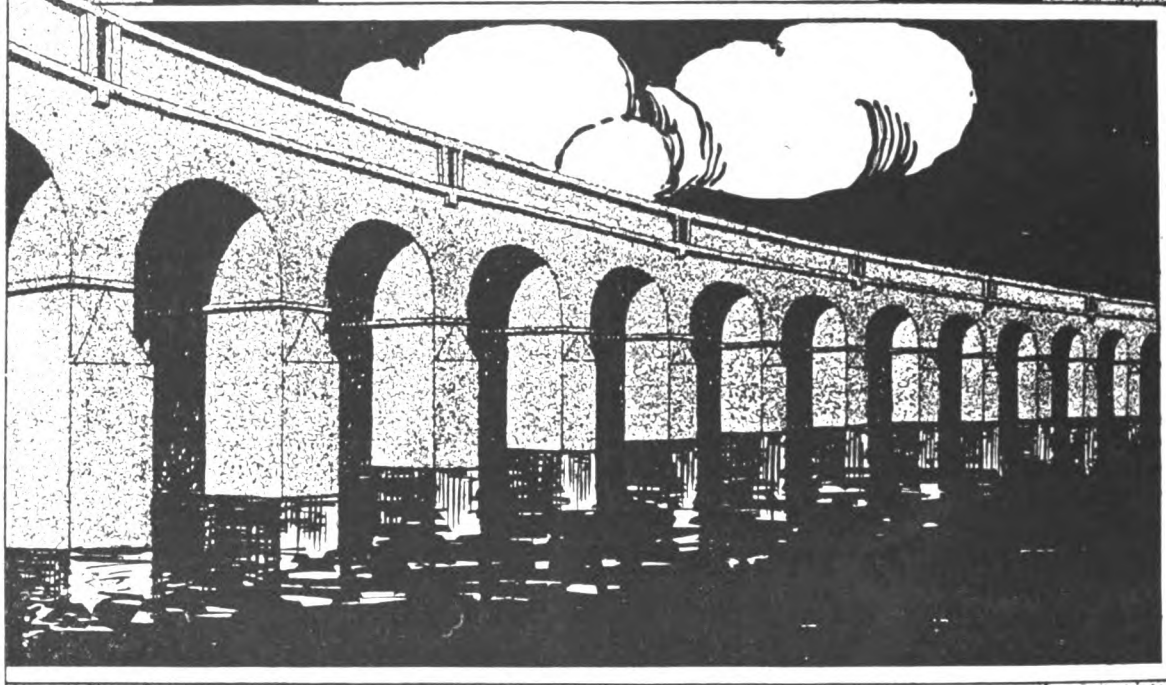
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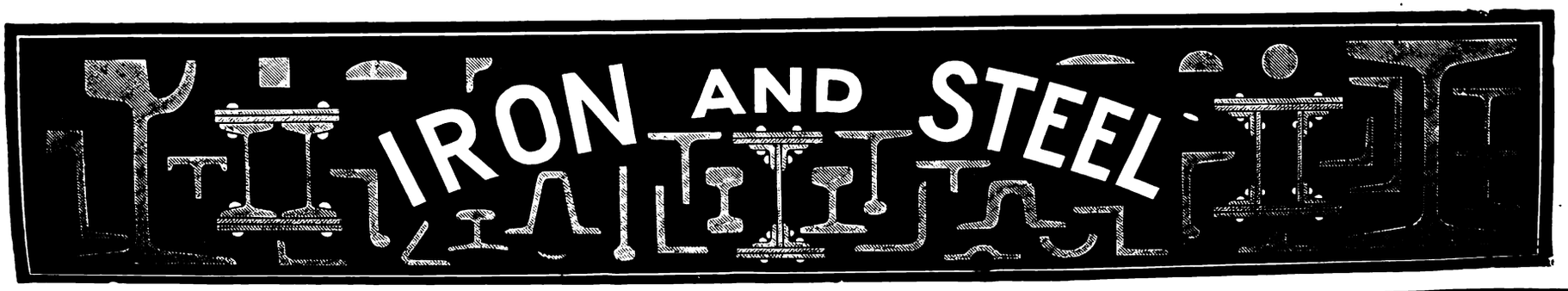
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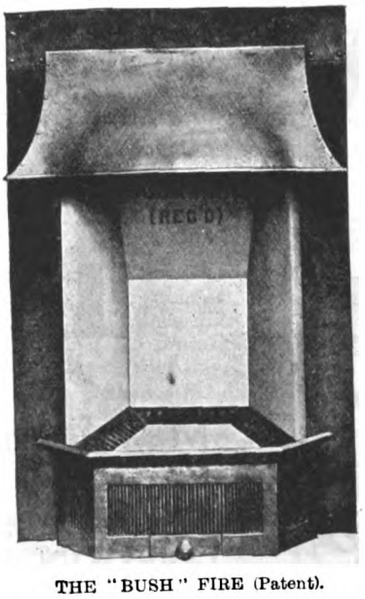
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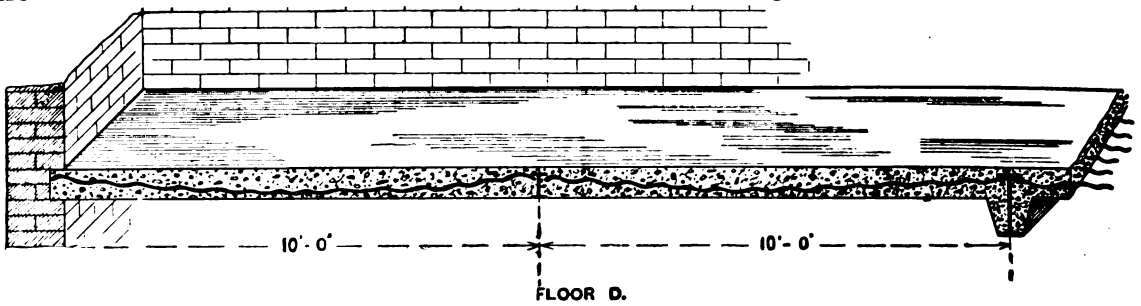
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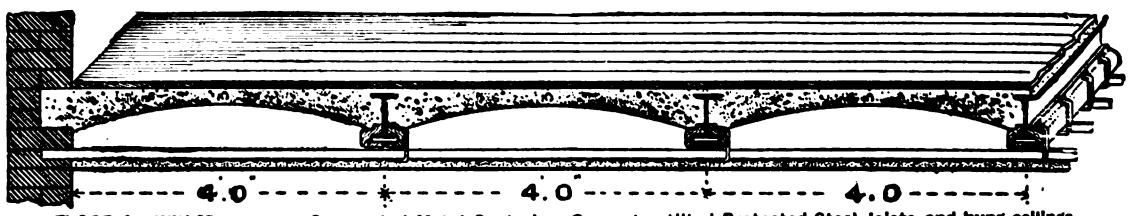
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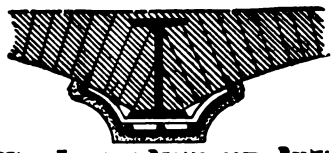
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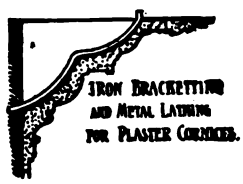




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Architect and Contract Reporter.

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EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

*** *As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than* 2 P.M. *on Thursdays.*

COMPETITIONS OPEN.

BURSLEM.—July 17.—For new public buildings. The author of the design placed first by the assessor will carry out the work. The architects placed second and third will receive premiums of 100*l.* and 50*l.* respectively. Deposit 2*l.* 2*s.* Mr. F. Bettany, borough surveyor, Burslem.

GLASGOW.—July 31.—The patrons of the Royal Incorporation of Hutchesons' Hospital invite designs for laying out for feuing and building about 195 acres of their lands of Thornliebank, Eastwood. Premiums of 100*l.*, 75*l.*, 50*l.* and 25*l.* will be awarded. Deposit 3*l.* 3*s.* Messrs. Hill & Hoggan, 194 Ingram Street, Glasgow.

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IRELAND.—June 7.—The Athy Urban District Council offer a prize of 5*l.* 5*s.* for the best plans of three kinds of artisans' houses, to cost 100*l.*, 150*l.* and 200*l.* each. The successful competitor will be offered the carrying out of the scheme at 2½ per cent. on the total cost. Mr. J. A. Lawler, clerk, Town Hall, Athy.

READING.—June 15.—The Berkshire County Council invite designs for offices, committee rooms, &c., on the Forbury, Reading. Mr. Mervyn Macartney, F.R.I.B.A., assessor. Premiums of 100*l.*, 75*l.*, and 50*l.* Deposit 1*l.* 1*s.* Apply to Mr. J. Fred Hawkins, county surveyor, Bank Chambers, Cross Street, Reading.



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AWBRIDGE.—June 7.—For erection of a class-room for forty children, and a cloak-room, at Awbridge Council school, Hants. Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

BACUP.—June 19.—For extensive alterations and additions to the St. Saviour's Council school. Deposit 2*l.* 2*s.* The Borough Engineer, Municipal Buildings, Bacup, Lancs.

BARNSTAPLE.—June 7.—For alterations to the Masonic Hall. Mr. J. C. Southcombe, P.A.S.I., architect, Barnstaple.

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BRIDGWATER.—June 8.—For construction of a cloak-room for the girls' department, Eastover Council school in Cornborough Place. The Borough Surveyor's office, Municipal Buildings, High Street.

BRISTOL.—June 16.—For the construction and maintenance for twelve months after completion of a passenger station at the Royal Edward Dock, Avonmouth, for the docks committee. Deposit 5*l.* Mr. W. W. Squire, engineer, Cumberland Road, Bristol.

COVENTRY.—June 7.—For erection of workshop, Dale Street. Mr. Herbert W. Chattaway, architect, Trinity Churchyard, Coventry.

DARLINGTON.—June 7.—For erection of a mechanical laboratory for thirty-six students at the Technical College. Deposit 2*l.* 2*s.* Mr. George Winter, borough surveyor, Town Hall, Darlington.

DURHAM.—June 15.—The County Council invite sole tenders for new Council schools at Langley Park, Beamish, and Cold Hesledon. (1) Langley Park school (600 scholars) and Beamish school (450 scholars), Mr. W. Rushworth, Shire Hall, Durham. (2) Cold Hesledon school (264 scholars). Mr. J. W. F. Phillipson, architect, Murton Chambers, 8 Grainger Street, Newcastle-on-Tyne.

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HELSBY.—June 22.—For the entire work of erection of a school for 200 children at Helsby, Cheshire. Deposit 2*l*. Send names by June 5 to Mr. Joseph Holt, A.R.I.B.A., 9 Albert Square, Manchester.

HULL.—June 9.—For erection of a superintendent's house in the Pearson Park. Deposit 2*l*. 2*s*. Mr. Joseph H. Hirst, city architect, Town Hall, Hull.

HULL.—June 8.—For alterations and additions at the East Hull Liberal Club premises, Holderness Road. Mr. George Thorpe, architect, 1 St. Mary's Chambers, Lowgate.

HULL.—June 9.—For erection of bowling green stores in the Pearson and West Parks. Mr. Joseph H. Hirst, city architect, Town Hall, Hull.

IRELAND.—June 14.—For putting on a new roof, &c., at the residence of Mr. John Adamson, The Mall, Downpatrick. Mr. J. M. Whiteside, C.E., Market Street, Downpatrick.

LISKEARD.—June 12.—For erection of a workshop and cycle shed at the Liskeard County Council. Mr. J. Sansom, architect, Liskeard, Cornwall.

LONDON.—June 9.—For building a postal sorting office at New Southgate, N. Deposit 1*l*. 1*s*. Mr. J. Wager, A.R.I.B.A., H.M. Office of Works, Westminster.

LONDON.—June 9.—For the enlargement of the Isolation Hospital, Tottenhall Road, Palmer's Green, N. (1) Extension of the administrative block; (2) erection of a ward block for twelve beds; (3) extension of the isolation block. Deposit 2*l*. 2*s*. The Surveyor, Council Offices, Palmer's Green, N.

LONDON.—June 10.—For new Western District Post Office, Wimpole Street—second contract. The work comprises masonry, plastering, joinery, glazing, plumbing, &c., the existing building being of ferro-concrete. Deposit 1*l*. 1*s*. Mr. J. Wager, A.R.I.B.A., H.M. Office of Works, Westminster.

LONDON.—June 10.—For an addition to the water-tower at the workhouse, Union Road, Leytonstone. Mr. Thomas Smith, clerk, Union Road, Leytonstone, N.E.

LONDON.—June 18.—For the construction of a store building and other contingent works on land at the Battersea works of the Board, London, S.W., for the Metropolitan Water Board. The Chief Engineer, Savoy Court, Strand, W.C. Deposit 10*l*. with the Accountant, Savoy Court, Strand, W.C.

LYNN.—June 7.—For alterations to existing buildings, and the erection of others at The Elms, West Lynn, Norfolk. Deposit 1*l*. 1*s*. Messrs. Walker & Walker, architects, Wisbech and Terrington.

MARYTAVY.—June 9.—For extensive alterations and additions to North Warne farmhouse, near Tavistock. Mr. Morley B. Collins, architect, Clinton Road, Redruth.

MIDDLESBROUGH.—June 15.—For alterations and additions at Middlesbrough station, for the North-Eastern Railway Company. Mr. William Bell, the company's architect, York.

MINERA.—June 16.—For erection of a bungalow at Minera, near Wrexham. Mr. G. F. Wynne, Plas Gwyn, Minera.

NELSON.—June 5.—For erection of three shelters in Victoria and Walverden Parks. Mr. B. Ball, A.M.I.C.E., borough engineer and surveyor, Nelson, Lancs.

NELSON.—June 5.—For the construction of a retaining wall near the sewage works. Mr. B. Ball, A.M.I.C.E., borough engineer and surveyor, Nelson, Lancs.

NELSON.—June 14.—For mason, joiner, plumber, plasterer and slater's work required in the erection and completion of the new Palace and Hippodrome, Nelson, Lancs. Messrs. Matthew Watson, Landless & Pearse, architects and surveyors, 2 and 4 Nicholas Street, Burnley, and 21 Dale Street, Liverpool.

PORTSMOUTH.—June 14.—For erection of a teachers' room and a cloak-room at the George Street Council school (girls' department). Mr. A. H. Bone, surveyor, Cambridge Junction, Portsmouth.

RAVENSTHORPE.—June 7.—For building a club and caretaker's house in Foundry Street, Ravensthorpe, Yorks. The caretaker of the Ravensthorpe Liberal Club, 238 Huddersfield Road, Ravensthorpe.

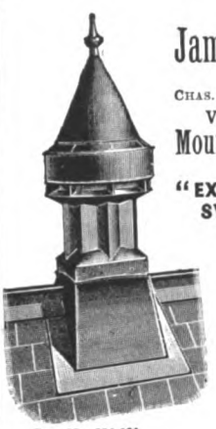
REDGRAVE.—June 29.—For the enlargement of the school. Rector, Redgrave, Suffolk.

RUSWARP.—June 5.—For the whole or any trade required in erection of a small Primitive Methodist church. Send name and trade to Mr. W. G. Smithson, A.R.I.B.A., architect, 13 Bond Street, Leeds.

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SCOTLAND.—June 5.—For the erection of an isolation hospital at Bangour Village, Uphall. Mr. Hippolyte J. Blanc, R.S.A., 25 Rutland Square, Edinburgh.

SCOTLAND.—June 12.—For erection of a block of working men's dwellings in St. Magnus Street, Lerwick. Deposit 1*l.* Mr. Arthur Sandison, factor for the trustees for Feuars and Heritors of Lerwick.

SEDBERGH.—June 4.—For erection of eight houses, mason, slater and plaster's work excepted. Mr. E. Dugdale Dennis, architect and surveyor, Sedbergh.

SEDBERGH.—June 10.—For erection of a Wesleyan chapel and schools. Deposit 2*l.* 2*s.* Mr. A. E. Lambert, architect, 22 Park Row, Nottingham.

SHERBORNE (DORSET).—June 4.—For additions to the Sherborne Ladies' College. Messrs. John Harding & Son, architects and surveyors, 58 High Street, Salisbury.

SOUTHAMPTON.—For additions at St. Michael's House. Deposit 3*l.* 3*s.* The Borough Engineer's Office, Southampton.

STANWELL.—June 5.—For erection of a chapel in the cemetery, London Road, Stanwell, Middlesex. Deposit 1*l.* 1*s.* Mr. W. Ralph Low, architect, 10 Basinghall Street, E.C.

SWANAGE (DORSET).—June 18.—For enlarging the Swanage Council school. The Secretary, County Education Office, Dorchester.

WALES.—June 5.—For erection of a house adjoining the Park Wood, Tregare, Abergavenny. Mr. B. J. Francis, architect, Abergavenny.

WALES.—June 7.—For erection of a hall in connection with St. James's Church, Pontypool. Mr. D. J. Lougher, architect, Bank Chambers, Pontypool.

WALES.—June 8.—For erection of a Council school to accommodate ninety-six children at Usk, Mon. Deposit 2*l.* 2*s.* Mr. C. Dauncey, County Council Offices, Newport.

WALES.—June 9.—For alterations and repairs to Cefn-y-Forest Farm, near Treharris. Mr. T. Edmund Rees, architect and surveyor, Gernant, The Walk, Merthyr Tydfil.

WALES.—June 10.—For erection of premises at Treherbert. Deposit 2*l.* 2*s.* Messrs. J. Rees & Son, architects, Pentre.

WALES.—June 12.—For erection at Briton Ferry of fifty-one houses for the working classes, for the Urban District Council. Mr. H. Alex. Clarke, architect and surveyor, Council Offices, Briton Ferry.

WALES.—June 15.—For alterations and additions to No. 90 Tonna Road, Caerau. Mr. W. H. Llewellyn, architect and surveyor, 40 Brynmawr Place, Maesteg.

WALES.—June 15.—For alterations and additions to Bethania Chapel, Dowlais, and erecting new school, &c., in connection therewith. Deposit 2*l.* 2*s.* Mr. E. A. Johnson, F.R.I.B.A., architect, Merthyr Tydfil.

WALES.—June 21.—For erecting platform, seating accommodation, &c., for the Eisteddfod pavilion, for the committee of the Cardigan Semi-National Eisteddfod. Mr. D. Williams, secretary, Yngs, Cardigan.

WESTON LULLINGFIELDS.—June 18.—For erection of two cottages and homesteads for small holdings at Weston Lullingfields, about two miles from Baschurch station. Deposit 1*l.* 1*s.* Mr. W. T. Hall, agent, College Hill, Shrewsbury.

WHISTON.—June 10.—For erection and completion of a block for male mental cases at the workhouse, Whiston, Prescot, Lancs. Mr. Jas. Gandy, architect, Masonic Buildings, St. Helens.

WINCHESTER.—June 23.—For erection of new secondary school for 160 girls. Deposit 5*l.* 5*s.* Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

WOLSINGHAM.—June 8.—The Durham County Council invite sole tenders for erection of a secondary school at Wolsingham. Mr. J. A. L. Robson, secretary for higher education, Shire Hall, Durham.

WORKINGTON.—June 9.—For erection of a house on the Seaton Road. Messrs W. G. Scott & Co., architects and surveyors, 2 Park Lane, Workington.

WREXHAM.—June 8.—For the construction of conveniences in Market Street and Crescent Road. Mr. John England, borough engineer, Willow Road, Wrexham.

YORK.—June 12.—For building conveniences at Mount Vale and Albemarle Road. Deposit 1*l.* 1*s.* Mr. F. W. Spurr, city engineer, Guildhall, York.

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Pittard & Son	825 0 0
Clarke	765 15 0
Parsons Bros. & Dunster	750 0 0
Layzell	721 10 0
Bazley	695 0 0
NEWBERY & SON, Axminster (*accepted*)	672 10 0

BARKING (ESSEX).

For private street works for the Barking Town Urban District Council. Mr. C. F. DAWSON, surveyor.

Cranborne Road, St. Erkenwald Road, St. Awdry's Road and Sunningdale Avenue.

JACKSON, Barking (*accepted*)	£2,448 10 4

Devon Road and Sparsholt Road.

WILSON, BORDER & Co., Romford (*accepted*)	905 11 10

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For erection of offices and drainage at the Council school, for the Kent education committee.

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Godden & Son	315 0 0
South	296 10 0
Bowles	295 0 0
Dixon (*recommended*)	261 10 0

CROWCOMBE.

For erection of a detached residence on the Crowcombe Heathfield estate, Somerset. Mr. F. W. ROBERTS, F.R.I.B.A., Taunton.

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Pittard & Son	1,858 10 0
Furseland	1,850 0 0
A. J. Spiller	1,820 0 0
H. J. SPILLER & SON, Taunton (*accepted*)	1,780 0 0

DERBY.

For erection of extensions to the Derby Borough Asylum. Mr. B. S. JACOBS, F.R.I.B.A., Hull, and Messrs. THORPE & FRYER, architects, Derby.

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Wilson & Son	12,289 15 3
Moss & Son	12,180 0 0
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Fenwick	11,791 18 0
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Kershaw	11,700 8 8
Wood	11,669 10 9
Lowe & Son	11,646 0 0
Ford & Son	11,627 6 9
Pegg & Bailey	11,547 8 0
Morley & Son	11,395 0 0
Byron	11,363 0 0
Dickenson	11,188 0 0
Pattinson & Sons	11,172 0 0
J. & J. WARNER, Mickleover (*accepted*)	10,855 11 3
Architects' estimate	11,800 0 0

EXETER.

For erection of Sunday-school buildings, St. Thomas. Mr. HARBOTTLE REED, F.R.I.B.A., architect, Exeter.

Dart & Francis	£2,097 0 0
Lamacraft & Sons	2,083 2 0
Pittard & Son	1,939 0 0
Wilkins & Sons	1,845 0 0
Ham & Passmore	1,738 0 0
Vaughan	1,735 16 0
Brealy	1,723 0 0
Sleeman	1,718 8 9
Roberts	1,701 14 7
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Westcoll, Austin & White	1,650 0 0
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LONDON—*continued.*

For erection of a cemetery chapel at Hounslow, for the New Brentford Burial Board. Messrs. NOWELL PARR, M.S.A., & KATES, architects, Brentford, W.

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Battley, Sons & Holness	643 0 0
Hughes	641 0 0
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SCOTLAND.

For the construction of a lifeboat slipway and storehouse at St. Abb's, Berwick, N.B., for the committee of the Royal National Lifeboat Institution. Mr. W. T. DOUGLASS, M.I.C.E., engineer and architect, 15 Victoria Street, Westminster.

Pearce	£1,968	9	10
Collin	1,465	7	8
Lester	1,400	0	0
Rae	1,303	8	0
Handman & Co.	1,289	7	7
Brebner & Co.	1,238	0	0
EXORS. OF J. ARUNDEL, Bradford (*accepted*)	1,184	0	0

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For hot-water heating apparatus at the workhouse.

Tye	£215	9	0
Paine & Co.	207	0	0
Strode & Co.	197	0	0
Mellowes & Co.	163	0	0
WENHAM & WATERS, Croydon (*accepted*)	150	0	0

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For laying about 1,200 lineal yards of 6-inch sewer. Messrs. FOWLER & MARSHALL, engineers, Hartshead, Sheffield.

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Green & Sons	730	0	0
King	694	15	9
Kay	600	0	0
Jenkinson	532	1	9
NADIN, Sheffield (*accepted*)	534	16	3
Hawksworth	522	10	0

TORQUAY.

For erection of new wing at Torquay Hydropathic. Messrs. WAYMOUTH, JOHNSON & WEBBER, architects, Torquay.

Blatchford	£6,251	0	0
Parker Bros.	5,918	0	0
Watson & Son	5,770	0	0
Phare	5,719	0	0
Jackman	5,700	0	0
Yeo & Sons	5,466	0	0
BOVEY & SON, Torquay (*accepted*)	5,293	0	0
Narracott	5,078	0	0

STRATFORD-UPON-AVON.

For erection of a villa residence. Mr. E. G. HOLTOM, architect, Stratford-on-Avon.

Finche & Co.	£1,375	0	0
Fenwick	1,350	0	0
Hains & Son	1,305	0	0
Bloxham	1,295	0	0
Barnsley & Sons	1,288	0	0
Bowen	1,275	0	0
Turner	1,265	0	0
Kimberley	1,250	0	0
Harris & Sons	1,239	0	0
James	1,235	0	0
Kennard	1,200	0	0
Whateley & Sons	1,130	0	0
Harris & Co.	1,127	0	0
Mobbs	1,119	0	0
Cox, Stratford-on-Avon (*accepted*)	1,110	0	0

TOTTENHAM.

For rebuilding the Tottenham Grammar school, for the Foundation Governors. Mr. H. G. CROTHALL, architect to the Middlesex education committee.

Minter	£12,320	0	0
Leslie & Co.	12,191	0	0
Holloway Bros.	12,099	0	0
Stewart	12,021	0	0
Johnson & Co.	11,985	0	0
Ford & Walton	11,924	0	0
Lawrance & Sons	11,817	0	0
Fitch & Cox	11,788	0	0
Lawrence & Son	11,694	0	0
Rowley Bros.	11,627	0	0
Renshaw	11,393	0	0
Mattock Bros.	11,077	0	0
Fairhead & Son	11,067	0	0
Treasure & Son	10,909	0	0
Neal	10,698	0	0
Porter	10,482	0	0
Knight & Son	10,437	0	0
Brand, Pettitt & Co., South Tottenham, N. (*recommended*)	10,327	0	0



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WALES.

For erection of a Congregational chapel and schoolroom at Glanamman, Carm. Mr. H. HERBERT, architect, Ammanford, S. Wales.

Jones Bros.	£6,650 0 0
Daniel	5,680 0 0
Rees	5,336 0 0
EVANS, Ammanford (*accepted*)	4,784 10 0

For additions to Pencoed Council school, for the Glamorgan education committee. Mr. D. PUGH JONES, F.S.I, county architect, Cardiff. Quantities by the architect.

WILLIAMS, Cardiff (*accepted*)	£1,600 0 0

For Gellidowel Council school, for the Glamorgan education committee. Mr. D. PUGH JONES, F.S.I., county architech, Cardiff. Quantities by the architect.

BOND, Cardiff (*accepted*)	£6,949 10 3

TRADE NOTES.

UNDER the direction of Messrs. J. M. Porter & Hunter, architects, Colwyn Bay, the "Boyle" system of natural ventilation, embracing the latest patent "air pump" ventilators, has been applied to Penrhos College, Carnarvon.

MESSRS. HATTERSLEY & DAVIDSON, LTD., Sheffield, are the patentees and sole manufacturers of the elliptical trussed ladder, which combines lightness with perfect rigidity. In the extension ladders the extension piece slides in a built up groove (between rollers of gun metal) and can be adjusted at 10-inch intervals. The staves or rungs are all 10 inches apart, except when otherwise ordered, each alternate stave being strengthened by a steel cross bolt. There are no springs, catches, &c., to work loose. The sides are made of Oregon pine, the rungs of English oak. Messrs. Hattersley & Davidson will show these and many other kinds of ladders at Stand No. 41 at the Royal Agricultural Show in Gloucester from June 22 to 26.

THE Flintshire County Council has entered into an important scheme for the provision of extended training college accommodation in North Wales. Four counties are concerned—Flint, Anglesey, Carnarvon and Denbigh. The scheme comprises the extension of the Bangor Normal College at a cost of 32,376*l*.

VARIETIES.

MR. HENRY DARE BRYAN, F.R.I.B.A., died last week at his Bristol residence at the age of forty-one. He was articled in 1883, and commenced an independent practice in Bristol seven years later.

MR. J. A. CARTER, who has been engaged in the local surveyor's office for the past nine years, has been appointed assistant borough surveyor for Workington at a salary of 120*l*. a year. There were over 100 applicants.

THE contract for the steel to be used in the construction of the naval base works and buildings for the Admiralty at Rosyth has been secured by the Brandon Bridge Building Company, of Motherwell, Lanarkshire.

MR. SYDNEY K. GREENSLADE, A.R.I.B.A., Gray's Inn Square, W.C., has been successful in the competition for the new buildings for the National Library of Wales. Their cost is estimated at 85,000*l*. The assessor was Professor Reginald Blomfield, A.R.A.

THE deadlock between the Lancashire County Council and the Local Government Board has been removed by the settlement of legal difficulties extending over eighteen months, and the Bacup and Rawtenstall Corporations can now go forward with the building of a technical school and institute at Waterfoot at a cost of 24,000*l*. The institute will serve a population of 60,000.

AT the last meeting of the Tynemouth Rural District Council plans were passed for the laying out of an estate at Benton Square, upon which the owners intend to build about 300 houses. The estate is near the new "Halt," at present being erected by the North-Eastern Railway Company, between Benton and Backworth Stations. Work has been commenced, several houses having already been built. Messrs. Armstrong & Wright, F.F.R.I.B.A., of Newcastle, are the architects.

SOME time ago the Aberdeen Harbour Commissioners, on the recommendation of the harbour engineer, sanctioned an important scheme of additional dock accommodation, and at the same time it was resolved to construct the new wharves of reinforced concrete. Arrangements have been made to employ a number of unemployed men through the Edinburgh local distress committee. The new wharves will take about

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ILLUSTRATIONS.

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three years to construct, and the scheme, including dredging and other work, is estimated to cost about 85,000*l.*

THE Earl of Powis presided at a county meeting in Shrewsbury on Friday to further a scheme for reopening the old Shropshire and Montgomery Railway as a light railway. The line, which is eighteen miles long, links up Shrewsbury with the Cambrian system at Llangmynech, and has lain derelict for twenty years. About two millions was spent on it, and the new company has acquired the concern for 32,000*l.* About 20,000*l.* is required to reconstruct bridges that have tumbled down, rebuild stations that are overgrown with trees, and replace signal posts and fences that have been carried away and burned.

B. T. BATSFORD is about to publish in book form at 5*s.* net the lectures on "The Arts connected with Building," which were recently delivered at the request of the Carpenters' Company by leading architects and art workers. The book will be profusely illustrated with examples, both old and modern, of architecture, furniture, plaster, wood, lead, and ironwork. The lectures were delivered with a desire to see a revival of the best traditions of craftsmanship. The book is published at a small price so that it may reach craftsmen and the general public, whose interest and encouragement craftsmen require.

COWDENBEATH Town Council have accepted the offer of Dunfermline district committee for a supply of water from their new reservoir. The price asked is 6*d.* per 1,000 gallons up to 15,000,000 gallons, 5*d.* per 1,000 for the next 10,000,000, and 4*d.* for all above 25,000,000. The water question has been troubling the Council for a number of years, and at a meeting of the Council the scheme for raising their present reservoir at Roscobie was also discussed, but it was agreed to accept the district committee's offer.

A LOCAL GOVERNMENT BOARD inquiry was held at Yeovil last week, consequent upon an application of the Town Council to borrow 27,500*l.* for sewerage and sewage disposal. New works have been rendered necessary owing to the failure of the septic tank system, which cost between 30,000*l.* and 40,000*l.* The money is to be spent on the adaptation of the existing works with improvements and extension, the erection of a refuse destructor, and the remodelling of a large area of sewerage for the purpose of separating the surface water and the sewage. The evidence showed that the peculiar nature of the trade sewage caused difficulty, there being large quantities of hair and wool from the glove factories.

EDINBURGH Dean of Guild Court last week granted to His Majesty's Office of Works a warrant for alterations on the Royal Institution, Mound. The proposed alterations include the removal of the roof, the clearing out of the whole of the interior structure of the building within the four walls, the reconstruction of the interior, the provision of accommodation for the Royal Scottish Academy offices, and public cloak-rooms on the ground floor, and the erection of public exhibition picture galleries and sculpture hall on the new first floor. The walls are to be of brick finished in plaster, and those of the first floor of steel and concrete, lined with wood for hanging the pictures. All the floors will be fire-resisting, constructed of steel and concrete and finished with wood blocks, tiles, or marble. The new roof will also be of steel and concrete, and finished on the outside with asphalt. The drainage system will be reconstructed.

THE Building By-laws Reform Association held their sixth annual meeting last week at the Whitehall Rooms, Sir William Chance in the chair. The annual report was adopted on the motion of the Chairman, seconded by Mr. Mark H. Judge. In an appendix to the report a conference with the Rural District Councils' Association was reported, the outcome of which was the drafting of a Bill for amending the Public Health Acts for the purpose of giving relief under oppressive administration by means of by-laws. The draft Bill was submitted and approved. The Dowager Lady Lovelace, Mr. Lacey W. Ridge, Mr. C. F. A. Voysey, and

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Mr. R. A. Read, hon. sec., were elected to represent the Association at the adjourned meeting of the conference on the taxation of land values.

THE President (Chief Officer Meier, Amsterdam Fire Brigade), Vice-Presidents (Chief Officer Westphalen, Hamburg, and Mr. Edwin O. Sachs, London), and the members of the Executive of the International Fire Service Council concluded their annual business meetings in London last Friday. They have decided to prepare and issue a small technical pocket dictionary of fire-service terms in English, French and German, and to also publish in these three languages the results of a large number of the tests undertaken in London by the British Fire Prevention Committee, whose testing-station they had an opportunity of visiting during their stay in London. The Council now represents some thirteen countries, having together over two and a half million firemen.

A CONVOCATION was held at Oxford on Tuesday, when it was resolved to enlarge the Bodleian Library by the construction of an underground chamber. The Curators of the Bodleian made investigations, and satisfied themselves that the scheme of an underground chamber in close proximity to the Radcliffe Camera was practicable and safe, and that it would meet the requirements of the library for many years. One of the members appealed for delay and for the consideration of an alternative plan of a book store some miles out of Oxford. On a division the decree was passed by 119 votes to twenty-eight. The cost of the extension will be borne by the Trustees of the Oxford University Endowment Fund.

THE Board of Visitors of the Oxford University Observatory mention in their annual report that "the observatory has recently become exposed to a very sensible vibration during the day, which is apparently due to a new engine set up by the Clarendon Press. When a nadir observation is attempted with the transit-circle while the engine is running the image of the wires oscillates through several seconds of arc, in a period corresponding with the number of revolutions of the engine. The oscillation ceases when the engine stops running." As such observations are taken at the University Observatory only for educational purposes, no serious harm is done, but the visitors remark that the fact "is chiefly interesting from the sidelight it throws on the disturbance of Greenwich Observatory (where such work is of primary importance) by the electric generating station, placed about the same distance from the Royal Observatory as is the Clarendon Press from us."

DR. BROUGHTON, the medical officer for Heckmondwike, in the course of his annual report, says:—Action of lead on water supplied has been under serious consideration by you and the Dewsbury Water Board, and it is to be hoped that some definite and sure plan will be adopted, so that the water, when delivered to the householder, shall be free from lead. During the year six samples of water were sent to the county analyst, and the following is a report of the analysis:—Old property, ½-inch bore lead pipe, ½ grain of lead was found; new property, ½-inch bore lead pipe, ⅛-grain per gallon was found; ½-inch bore block tin-lined iron pipe (health pipe) laid in 1895, no trace of lead; from the same sources as first and second samples after the tap had run at full for three minutes, $\frac{1}{20}$ grain of lead per gallon found. The first four samples were taken after the water had stood in the pipes not less than ten hours.

THE Port-Glasgow Town Council have taken an important preliminary step in connection with the Bay Area improvement scheme. Some time ago the late Mr. W. T. Lithgow gifted to the Town Council of Port-Glasgow the sum of 10,000*l.* for the purchase of condemned properties in that part of the town. At the same time he offered to purchase the vacant ground. In this area it is estimated that there is a population of over 1,800. According to the plans prepared, it is proposed that forty-five tenements of houses be erected. The principal streets will be 60 feet wide, while the other streets will have a width of 50 feet. Schedules for the building of the houses were issued recently. The contract for the digger, mason, brick and slater work, and also for the joiner work has been secured by Messrs. P. M'Bride & Co., builders and contractors, Port-Glasgow, and it is believed that the value of this part of the work will not fall far short of 60,000*l.* It is expected that a start will be made by the contractors with the demolition of the old buildings in the course of a few days. The work is to be carried on in three sections, and one year is to be devoted to the reconstruction of each section.

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THE ILLUMINATING ENGINEERING SOCIETY.

AT an inaugural dinner held on February 9, it was decided to form an Illuminating Engineering Society, having for its object the study of the science and art of illumination in this country. An executive committee was appointed to consider the drafting of the constitution of the Society, &c., and this committee reported at a meeting of the supporters of the Society, held at St. Bride's Foundation Institute, E.C., on May 25, Mr. Chas. Hastings being in the chair. The constitution and by-laws drafted by the committee were formally ratified and the executive committee, forming the nucleus of the first Council of the Society, were reappointed with the power of adding to their numbers as might be expedient, in order that they might proceed with the affairs of the Society during the summer vacation.

It was decided that this committee should approach a number of gentlemen, the names of whom were submitted to and approved by the meeting, with a view to their being invited to act as officers or on the Council of the Society. It was also agreed that the Council should be free to elect as members any who intimated their desire to become members of the Society, and were duly proposed and seconded in the prescribed manner, without the formality of ballot, up to the beginning of the first session of the Society.

Anyone interested in the objects of the Society, and desiring to become a member is invited to communicate with the hon. secretary, Mr. L. Gaster, Editor of *The Illuminating Engineer*, 32 Victoria Street, London, S.W.

THE award of the Board of Trade arbitrators in the Southport painters' dispute was received on Friday, and is against the men, who asked for an advance from 8½*d.* to 9*d.* per hour.

THE Welshpool Town Council have adopted a scheme submitted by Mr. S. R. Lowcock, engineer, London, for disposal of the town sewage and refuse at Henfaes estate. Last year the Council decided to purchase the Henfaes estate, conditionally, for the purposes of a sewage scheme at the price of 2,850*l.* Mr. Lowcock estimates the cost of the works at 3,878*l.*, making a total of 6,728*l.*

PROPOSED LAND TAXATION.

AN important memorandum has been issued by the Council of the Surveyors' Institution on the Budget proposals for the taxation of land. The following is a slightly condensed report:—

The Council of the Surveyors' Institution, being in touch with the views of the profession in all parts of Great Britain, and having themselves large experience in connection with the management and disposal of all descriptions of real estate, are perhaps peculiarly competent to form a sound opinion as to the probable effect of the Budget proposals for the taxation of land values.

They feel therefore that they need offer no explanation or excuse for their action in drawing up the following statement of their views.

They are, of course, aware that a necessity has arisen for raising money by increased taxation to meet national requirements, and that such increased taxation must inevitably involve a certain amount of hardship upon taxpayers. But their practical experience in the management and sale of houses and land leads them to fear that some misapprehension exists as to the consequences to be anticipated from the proposals for the further taxation of real property. Not only would serious loss be inflicted upon persons, including mortgagees, whose capital is invested in land or houses, but so great an obstacle to the cheap and rapid housing of the population would be interposed that the national loss would exceed any benefit which could accrue therefrom.

There have no doubt been cases of hardship to holders of building and other leases owing to the demands of grasping or unreasonable landlords, but the evidence taken by the Select Committee on Town Holdings in 1886, and by subsequent Parliamentary committees appointed to consider similar subjects, has established the fact beyond a doubt that the practice of building on the leasehold system has worked fairly to builders and the subsequent holders of the building leases, and has been of great assistance in the cheap housing of the population. It has enabled builders to provide houses without sinking their capital or running into debt for the purchase of sites, and has allowed ground landlords to effect important improvements without the assistance of public

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money by clearing away insanitary dwellings covering considerable areas and substituting decent dwelling-houses.

It was also proved that the terms on which building leases were usually granted threw upon the ground landlord the burden of all outgoings to be foreseen at the time of the granting of a lease, and made ample allowance for the reversion to him at the end of the term of the buildings erected under the lease. The whole of any appreciation in value occurring during the term of the lease was shown to be appropriated by the lessee and his successors, an increase usually largely in excess of the additions to the burdens on the property which the lessees have to bear. There is therefore nothing inherently unfair in the arrangement between lessors and lessees which would justify special taxation to the disadvantage of the former.

Moreover, the conditions of the market for urban land and houses have changed much in recent years, and the Council fear this change would aggravate the harm which the proposed special taxation of this class of property would do.

The use of telephones and improved means of road communication, such as motor traction and electric trams, have rendered it possible not only for persons of all classes to live outside the towns in which they work, but for the workshops and other premises in which trades are carried on to be in the country with the dwelling-houses of the workpeople employed around them; while merely the clerical work is carried on in offices in the town.

The result is that every year an increasing number of persons avail themselves of these facilities, and both live and work outside London and other large cities. The consequent relaxation of the pressure of population on urban space has already produced a marked effect on the value of property; for instance, the depreciation from this cause in Newington Causeway, Hoxton, parts of Notting Hill, and in many other districts and in most provincial towns, has been sufficient to cause serious loss to owners and mortgagees. To this the proposed additional taxation would without doubt add considerably, while it could not be justified on the ground of any necessity for forcing land or buildings into the market.

It is generally admitted that it is desirable that persons who are likely to be able to reside in the same neighbourhood for a considerable time should be encouraged to become owners of the houses they occupy, not only from the independence which ownership gives them and the advantage of their benefiting by any improvements they make, but because such ownership has a direct influence in giving men an interest in the good government and prosperity of the places in which they live and encouraging public spirit and thrift. To place special taxation on land and houses to the disadvantage of that form of investment compared with others would directly discourage purchasers of all classes, besides diminishing the number of houses provided for them to purchase.

The Council desire to limit their remarks to the three proposals upon which the practical experience of surveyors specially fits them to speak. They have therefore, in the short time at their disposal, without going into very great detail, prepared a statement showing to some extent what in their opinion would be the effect of the three duties on land proposed in the Budget, viz.:—

(1) The tax on increment value;
(2) The tax on reversions; and
(3) The tax on uncovered building land and ungotten minerals.

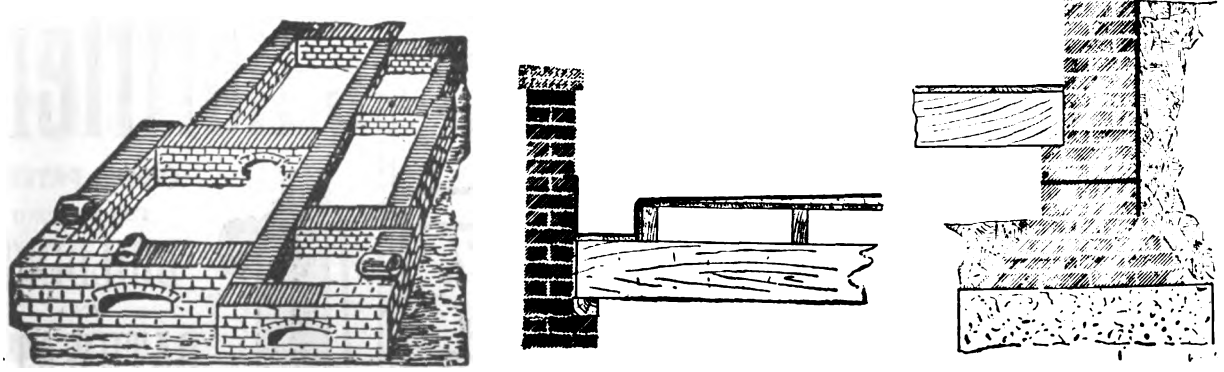
(1) While there is no doubt that there have been instances of extraordinary profit accruing to landowners through circumstances which have suddenly created a demand for their land for building purposes, such cases are exceptions.

In ordinary cases the growth of the value of building land is slow, and during the period between its having only agricultural or accommodation value and its attainment of its full value as sites for houses it will usually be found that land in the neighbourhood of towns has changed hands several times, and that the increment of value has been divided between several successive owners, all of whom except the last will have escaped the proposed taxation. In many cases this increment has been due mainly to the enterprise, judgment, and expenditure of the owners of the land, who have at their own expense made roads and sewers for the creation of building frontages, and in many cases have laid out gardens or executed other useful works for the purpose of attracting residents to their estates. The business of so dealing with land and providing building sites where required forms a large and important part of the transactions

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of many companies whose shares are a favoured investment of the middle and working classes.

In London alone a short time ago there were about fifty-three such companies, and there are some in most important provincial towns. One of these companies alone in thirty-seven years sold in building plots about 8,000 acres of land of the value of about 4,000,000*l.*

With a rapidly increasing population such as that of this country, it is manifest that it would be impossible to provide a supply of houses always ready to meet the increasing demand, and therefore always ahead of it, without a regular market for real property being maintained; and it is equally obvious that no persons would be induced to run the very serious risk involved, not only in building but in providing the sites on speculation, without reasonable hope of an adequate profit. If every profit made on dealings in houses and land were to be heavily taxed, business men would avoid such transactions and the market would be extinguished.

It is a matter of common knowledge that business of this class is subject to periodical ebb and flow, that for a time it prospers, and the selling of building plots and of speculative builders' houses produces considerable profits until the demand is over-supplied, and that a period of stagnation then inevitably follows during which building sites and unoccupied houses to the value of many hundreds of thousands of pounds lie idle, not only producing no interest, but involving their owners in the expense of maintenance.

To illustrate the effect of this ebb and flow of value it might well happen that an estate purchased for 100,000*l.* might be worth only 80,000*l.* at the date of valuation. A few years later, on changing hands through death or sale, its value might be found to have increased to 90,000*l.*, a loss of 10,000*l.* upon the original cost, but equally an increase of 10,000*l.* upon the later valuation, and upon this difference the State would take toll to the amount of 2,000*l.*, making the total loss 12,000*l.*

At the present moment, for instance, in Croydon alone there are about 3,000 empty houses, the population being about 160,000; and there are about 2,000 acres of uncovered land in the borough. A considerable portion of this is already laid out for building, and cannot be sold because there is no demand for houses to be built upon it; and the majority of the suburbs of London and provincial towns are in a similar condition.

It appears, therefore, that although an adequate supply of dwellings and their sites is at present maintained by persons willing to run considerable risk of loss, all business of the kind would be checked at once if any profit from their transactions were liable to taxation, while losses had to be borne without assistance.

Eastbourne has reached its present dimensions and popularity principally through the enterprise and expenditure of two great landowners, who have practically laid out nearly the whole of the town outside the original village at their own expense, spending many hundreds of thousands of pounds in making roads, sewers, gardens, &c., while the local authorities have provided for the requirements of the town out of the rates obtained from the persons who have been attracted to come and live on these two estates.

In such instances the increment of value to which the landowner is entitled cannot be limited merely to the interest on his actual expenditure, but must be allowed to include a proper reward for his risk and enterprise, for without such inducement development would not be begun.

It is a grave objection to the proposed duty that heavy taxation, which in most favourable circumstances would hinder considerably the free purchase and sale of land and houses, would necessarily be based not on facts but on mere opinion.

The circumstances of many urban properties are such that they are of much more value for other purposes than for those to which it is possible to apply them at the moment, and a correct valuation must depend on an accurate opinion as to the probabilities of the future, the circumstances of the surrounding district and other facts about which there is room for considerable difference of opinion. The same remark applies to each succeeding valuation. It might very easily happen therefore that a tax would be levied upon a supposed increment of value which subsequent dealings might prove to be entirely imaginary, and in that case justice would demand that the tax paid should be refunded. Besides it could hardly be proposed that the owners of land should be made liable to taxation based entirely upon ex parte valuations without a right of appeal; and the ex-

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pense to both owners and the Government of the valuations and of the appeals would together be enormous.

A point which appears to have been overlooked is the difficulty which will arise in comparing past and present values as occasion arises and in thus arriving at the corpus for taxation. In many cases land after it had first been valued would be divided and again subdivided, and the difficulty of comparison would increase on each occasion.

The council therefore are strongly of opinion that the term unearned increment is in many cases a misnomer, and that the proposal to tax all increase in the value of real property would prove not only impracticable but a national injury, because it would impose an effectual check upon the development of land in the future.

2. As regards the proposed tax on reversions. There are, of course, some large estates on which ground rents secured by building leases for eighty years and upwards are still in the hands of the estates of the freeholders who granted them, but in the large majority of cases ground rents, which have been created many years, have changed hands many times since the original granting of the leases, and on each occasion the value of the reversion, increasing as it approached more nearly to its enjoyment, was carefully assessed and its value paid for in the price.

For instance, the purchaser of a freehold ground rent of 16*l*. per annum, secured upon a thirty years' unexpired lease of premises worth a rack rent of 100*l*. per annum, would, if he bought on the usual tables, give 739*l*., of which 276*l*. would be for the ground rent and 463*l*. for the reversion; while if the lease had only ten years unexpired the price would be 1,357*l*., of which 129*l*. would be for the ground rent and 1,228*l*. for the reversion.

When, therefore, the reversion falls in the benefit accruing from it is in the nature of goods delivered, which have been paid for in advance with a discount off for cash, and is not in any sense a windfall or an unexpected benefit for which the recipient can afford to pay a special tax.

It would be impossible to get out a statement of the number and value of ground rents sold even in London and by auction alone, but it is worthy of note that during the years 1906, 1907, and 1908, which were not busy years, ground rents to the value of over 2,000,000*l*. sterling were sold at the Auction Mart in the City of London alone. This forms but a small proportion of the whole, as the creation of ground rents, especially on suburban building estates, has been very rapid for many years past, and many are disposed of privately and by auction elsewhere.

In those cases where freehold ground rents have remained in the possession of the estate of the same owner during the whole time of the building lease, it has been clearly proved by the evidence given before parliamentary committees, that the terms on which such leases were granted in practically all cases made fair allowance for the fact that at the end of the term the building to be erected would become the property of the lessor, who has therefore already allowed a consideration for the reversion, including all the outgoings borne by the lessee and the cost of the building.

It seems certain that the tax in question would have the effect of checking the present system of letting land on building leases with its attendant advantages, and that a large amount of floating capital, at present available for expenditure in bricks and mortar, would be locked up in the sites to the disadvantage of tenants, and especially of the poorer classes.

3. As regards the tax payable annually in respect of the capital value of uncovered building land and ungotten minerals.

The proposal to tax the capital value of undeveloped or uncovered building land would in the opinion of the council have an opposite effect to that anticipated by the Government. Instead of land being forced more freely into the market, the demand would be checked by the hesitation of those who up to now have undertaken the development of semi-urban areas, to risk loss through land lying idle with the weight of taxation added to that of the interest accruing upon the original value plus the cost of development.

But in any event it cannot be insisted upon too strongly that forcing building land into the market before there is any real demand for it is not only without benefit to the surrounding district, but is actually a source of injury by lowering the rateable value of houses, which are depreciated by the proximity of uncovered building plots. Nor will the fact of land being forced into the market secure building upon it until the demand justifies the expectation that persons can be found within a reasonable period to occupy the houses when built.

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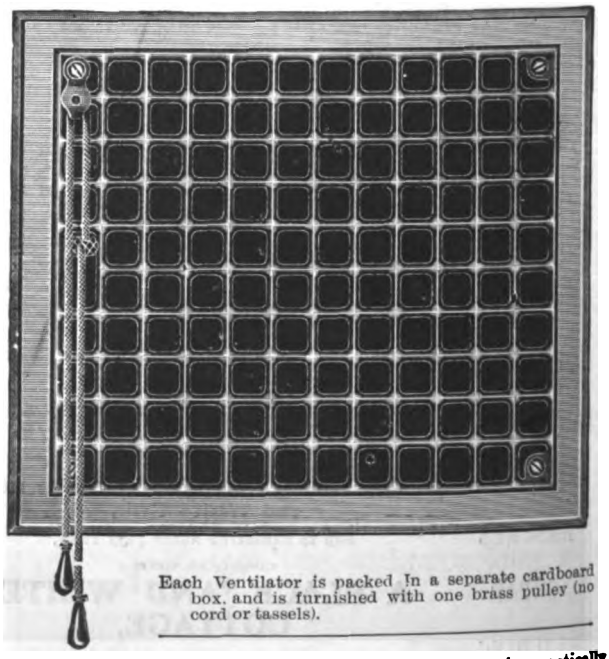
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The existence in suburban and semi-suburban districts of large houses with grounds of several acres in extent is a great benefit to the inhabitants. Much labour is employed by the occupants both directly and indirectly in the upkeep of the premises, and the proximity of such houses and their grounds adds to the enjoyment of the neighbouring houses and to their rateable value.

If the quantity of land occupied with these residences were limited by taxation to one acre or any comparatively small area, the houses would become valueless for their present purpose, and it would be necessary to pull them down and endeavour to utilise the grounds as sites for smaller houses. But it is desirable to discourage and not to encourage this process, in the first place because it renders neighbourhoods less pleasant and less healthy, and in the second because the prospect of profitable development is already so strong an inducement to owners to cut up such properties that they are almost always laid out for building prematurely, to the great depreciation of the rateable value of the surrounding district.

It is not too much to say that there is hardly a suburb of London which has not suffered injury in this way, and this of course involves serious loss of rates to the local authorities.

Under present conditions the difference between the income produced by land let for building and that let for other purposes affords an inducement to owners of all classes to put their land into the market for building as soon as possible, with the result that the supply in most places exceeds the demand. But proposals which would add to the loss in the event of failure and detract from the profits of success, would limit such transactions to those whose means enabled them to run greater risks and to stand out of a return for their money for a longer period, while such persons would look necessarily for a wider margin of profit than would otherwise be the case. In the opinion of the Council, therefore, the effect would be twofold:—(1) Land would not be laid out for building while it was possible to contend that it had only accommodation value, with the result that there would be no supply of sites and buildings in advance of the demand; and (2) those who purchase it with a view to development would insist upon a greater profit in order to compensate them for their greater risk of loss.

It is obviously advantageous to the public to secure an ample supply of dwellings at low rents and prices; but, if in addition to standing out of their return upon the cost of the roads and sewers made to create building frontages and of interest on the capital sunk in the land, the owners of uncovered building land had to pay a tax on its capital value, the laying out of building land would be restricted and delayed in order to avoid such loss, with the result that the supply of houses would be limited and rents and prices raised in consequence.

It is obvious that the imposition of a tax on the capital value of property, at a time when it could not produce any return at all in proportion to its value, must lay a heavy burden upon its possessor, and especially on those land companies formed to provide sites for houses for the working classes. At the present time these companies in the neighbourhood of London alone own uncovered sites believed to be nearly 1,000,000*l.* in value, while they already pay small or no dividends.

With regard to ungotten minerals, the cases in which minerals which could be worked at a profit remain ungotten are rare, as in almost all cases owners are only too anxious to turn to account any minerals of value to be found upon their estates. There are, however, many estates under which it is known that coal exists, which owing either to its depth or the poorness of its quality, it is at present impossible to work at a profit. The time no doubt must come when increase of price or improvement in the methods of mining will render it profitable to work this coal, but meanwhile the minerals must necessarily lie idle. It would therefore be an obvious injustice to compel an owner, who cannot get anyone to work the minerals under his estate, to pay an annual tax on an unavailable capital value.

In the case, therefore, of both uncovered building land and ungotten minerals, the Council foresee many objections to the proposed tax which may not have presented themselves to the Government, and which would, in the opinion of the Council, more than counterbalance the income to the nation to be anticipated therefrom.

A practical objection to this tax presents itself in the difficulty of saying when any particular piece of land will become liable to its payment. A large proportion of the land in this country has a prospective building value, and therefore exceeds 50*l.* per annum in value, but presumably



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it is not proposed to place the additional tax upon any particular plot until it is actually ripe for building. Otherwise a tax would be imposed which in many cases could not be met out of the income of the estate, but would have to be satisfied out of the corpus itself. Opinions must differ as to whether land has become ripe for building, with the result that expensive appeals will follow, and in any event the tax will be based upon mere opinion and not upon fact.

The effect upon mortgage securities through the depreciation in value caused by the proposed taxes and the fear of others on the same lines will be in many cases more than to destroy the margin of the value of the security, and will render it difficult, if not impossible, at any rate for a considerable time, for mortgages to be effected at all. Indeed, instances have already been brought to the notice of the Council where both mortgages and sales have fallen through on account of the proposed taxation, and this is not a matter which affects merely the well-to-do classes, as the 1907 returns show that the building societies, the members of which to the number of 60,000 are mostly people of comparatively small means, have more than 57,000,000*l.* invested in mortgages of land and houses. The consequent uncertainty of value will probably render mortgages improper securities for trustees and involve the calling in of many such investments.

Insurance companies will also be adversely affected. They have also large sums secured by mortgage upon properties in which much uncovered land is included, and the proposed tax would have the effect of imposing a charge in front of that security which was not contemplated at the time the advances were made.

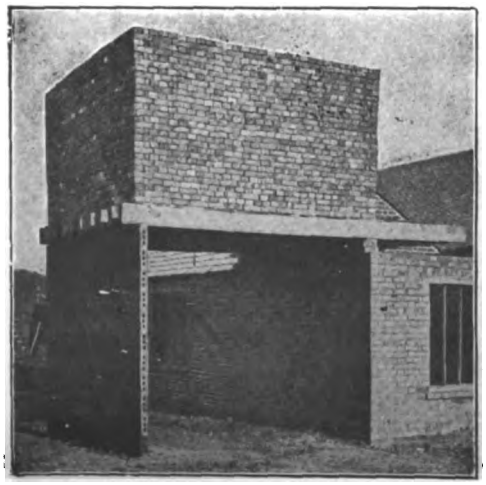
It is difficult to say what depreciatory effect on the value of real property would be caused were a purchaser in future liable to a tax of one-fifth on any profit he might make by a resale, having at the same time to face the risk of depreciation from many causes, among others the possibility of an extension of such similar taxation, but it is not too much to say that such a tax would practically destroy the general market for real property.

It is not unusual for ground rents in quite small parcels, say of 10*l.* a year, to be sold in separate lots. They are the favoured investment of thrifty people of small means, and the one attraction which overcomes the objection that the expense of the transaction is in most cases out of all proportion to the value of the purchase is the fact that not only is the income unfluctuating but continually growing in value as the lease runs out, thus serving as a provision for the future. If that advantage is impaired the value will fall to an extent which it is difficult to calculate, at any rate far out of proportion to the mere capitalised value of the proposed tax.

With regard to uncovered land, as almost any land under the present altered conditions of road communication might become capable of being used for building, it would in ordinary circumstances become almost unsaleable, because no purchaser would care to face the risk of having to pay an annual charge in the shape of taxation, besides standing out of the annual interest on the value while the land lay idle.

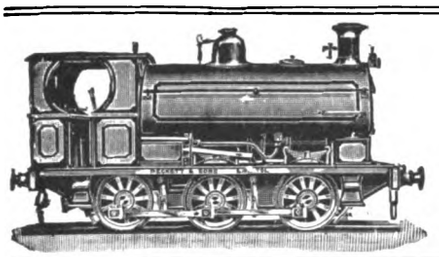
SIR GEORGE HAYTER CHUBB, writing to the *Times* from 128 Queen Victoria Street, E.C., on the effect of the Budget on the building trade, says:—"Mr. Lloyd George and many other people seem to be under the mistaken impression that the extra taxation proposed by the Budget will be felt only by those who are well-to-do. I have been told this week of a builder who had two or three estimates out awaiting decision; but when the Budget was introduced he was informed that none of the buildings would be proceeded with, so he gave notice to sixty of his men to leave to-day. At the present moment the Budget has hardly affected any rich men; but here is one case (out of, probably, very many more) where a number of working men and their families suffer at once. The proposed tax on increased values of property will have exactly the same general effect. I am a director of a company which has been negotiating with the ground landlord for a long building lease at an increased rent. One clause in the proposed agreement says that any land tax, old or new, is to be borne by the tenant; and, as we are advised that the extra cost to us, under the Budget proposals, may be 2,000*l.*, we are holding our hand and not going on with our scheme to distribute about 10,000*l.* among workmen in erecting a new building."

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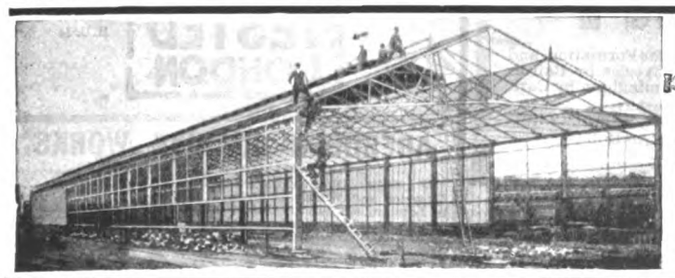


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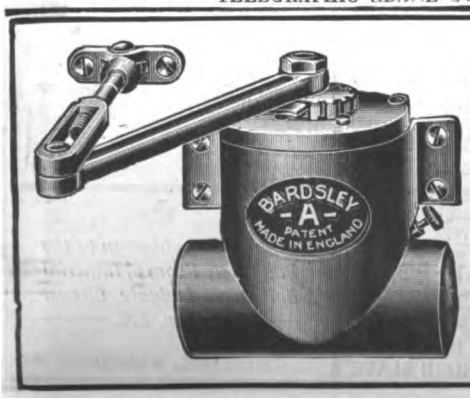
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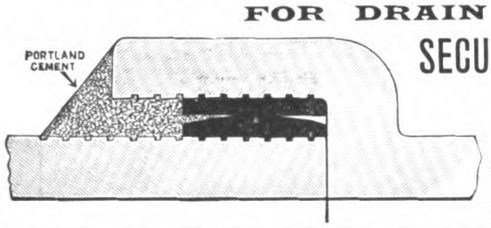
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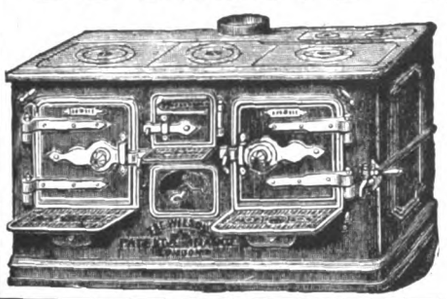
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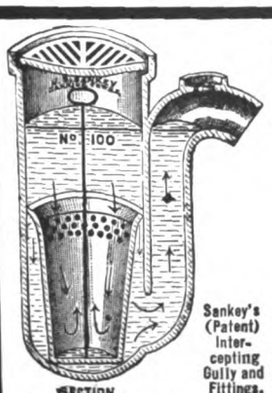
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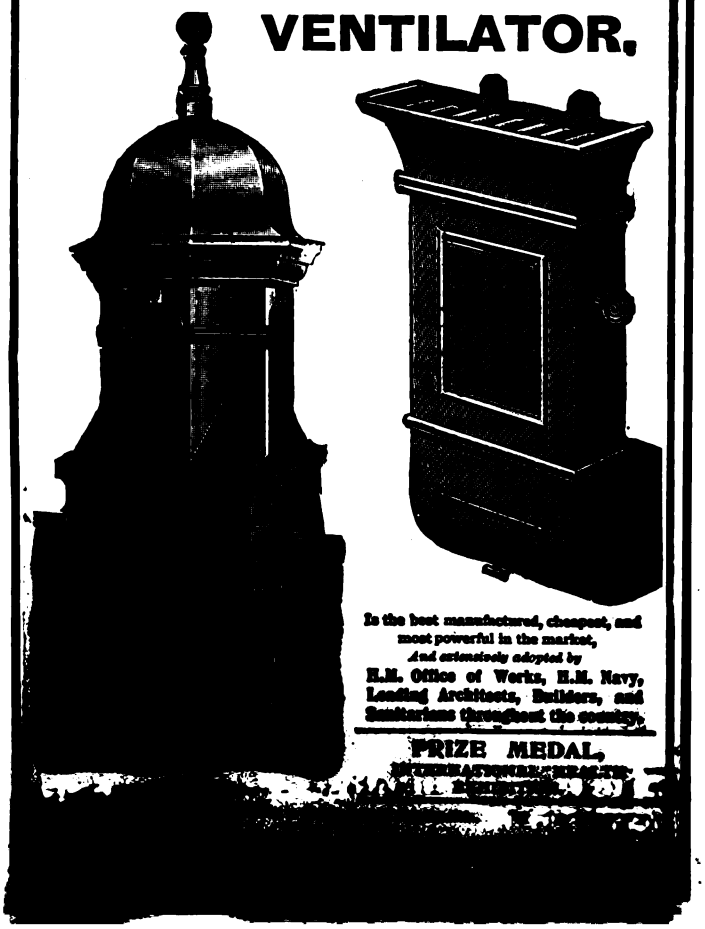
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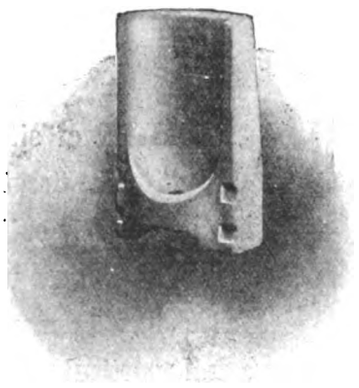
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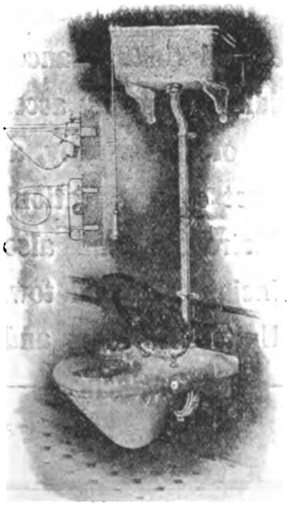
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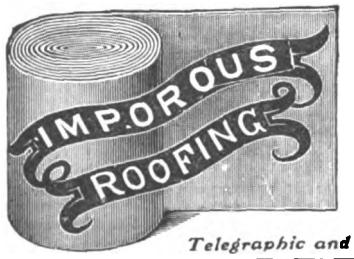
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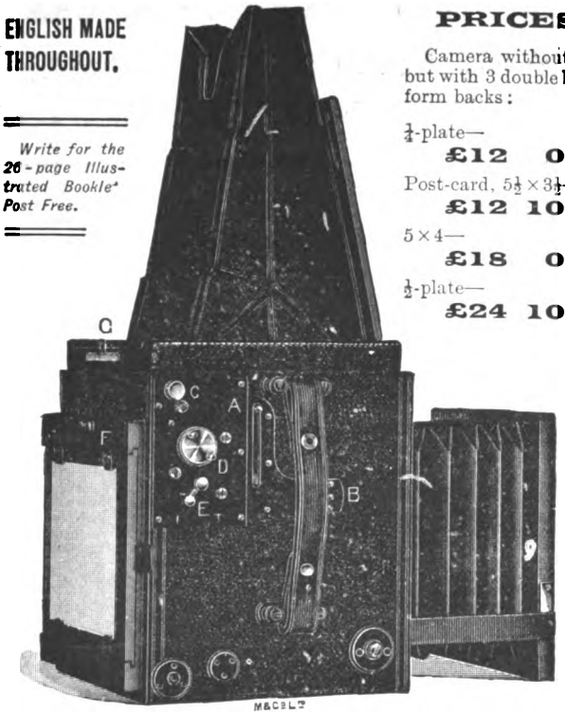
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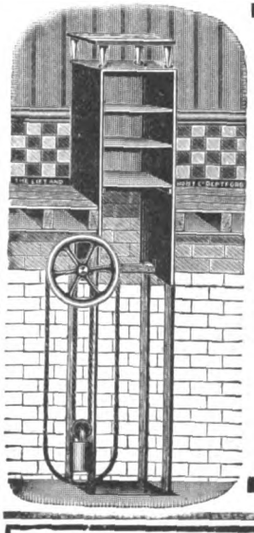
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BURSLEM.—July 17.—For new public buildings. The author of the design placed first by the assessor will carry out the work. The architects placed second and third will receive premiums of 100*l.* and 50*l.* respectively. Deposit 2*l.* 2*s.* Mr. F. Bettany, borough surveyor, Burslem.

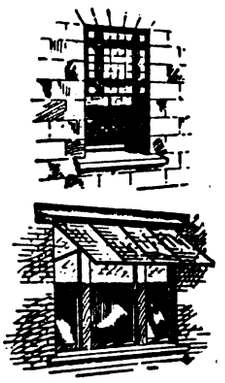
DEPTFORD.—Sept. 1.—The Metropolitan Borough Council of Deptford invite designs for a branch library at New Cross, S.E. Premiums of 50 guineas, 25 guineas and 10 guineas will be awarded. Assessor, Mr. J. S. Gibson, V.P.R.I.B.A. Deposit 1*l.* 1*s.* Competition is limited to architects practising in the city or county of London. Mr. Vivian Orchard, Town Clerk, Town Hall, New Cross Road, S.E.

GLASGOW.—July 31.—The patrons of the Royal Incorporation of Hutchesons' Hospital invite designs for laying out for feuing and building about 195 acres of their lands of Thornliebank, Eastwood. Premiums of 100*l.*, 75*l.*, 50*l.* and 25*l.* will be awarded. Deposit 3*l.* 3*s.* Messrs. Hill & Hoggan, 194 Ingram Street, Glasgow.

GRIMSBY.—July 30.—For the extension of the town hall, at an estimated cost of 26,000*l.* Premiums of 250*l.*, 150*l.* and 100*l.* will be awarded. An eminent architect will act as assessor in conjunction with the borough engineer. Deposit 2*l.* Apply to Mr. H. Gilbert Whyatt, A.M.I.C.E., borough engineer, Town Hall, Grimsby.

READING.—July 31.—The Berkshire County Council invite designs for offices, committee rooms, &c., on the Forbury, Reading. Mr. Mervyn Macartney, F.R.I.B.A.,

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assessor. Premiums of 100*l.*, 75*l.*, and 50*l.* Deposit 1*l.* 1*s.* Apply to Mr. J. Fred Hawkins, county surveyor, Bank Chambers, Cross Street, Reading.

STOKE-UPON-TRENT.—July 9.—For additions to the town hall, including hall to seat 3,000 people, and police court. Premiums of 100*l.* and 50*l.* for designs placed second and third. Mr. J. B. Ashwell, town clerk, Town Hall, Stoke-upon-Trent.

WALSOKEN.—June 30.—The Norfolk education committee invite plans, specifications and estimates for a new school. Apply to the Secretary, County Education Offices, Shire Hall, Norwich.

WHITBY.—July 30.—The North Riding of Yorkshire County Council education committee invite designs for a secondary school. Mr. Paul Waterhouse, assessor. Apply to the Secretary, Education Offices, County Hall, Northallerton.

WHITLEY BAY.—The local education authority invite designs from architects practising in Northumberland and in the city and county of Newcastle-on-Tyne for a public elementary school at Whitley Bay, Northumberland, to accommodate 600 scholars. Apply to Mr. C. Williams, secretary to the education committee, The Moothall, Newcastle-on-Tyne.

CONTRACTS OPEN.

ANNFIELD PLAIN.—June 12.—For erection of nine self-contained dwelling-houses at Annfield Plain, Durham. Send names to Mr. Wm. Burton, A.R.S.I., architect, Amble.

BACUP.—June 19.—For extensive alterations and additions to the St. Saviour's Council school. Deposit 2*l.* 2*s.* The Borough Engineer, Municipal Buildings, Bacup, Lancs.

BARNET.—June 30.—For erection and completion of a County Council school. Deposit 2*l.* 2*s.* Mr. Urban A. Smith, county surveyor, Hatfield.

BELFAST.—June 16.—For additions and alterations to the General Post Office, Belfast. Deposit 3*l.* The Office of Public Works, Dublin, or Mr. Samuel C. Hunter, quantity surveyor, 2 Wellington Place, Belfast.

BERWICK-ON-TWEED.—June 17.—For mason, joiner, slater and plumber works of farm offices on Corporation estate, Folly Farm. Mr. J. Stevenson, architect, 14 North Terrace, Berwick-on-Tweed.

BLACKBURN.—July 5.—For erection of higher elementary school and swimming-bath on Blakey Moor. Deposit 1*l.* 1*s.* Messrs. Briggs & Wolstenholme and Messrs. Stones & Stones, joint architects, Richmond Terrace, Blackburn.

BRISTOL.—June 16.—For the construction and maintenance for twelve months after completion of a passenger station at the Royal Edward Dock, Avonmouth, for the docks committee. Deposit 5*l.* Mr. W. W. Squire, engineer, Cumberland Road, Bristol.

CHURWELL.—June 17.—For the various works required in erection of warehouse, &c., Lane Side Mills, Churwell, Yorks. Mr. T. A. Buttery, F.I.A.S., architect, Queen Street, Morley, and 1 Basinghall Square, Leeds.

DISTINGTON.—June 22.—For the various works required in erection of two cottages at Distington, Cumberland. Messrs. W. G. Scott & Co., architects and surveyors, 2 Park Lane, Workington.

DURHAM.—June 15.—The County Council invite sole tenders for new Council schools at Langley Park, Beamish, and Cold Hesledon. (1) Langley Park school (600 scholars) and Beamish school (450 scholars), Mr. W. Rushworth, Shire Hall, Durham. (2) Cold Hesledon school (264 scholars). Mr. J. W. F. Phillipson, architect, Murton Chambers, 8 Grainger Street, Newcastle-on-Tyne.

ENFIELD.—June 18.—For the preparation of the site, and the construction of the foundations, and other contingent works for a pumping station in Hadley Road, Enfield, Middlesex, for the Metropolitan Water Board. The Chief Engineer, Savoy Court, Strand, W.C. Deposit 10*l.* with the accountant, Savoy Court, Strand, W.C.

FRIENDLY.—June 16.—For the various works required in erection of a branch store, house and appurtenances, at Friendly, near Luddenden Foot, Yorks. Messrs. Longbottom & Culpan, architects and surveyors, George Street, Halifax.

GLASGOW.—June 16.—For the following works in connection with alterations and additions to the Port Dundas Electricity Station, viz.:—(1) Brick and mason work, (2) painter

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work; (3) carpenter, joiner, glazier and ironmongery work; (4) slater work; (5) plumber work; (6) reinforced concrete work; and (7) iron and steel work, for the Corporation. Deposit 2*l*. Mr. W. W. Lackie, electrical engineer, 75 Waterloo Street, Glasgow.

GLASGOW.—June 28.—For the following works of F Block (special diseases) at the Glasgow Royal Infirmary, viz.:—(1) Digger, mason, brick and steel; (2) carpenter, joiner, glazier and ironmonger; (3) plumber; (4) plasterer; (5) tile and marble. Deposit 1*l*. 1*s*. Mr. James Miller, A.R.S.A., architect, 15 Blythswood Square.

GREAT CORBY.—June 14.—For two houses at Great Corby, Cumberland. Mr. H. H. Hodgkinson, architect, 64 Lowther Street, Carlisle.

HAMBLEDON.—June 17.—For erection of a shed, with loft over, in the grounds of the workhouse at Hambledon, Surrey. Mr. Edward L. Lunn, architect, 36 High Street, Guildford.

HAMPTON WICK.—June 15.—For erection of a cloakroom and additional staircase at the endowed schools. Mr. Percy Taylor, architect and surveyor to the governors, High Street, Hampton Wick.

HAXBY (YORK).—June 16.—For the erection of a grand stand, for the Agricultural and Horticultural Society. Mr. E. T. Felgate, architect and surveyor, 3 Castlegate, York.

HAXEY.—June 21.—For new church and out-offices. The Rev. P. H. Powell, Epworth.

HELSBY.—June 22.—For the entire work of erection of a school for 200 children at Helsby, Cheshire. Deposit 2*l*. Send names by June 5 to Mr. Joseph Holt, A.R.I.B.A., 9 Albert Square, Manchester.

HOLNE (DEVON).—June 15.—For erection of a farmhouse at Middle Stoke Farm. Mr. W. F. Tollit, architect, 10 High Street, Totnes.

IRELAND.—June 14.—For putting on a new roof, &c., at the residence of Mr. John Adamson, The Mall, Downpatrick. Mr. J. M. Whiteside, C.E., Market Street, Downpatrick.

IRELAND.—June 16.—For additions and alterations to the Richmond Asylum Buildings at Grangegorman. Deposit 5*l*. Mr. George T. Moore, engineer and architect, 1 and 2 Foster Place, Dublin.

IRELAND.—June 16.—For erection of a new isolation hospital and for sundry alterations in the existing male and female acute blocks at Portrane Asylum, Donabate, co. Dublin. Deposit 5*l*. Mr. George T. Moore, engineer and architect, 1 and 2 Foster Place, Dublin.

KIRKBURTON.—June 24.—The West Riding education committee invite whole or separate tenders for Kirkburton new (mixed) school (builder, joiner, slater, plasterer, plumber, painter). Deposit 1*l*. 1*s*. The West Riding Architect, County Hall, Wakefield.

LANGTON HERRING (DORSET).—June 18.—For erection of a Primitive Methodist chapel, with accommodation for sixty persons. Mr. George Albert Andrews, A.S.I., architect and surveyor, Broadway, Dorset.

LEYTON.—June 29.—For the following works, for the Urban District Council, viz.:—Cleansing, painting and repairs at four schools; improvement of gas lighting at two schools, during the summer vacation; and for hot-water heating apparatus at Sybourn Street school, in course of erection. Deposit 1*l*. Send names by June 19 to Mr. William Jacques, A.R.I.B.A., 2 Fen Court, Fenchurch Street, E.C.

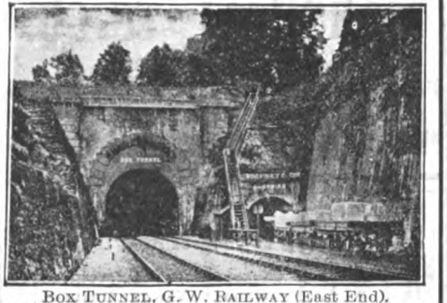
LISKEARD.—June 12.—For erection of a workshop and cycle shed for the Liskeard County Council. Mr. J. Sansom, architect, Liskeard, Cornwall.

LONDON.—June 18.—For the construction of a store building and other contingent works on land at the Battersea works of the Board, London, S.W., for the Metropolitan Water Board. The Chief Engineer, Savoy Court, Strand, W.C. Deposit 10*l*. with the Accountant, Savoy Court, Strand, W.C.

LONDON.—June 22.—For external repairing, painting and sundry work at Shaftesbury Road school, and for cleansing and whitewashing the latrines and urinals at nineteen schools, as described in form of tender, for the East Ham education committee during the summer vacation. Deposit 5*l*. The Education Office, Wakefield Street, East Ham.

LONDON.—June 25.—For erection of a bandstand, composed of wood and tiles, at Boundary Street Garden, Bethnal Green, for the London County Council. The Architect's Department, 19 Charing Cross Road, W.C.

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LONDON.—June 29.—For erection of a new ward block in Upper Road, Plaistow, E., for the trustees of the St. Mary's Hospital for Women and Children. Deposit 10*l*. Send names by June 19 to Mr. A. Saxon Snell, F.R.I.B.A., 22 Southampton Buildings, Chancery Lane, W.C.

LOWESTOFT.—June 29.—For erection and completion of an additional ward pavilion and for additions to the administrative block at the sanatorium, Rotterdam Road. Deposit 2*l*. Mr. G. H. Hamby, A.M.I.C.E., borough surveyor, Town Hall, Lowestoft.

LOW MOOR.—June 25.—For repairing and beautifying the Church school. Messrs. Jas. Brown & Walter Clayton, 13 and 94 St. Paul Street, Low Moor.

MACCLESFIELD.—June 16.—For additions and improvements to the Industrial School. Deposit 1*l*. Mr. Jabez Wright, architect, Macclesfield.

MANCHESTER.—June 15.—For the rebuilding of pitch-store, cart-sheds, &c., at the Moss Side Highways Yard. The City Architect, Town Hall.

MANCHESTER.—June 30.—For the construction of an underground lavatory for males at the Poultry Market, Shudehill. Deposit 1*l*. 1*s*. The City Surveyor, Town Hall, Manchester.

MIDDLESBROUGH.—June 15.—For alterations and additions at Middlesbrough station, for the North-Eastern Railway Company. Mr. William Bell, the company's architect, York.

MINERA.—June 16.—For erection of a bungalow at Minera, near Wrexham. Mr. G. F. Wynne, Plas Gwyn, Minera.

NELSON.—June 14.—For mason, joiner, plumber, plasterer and slater's work required in the erection and completion of the new Palace and Hippodrome, Nelson, Lancs. Messrs. Matthew Watson, Landless & Pearse, architects and surveyors, 2 and 4 Nicholas Street, Burnley, and 21 Dale Street, Liverpool.

ORMSIDE.—June 25.—For erection of a block, 97 feet in length, consisting of two wards, with kitchen and nurses' room, lavatories, bath, w.c., &c., at the Joint Infectious Hospital at Ormside, near Appleby. The building will be of matchboarding on brick foundations and covered with corrugated iron. The Borough Surveyor, Appleby.

PENSHAW.—June 21.—For building miners' hall at Penshaw Staithes, Durham. Mr. J. Palliser, architect, Philadelphia, Fence Houses.

PORTSMOUTH.—For erection of a nurses' home at the Royal Portsmouth, Portsea and Gosport Hospital. Deposit 2*l*. 2*s*. Mr. C. W. Bevis, F.R.I.B.A., Elm Grove Chambers, Southsea.

PORTSMOUTH.—June 14.—For erection of a teachers' room and a cloak-room at the George Street Council school (girls' department). Mr. A. H. Bone, surveyor, Cambridge Junction, Portsmouth.

PORTSMOUTH.—June 16.—For alterations and additions to the medical officer of health's department in the town hall. The Borough Engineer's Office, Town Hall.

REDGRAVE.—June 29.—For the enlargement of the school. Rector, Redgrave, Suffolk.

SCOTLAND.—June 12.—For erection of a block of working men's dwellings in St. Magnus Street, Lerwick. Deposit 1*l*. Mr. Arthur Sandison, factor for the trustees for Feuars and Heritors of Lerwick.

SCOTLAND.—June 14.—For the mason and carpenter works of new exit door and for the heating engineer works of a new heating installation at Banchory town hall. Messrs. Brown & Watt, architects, Aberdeen.

SCOTLAND.—June 16.—For mason, joiner, plumber, plasterer, slater and painter works in addition to and alterations on Gilmerton police station, for the Midlothian County Council. Mr. R. Murray, surveyor, 50 George Street, Edinburgh; or Mr. George Wilkie, architect, Peebles.

SHARLSTON, NEAR WAKEFIELD.—June 28.—For erection of a central Sunday-school near St. Luke's Church. Deposit 1*l*. St. Luke's Lodge, Sharlston, near Wakefield.

SHAW.—June 18.—For erection of playsheds and latrines, alterations and additions and re-draining at Greenfield Council school, Shaw, near Oldham. Deposit 2*l*. Mr. Henry Littler, county architect, Ribblesdale Place, Preston.

SOUTHAMPTON.—June 21.—For constructing a police-station, &c., at Payne's Road. Deposit 2*l*. The Borough Engineer's Office.

SOUTHPORT.—June 14.—For erection of nurses' bedrooms and other alterations at the infirmary. Mr. Goodwin S.

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SWANAGE (DORSET).—June 18.—For enlarging the Swanage Council school. The Secretary, County Education Office, Dorchester.

TAUNTON.—June 22.—For head post office at Taunton. H.M. Office of Works, &c., Storey's Gate, London, S.W.

TIPTON.—June 14.—For erection of buildings and machinery in connection with the proposed plant for the making of tarred macadam. Mr. W. H. Dukes, M.E., engineer and surveyor, Public Offices, Tipton.

WALES.—June 12.—For erection at Briton Ferry of fifty-one houses for the working classes, for the Urban District Council. Mr. H. Alex. Clarke, architect and surveyor, Council Offices, Briton Ferry.

WALES.—June 18.—For erection of eight houses at Queen's Road, Merthyr. Mr. C. M. Davies, architect, Merthyr.

WALES.—June 14.—For alterations to Wern Congregational Chapel, Aberavon, and erection of new schoolrooms, &c. Deposit 2*l.* 2*s.* Messrs. Evans & Jones, architects, Station Road, Port Talbot.

WALES.—June 15.—For erection of a bungalow at Bargoed. Mr. Idris Leyshon, architect and surveyor, Hanbury Road, Bargoed.

WALES.—June 15.—For alterations and additions to No. 90 Tonna Road, Caerau. Mr. W. H. Llewellyn, architect and surveyor, 40 Brynmawr Place, Maesteg.

WALES.—June 15.—For alterations and additions to Bethania Chapel, Dowlais, and erecting new school, &c., in connection therewith. Deposit 2*l.* 2*s.* Mr. E. A. Johnson, F.R.I.B.A., architect, Merthyr Tydfil.

WALES.—June 16.—For additions to St. Winifred's Hall, Penrhiwceiber. Mr. T. W. Millar, architect and surveyor, Mountain Ash.

WALES.—June 17.—For the erection of a wing and isolation block, to contain seventy-eight beds, a new operating theatre, a pathological block, nurses' and servants' bedrooms, and other buildings, at the Cardiff Infirmary. Deposit 5*l.* 5*s.* Send names to Mr. Leonard D. Rea, secretary and general superintendent, Cardiff.

WALES.—June 19.—For erection of a church at New Inn, for the Wesleyan Methodist trustees. Mr. D. C. Udell, architect, Commercial Street, Pontypool.

WALES.—June 21.—For erecting platform, seating accommodation, &c., for the pavilion, for the Cardigan Semi-National Eisteddfod. Mr. D. Williams, secretary, Yngs, Cardigan.

WALES.—June 22.—For erecting pair of semi-detached villas at The Walk, Merthyr Tydfil. Mr. T. Edmund Rees, architect and surveyor, Merthyr Tydfil.

WALES.—June 24.—For erection of a building for the Llanelly Y.M.C.A. Deposit 1*l.* 1*s.* Mr. W. Griffiths, F.S.I., architect, Llanelly.

WALTHAMSTOW.—June 29.—For proposed junior mixed school to be erected on the playgrounds of the Coppermill Road school. Deposit 5*l.* Send names by June 14 to Mr. H. Prosser, M.S.A., architect to the committee, High Street, Walthamstow.

WEALDSTONE.—June 15.—For erection of a foreman's cottage and an engine and tool house at the sewerage outfall works. Deposit 1*l.* Mr. Herbert Walker, engineer and surveyor, Council Offices, Wealdstone.

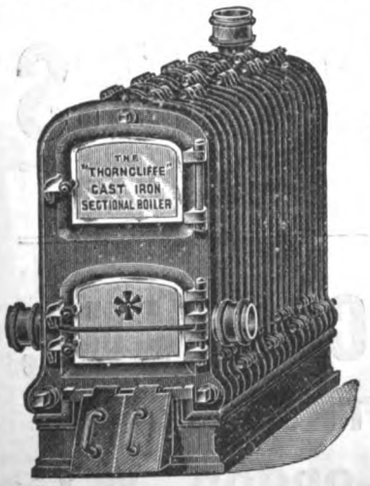
WESTON LULLINGFIELDS.—June 18.—For erection of two cottages and homesteads for small holdings at Weston Lullingfields, about two miles from Baschurch station. Deposit 1*l.* 1*s.* Mr. W. T. Hall, agent, College Hill, Shrewsbury.

WHITLEY AND MONKSEATON (NORTHUMBERLAND).—July 5.—For the work of extending Whitley and Monkseaton North Council school. Deposit 2*l.* 2*s.* Send names by June 14 to Mr. C. Williams, secretary, Education Committee, The Moothall, Newcastle-on-Tyne.

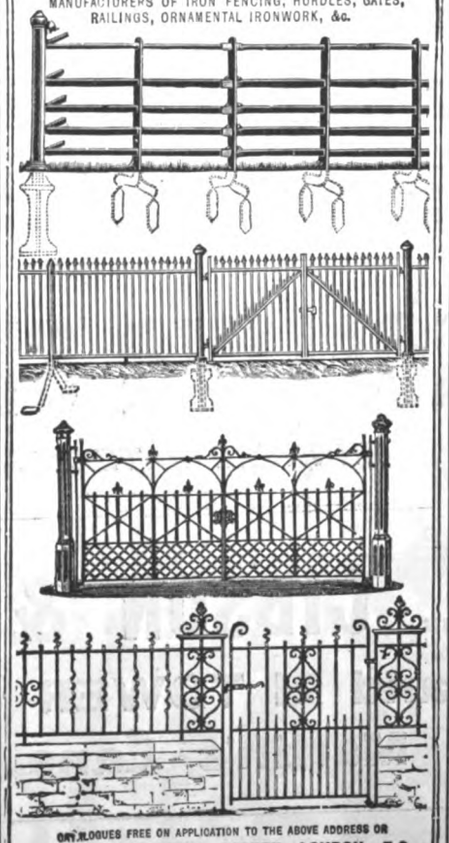
WIGTON.—June 14.—For alterations and additions to premises in George Street, Wigton. Mr. A. W. Johnston, architect, 81 Castle Street, Carlisle.

WINCHESTER.—June 23.—For erection of new secondary school for 160 girls. Deposit 5*l.* 5*s.* Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

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[Copy] 46 Newcastle St, London, E. June 8, 1909.
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WRENBURY.—June 26.—For interior alterations to Wrenbury Church, near Nantwich, comprising wood-block floor and reseating to nave and aisles, heating, ventilation, &c. Deposit 3*l.* 3*s.* Mr. C. Russell Hall, architect, Congleton.

YORK.—June 12.—For building conveniences at Mount Vale and Albemarle Road. Deposit 1*l.* 1*s.* Mr. F. W. Spurr, city engineer, Guildhall, York.

YORKS.—June 21.—The West Riding education committee invite whole or separate tenders for the following works:—Clayton Provided School—new heating boiler; Royston Provided School—alterations (builder, joiner, plumber, plasterer). Deposit 1*l.* each. The West Riding Architect, County Hall, Wakefield.

AT Glasgow Dean of Guild Court on the 27th ult., Mr. M. Pearce Campbell, Dean of Guild, presiding, authority was granted to the Glasgow and West of Scotland Technical College to erect the last portion of the new buildings whose frontage is to George Street. This part, which is estimated to cost about 40,000*l.*, is situated in John Street, and occupies the former site of St. Paul's parish church. The Western Infirmary were authorised to erect, at a cost of about 15,000*l.*, additional ward accommodation. A lining was granted to the Partick Thistle Football Club, Ltd., 995 Dumbarton Road, Whiteinch, to form a football field, erect a grand stand and corrugated sheet fence and pay-boxes in Firhill Road. The total cost will be about 2,100*l.*

AT a meeting of the Edinburgh, Leith and District Building Trades Association, held last week in the Building and Allied Trades Exchange, Edinburgh, the question of the prices for jobbing work, inserted by the surveyors in the schedules of the contracts for the erection of the offices of the United Free Church, were under consideration. It had been pointed out to the representatives of the United Free Church that in some cases the figures for material were actually lower than those quoted by the wholesale timber merchants in Leith. A request has been made that the agents of the United Free Church should receive a deputation from the Builders' Association on the subject.

TENDERS.

ADWICK-LE-STREET (YORKS).

For the execution of a scheme of sewage disposal for the Doncaster Rural District Council. Mr. W. R. CRABTREE, surveyor.

BUSHBY & SONS, Headingley, Leeds (*accepted*)	£3,307 0 9

BELPER.

For erection of two children's homes at Holbrook Road, for the Guardians. Messrs. HUNTER & WOODHOUSE, architects, Belper.

Dickinson	£1,325 0 0
Wheeldon Bros.	1,240 0 0
Evans Bros.	1,235 0 0
Harris & Hunt	1,175 5 8
HAYNES, Belper (*accepted*)	1,152 6 8
Morley & Son	1,148 3 0

BLETCHINGLEY.

For erecting a temporary hospital at the Workhouse, for the Godstone Guardians. Mr. G. H. WIDGER, architect, Godstone, Surrey.

Lee & Co.	£562 11 0
Dives	559 3 0
Pink	549 0 0
Honour	498 10 0
Cooper	476 0 0
Hawkins & Co.	437 10 1
Alternative tender in Brickwork.	
Pink	654 0 0
Dives	612 0 0
Hawkins & Co.	566 0 0
Honour	530 0 0
Cooper	523 0 0

CHELTENHAM.

For the construction of the sewage disposal works at Hayden.

WATSON, Southall (*accepted*)	£7,580 17 6

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BRIXWORTH (NORTH HANTS).

For building a heating apparatus chamber, &c., All Saints Church. Messrs. LAW & HARRIS, F.R.I.B.A., architects, Northampton.

Harris	£187 13 9
Green	139 0 0
MARTIN, Northampton (*accepted*)	138 0 0
Beardsmore & West	135 0 0
Higgins	129 12 2

CHELMSFORD.

For demolition of No. 83 High Street, and the construction of a public convenience on part of site. Mr. CUTHBERT BROWN, A.M.I.C.E., surveyor.

Allen & Gowers	£893 0 0
Johnson & Hawkes	809 6 1
Potter & Son	797 10 0
BAILEY, Writtle (*accepted*)	778 7 6

COLWALL (CHESHIRE).

For the erection of a church at Upper Colwall.

Porter	£2,677 0 0
Stokes	2,675 0 0
Bowers	2,500 0 0
Wilesmith	2,492 0 0
Wood & Son	2,384 0 0
Brazier	2,365 0 0
Collins & Godfrey	2,360 0 0
James	2,247 0 0
BROAD, Malvern (*accepted*)	2,201 0 0

EASTBOURNE.

For four houses and shops at Church Street. Mr. C. CRISFORD, architect, Eastbourne.

Martin & Sons	£2,100 0 0
Bodle	1,917 0 0
Dunlop	1,900 0 0
Miller & Selmes	1,868 0 0
Bainbridge & Son	1,780 0 0
J. Martin	1,690 0 0
Sawyer & Son	1,650 0 0
Rich	1,388 0 0
RELF, Eastbourne (*accepted*)	1,209 10 0

FENNY STRATFORD.

For the erection of a Wesleyan church. Messrs. EWAN, HARPER & Co., architects, Birmingham.

HAWTIN, Northampton (*accepted*)	£1,851 10 0

HOYLAND.

For reconstructing the sewage disposal works.

BUSHBY & SONS, Headingley, Leeds (*accepted*)	£1,825 3 10

IPSWICH.

For alterations and additions at St. John's Home. Mr. J. A. SCHEUERMANN, architect, Ipswich.

Grayston	£1,193 0 0
Roper	1,111 0 0
Sadler & Sons	1,110 0 0
Bennett	1,080 0 0
Death	1,075 0 0
Fisk & Co.	1,069 10 0
Turner	1,067 0 0
Spencer, Santo & Co.	1,060 0 0
Linzell	1,053 0 0
Cubitt & Gotts	1,052 0 0
Grimwood & Sons	1,047 0 0
G. A. Kenney	1,040 0 0
S. A. Kenney	1,035 0 0
Cundall	998 10 0
Green	993 0 0
Gayford	965 10 0
MARRIOTT, Ipswich (*accepted*)	938 10 0

LONDON.

For additions to the infectious diseases hospital, near Renters Lane, Hendon, N.W. Mr. S. SLATER GRIMLEY, engineer.

BOULTER & PAUL (*accepted*)	£419 6 0

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LONDON—*continued.*

For erecting depôt buildings, Norman Road, Greenwich, for the Borough Council.

	Buildings, &c., excluding Cart Shed.	Cart Shed.
Spencer, Santo & Co.	£1,943 0 0*	—
F. & G. Foster	1,850 0 0	£180 0 0
Hyde & Co.	1,737 0 0*	—
Kirk & Randall	1,734 0 0	104 0 0
Wood Bros.	1,700 0 0	95 0 0
Western	1,659 0 0	120 0 0
Mills & Sons	1,640 0 0	115 0 0
Newell & Lusty	1,600 0 0	98 0 0
Thomas & Edge	1,597 0 0	98 10 0
Groves	1,569 0 0	112 0 0
Gorham	1,554 11 0	108 0 0
DEACON & SON, Addlestone (*accepted*)	1,395 0 0	71 13 0
Pasterfield & English	1,298 0 0	98 0 0

* Including cart-shed.

For erection of additional offices for the Royal London Mutual Insurance Society, in Finsbury Square. Mr. JOHN BELCHER, R.A., architect.

Wall	£27,307 0 0
Holland & Hannen	25,954 0 0
Foster & Dicksee	25,605 0 0
Cubitt	25,525 0 0
Trollope & Colls	24,994 0 0
Lawrance & Sons	24,601 0 0
Higgs & Hill	24,594 0 0
Carmichael	24,569 0 0
Waring White Building Co.	24,569 0 0
Prestige & Co.	24,554 0 0
Kerridge & Shaw	24,473 0 0
Holloway	24,368 0 0
Downs	24,150 0 0
H. & H. F. Higgs	23,933 0 0
Williams	23,900 0 0
Simpson & Sons	23,881 0 0
Lawrence & Son	23,862 0 0
Holloway Bros.	23,500 0 0
Godson & Sons	23,442 0 0
Spencer, Santo & Co.	23,359 0 0

LONDON—*continued.*

For additional stabling, Liverpool Road, Islington, for the Borough Council. Mr. J. P. BARBER, borough surveyor.

Weibking & Co.	£1,414 15 0
Rawkins & Jackson	1,361 0 0
Sabey & Son	1,305 0 0
Eyre	1,266 10 0
Stevens & Sons	1,164 0 0
Mattock & Parsons	1,164 0 0
Reason	1,159 0 0
Newel & Lusty	1,148 0 0
Hollingsworth	1,124 0 0
Percy	1,098 5 0
F. & G. Foster	1,080 0 0
McLoughlin & Harvey	1,077 10 0
Nightingale	1,074 0 0
Coles	1,058 0 0
ROBERTS & Co., 138 St. Paul's Road (*accepted*)	1,019 0 0
Pasterfield & English	1,017 0 0
Hyde & Co.	1,000 0 0

SCOTLAND.

For the erection of baths at Forfar. Mr. H. BLANC, architect, Edinburgh.

Accepted tenders.

Adamson, Forfar, mason	£2,171 0 0
Milne & Sons, Forfar, engineer	890 0 0
Farquharson & Sons, Forfar, joiner	663 0 0
Milne & Sons, Forfar, plumber	401 9 10
Nicoll & Co., Dundee, steel and iron	364 0 0
Troup Bros., Forfar, plaster	232 8 7
A. & C. Shepherd, Forfar, slater	142 15 0

WALES.

For a north aisle vestry, &c., Holy Trinity Church, Abergavenny. Mr. E. A. JOHNSON, F.R.I.B.A., architect, Abergavenny.

Broad	£1,299 0 0
Moon	1,295 0 0
Smith	1,180 0 0
THOMAS & SONS, Abergavenny (*accepted*)	1,175 0 0



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WALES—*continued.*

For erection of a chapel school-room at Bargoed, for the English Wesleyan Church. Mr. W. HARRIS, architect and surveyor, Bargoed.

Williams	£1,544 0 0
Watkins	1,518 0 0
Evans	1,357 6 0
Morgan & Co.	1,330 0 0
BROWN, Bargoed (*accepted*)	1,290 0 0
Kirby & Westacott	1,250 0 0
Davis	1,237 15 0

For erection of thirty or more cottages at Gelligaer Village, for the Cascade Building Club. Mr. WM. HARRIS, architect, Bargoed.

Davies & Lloyd	£170 0 0
Jones	157 10 0
Davis	141 5 0
Williams	139 5 0
A. W. Davies	138 10 0
Brown	130 0 0
Barnett	125 0 0
Matthews	124 10 0
E. P. DAVIES, Dowlais (*accepted*)	124 0 0

For erection of Y.M.C.A. buildings, Merthyr. Messrs. I. JONES & P. THOMAS, architects, Cardiff.

Terra-cotta.

Brown	£7,548 0 0
Williams & Sons	7,314 0 0
Jones Bros.	7,040 0 0
Evans & Bros.	7,025 0 0
Knox & Wells	6,950 0 0
Davies & Son	6,906 0 0
Thomas	6,896 0 0
Jenkins	6,857 0 0
Moss	6,813 0 0
Stephens & Bastow	6,444 0 0
Symonds & Son	6,402 0 0
W. Williams	6,199 0 0
Colborne	5,871 0 0
D. W. DAVIES & HOWELL (*accepted*)	5,688 0 0

WALES—*continued.*

Bath stone.

Brown	8,332 0 0
Williams & Sons	7,314 0 0
Moss	6,988 0 0
Jones Bros.	6,940 0 0
Evans & Bros.	6,872 0 0
Knox & Wells	6,770 0 0
D. Davies & Son	6,756 0 0
Thomas	6,721 0 0
Jenkins	6,717 0 0
Stephens & Bastow	6,235 0 0
Symonds & Son	6,227 0 0
W. Williams	6,099 0 0
Colborne	5,780 0 0
D. W. Davies & Howell	5,580 0 0

Club Room.

Moss	144 0 0
Brown	118 0 0
Jones Bros.	105 0 0
D. Davies & Son	100 0 0
Evans & Bros.	95 0 0
Jenkins	92 0 0
Knox & Wells	90 0 0
Williams & Sons	90 0 0
Symonds & Son	88 0 0
Stephens & Bastow	87 0 0
Thomas	87 0 0
D. W. Davies & Howell	81 0 0
Colborne	77 0 0
W. Williams	75 0 0

For the erection of the church of St. Cynfelyn, Caerau, Glam. Mr. G. E. HALLIDAY, F.R.I.B.A., architect, Cardiff.

W. H. Evans	£4,468 17 7
D. W. Evans	4,395 3 0
Evans & Jones	4,290 13 8
Prothero	4,279 10 0
Rees	4,159 0 0
Symonds & Sons	4,050 0 0
Stephens, Bastow & Co.	3,994 0 0
Cox & Bardo	3,975 16 0
W. & J. Watson	3,876 0 0

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WALTON-UPON-THAMES.

For the construction of the following lengths of surface water sewers, viz.:—793 yards lineal 15-inch stoneware pipe sewer, 206 yards lineal 12-inch stoneware pipe sewer, 1,313 yards lineal 9-inch stoneware pipe sewer, 292 yards lineal 6-inch stoneware pipe sewer, together with manholes, lampholes and street gullies. Mr. R. WILDS, surveyor.

Gaze & Sons	£2,032	0	0
Coles	1,895	0	0
Ford	1,790	0	0
Pattinson & Sons	1,755	0	0
Smith & Co.	1,632	0	0
Pedrette	1,584	0	0
Moran & Son	1,525	0	0
Free & Sons	1,523	0	0
E. & E Iles	1,513	0	0
Bell & Sons	1,500	0	0
Hardy & Co.	1,489	0	0
Osenton	1,464	0	0
Wilby & Co.	1,443	0	0
Swaker	1,426	0	0
Kavanagh & Co.	1,425	0	0
Coxhead	1,420	0	0
Hamiltons	1,407	0	0
F. & G. Foster	1,382	0	0
Wilson, Border & Co.	1,363	0	0
Dean & Perkins	1,338	0	0
Jackson	1,310	0	0
May	1,272	0	0
Brebner & Co.	1,258	0	0
Pearce	1,239	0	0
POTTERTON & Co., East Molesey (*accepted*)	1,227	0	0
Watson, jun.	1,189	0	0
Macdonald	1,133	0	0
Surveyor's estimate	1,503	0	0

WANSTEAD (ESSEX).

For the laying of granite kerb and channel in High Street and Blake Hall Road, for the Wanstead Urban District Council.

PARSONS & PARSONS, Ilford (*accepted*)	£253	3	11

TRADE NOTES.

MESSRS. PATMAN & FOTHERINGHAM, LTD., builders and contractors, 100 & 102 Theobald's Road, W.C., have obtained the contract for the erection of a large block of chambers at Brick Court, Middle Temple, E.C., for the Honourable Society of the Middle Temple. The joint architects are Sir Aston Webb, R.A., and Mr. H. J. Wadling.

HOFLER, LTD., 26A Soho Square, W., have secured the order for the council chamber furniture of the University of South Wales and Monmouthshire, Cardiff, to the designs and under the supervision of Mr. W. D. Caröe, architect. Messrs. Hofler's factory is at Young's Corner, Hammersmith, W.

THIEVES and fires are the two sworn enemies of John Tann, and it seems as if victory lies with him if we may judge from the letters of thanks which flow into his office in 11 Newgate Street, E.C. To instance two received in April last. The Secretary to one charitable institution wrote:—"Although burglars tried to break open the 'Anchor Reliance' safe we purchased from you, they did not succeed in doing so, as it resisted their efforts completely." The other came from a firm of piano manufacturers whose works were destroyed by fire on March 27. The letter says:—"The premises were packed with goods which were entirely destroyed, but happily our securities and valuable books, &c., were contained in one of your 'Anchor Reliance' safes which fell from the second floor and remained in the burning débris for two days until it cooled down. The safe had undergone such a remarkable test we were surprised at the contents being in such splendid condition; everything being as perfect as when placed in the safe before the fire. . . ." These may be given as typical of the general experience of purchasers of the safe. Mr. John Tann is, in addition, a specialist in strong-room construction. The ingenuity necessary to conduct such a business is applied to small things as well as big, as is seen in his new key ring, which is a powerful spring locked by a steel loop. To put on or take off a key it is no longer necessary to run the risk of injuring one's finger-nails.



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ILLUSTRATIONS.

COMPETITION DESIGN FOR BANQUETING HALL AND BALL ROOM, FREEMASONS' HALL, LONDON.

OXFORD COLLEGE SERIES, HERTFORD.—ENTRANCE—INTERIOR OF HALL.

LODGE AND STABLES AT CHALFONT ST. GILES, BUCKS.

HOUSE AT CHALFONT ST. GILES, BUCKS, FOR ARCHIBALD GROVE, ESQ., M.P.

HOUSE AT CHALFONT ST. GILES, BUCKS, FOR J. EDWIN FORBES, ESQ.—NORTH ELEVATION—SOUTH ELEVATION.

PARISH OF BERMONDSEY.—THE INFIRMARY, LOWER ROAD, ROTHERHITHE—SITE PLAN.

THE Trussed Concrete Steel Company have issued a booklet which is confined to one single application of the Kahn system, viz. the Kahn Trussed Lintel—*i.e.* lintels of concrete reinforced with the Kahn trussed bar. It is put forward as a substitute for the usual rolled-steel joists or built-up girder, and one which will effect a saving of from 25 per cent. The list of standard types which can be promptly furnished commences with a span of 3 feet. In this two ½-inch bars are used; the minimum depth and width of the lintel is 7½ inches and 6 inches respectively, while the total safe load carried is 4,700 lb. The price for the complete reinforcement per lintel, including carriage to the nearest railway station, is 1*s.* 6*d.* For a span of 20 feet the two Kahn bars used are 1¾ inches; the width and depth of the lintel is 19 inches and 12 inches; the safe load is 30,600 lb., and the price is 2*l.* 1*s.* each. The span of the lintel may, however, be carried up to 40 feet if desired; in such large openings it is possible to build the reinforced concrete lintel within the wall, and, if necessary, extend it upward to 4 or 5 feet so as to make the wall into a beam. The pamphlet, which may be obtained on application, should be read by all architects who are about to carry out the construction of any large building.

VARIETIES.

THE Middlesex County Council are going to erect, at a cost of 65,475*l.*, an addition to Napsbury Asylum for 582 patients, although the asylum, accommodating nearly 1,500, was opened only four years ago.

MESSRS. HINE, ODGERS & MAY have prepared plans for alterations to the public school, Plymouth, at an estimated cost of 1,000*l.* The plans have been approved, and application is to be made to the L.G.B. for the necessary loan.

THE establishment of cottage baths in Coventry Street, Birmingham, has been so successful that the baths and parks committee of the City Council have decided to extend the system by providing similar baths in five other districts of the city.

MR. WILLIAM LIVERSIDGE, of Millgate House, Selby, has promised to defray the cost—about 200*l.*—of providing new furnishings for the altar in the new choir of Selby Abbey. He made himself responsible for the restoration of the east window when last the choir was renovated.

THE Stockport Town Council have authorised the waterworks committee to purchase 200 acres of land in the Sett Valley for the construction of a reservoir to increase the town's water supply, in addition to the one being constructed at Kinder.

A START was made last week with the preliminary work in connection with the erection of the large model lodging-house at Jamestown, which is to be built at a probable cost of 8,000*l.* The contract for the mason and brickwork, which is estimated at 2,500*l.*, has been secured by Messrs. M'Lauchlan, brickmakers and builders, Larbert.

THE Special Commission of the British Fire Prevention Committee left London for North Germany on Wednesday, to study various matters relating to fire, more particularly in respect to theatre safety, petrol storage, warehouses and shops. They will visit Berlin, Hamburg and other cities, and issue a report on their visit, as on previous occasions.

THE foundation-stones of the Congregational Church, Palmer's Green, N., were laid on June 5. The design is in late Gothic. Bath stone is being used for the dressings, pressed red bricks for the facings, and oak for the joinery. The contract is let to Messrs. Mattock Bros., of Winkfield

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Telegrams—Distend, London.

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Road, Wood Green, N. The architects are Messrs. George Baines & Son, of 5 Clement's Inn, Strand, W.C.

MESSRS. BRUNNER, MOND & Co., chemical manufacturers, have commenced the erection of workmen's baths for their men at Winnington, Northwich. The building will cost 4,000*l.*, and will be 135 feet long. There will be fifty shower and six slipper baths and 100 dressing and drying rooms. Arrangements will be made to allow the employees to take baths after their day's work and to change from their working into their home clothes.

MESSRS. HASLAM & SON, auctioneers, Reading, recently announced that terms had been practically arranged for the erection of a factory at the rear of the plots of building land on the Ayres' Farm Estate, fronting the Basingstoke Road. The extent of the ground required for the factory will cover five or six acres, and employment may be found for 300 hands. The promoters, whose names could not then be given, desire to erect something on the lines of Bournville.

THE St. Annes District Council decided on Monday against a skating rink which it was proposed to put up in the town. Plans for a temporary building had been submitted by an entertainment provider, and the highways and building committee recommended the Council to pass them. On the casting vote of the chairman, the plans were referred back. Several of the members considered the existence of a rink would vulgarise the resort.

A BRITISH Timber Conference is to be held in the offices of the London Chamber of Commerce, Oxford Court, Cannon Street, E.C., on Wednesday next, under the joint auspices of the Royal English Arboricultural Society and the Timber Trade Federation of the United Kingdom. Its object is "to discuss questions of interest bearing upon the improvement and development commercially of the growing and utilisation of native timber in the British Isles." The president is Mr. E. Stafford Howard, C.B. (Commissioner of His Majesty's Woods, Forests and Land Revenues).

PLANS for the extension of Lenzie Academy have been passed by the Kirkintilloch Dean of Guild Court. They provide for the pulling down of the older portion of the school, leaving only the north wing standing. It is proposed to provide a laboratory, cookery-room and two secondary classrooms, together with ample lavatory and store accommodation, and to alter the existing rooms so as to give an art room and two higher grade classrooms. A workshop for manual instruction is also to be erected. The architect is Mr. Baird, Glasgow, and the estimated cost is close on 6,250*l.*

THE Home Secretary has approved of the acceptance by the Essex County Council of the scheme and tender of Messrs. Dargue, Griffiths & Co., Ltd., for the engineering plant at the Essex Second County Asylum, Mile End, Colchester, including boilers, pumps, warming, ventilating, hydrants, &c. The work will be carried out in sections, the first of which, amounting to 20,000*l.*, is now going on. The system adopted is the "D.G. Economic Centralised."

THE free libraries committee of the Sheffield City Council have inspected the Old Sheffield Music Hall premises in Surrey Street, proposed to be acquired for library purposes. The committee think that, having regard to the age and condition of the building, it is not advisable to undertake any large scheme of alterations. The committee believe that for 500*l.* the premises can be made clean and safe, and adapted for library purposes temporarily. The proposed price of the music-hall is 6,750*l.*

THE Concrete Institute will hold a general meeting (Mr. F. E. Wentworth Shields, M.I.C.E., in the chair) at the Royal United Service Institution, Whitehall, S.W., on Thursday next, for the adjourned discussion of the paper by Mr. H. K. C. Bamber, F.C.S., on "The Setting of Portland Cement and Methods of Regulating the same." When the paper was read on May 27 the following took part in the discussion:—Mr. Bertram Blount, F.I.C., Mr. D. M. Butler, A.M.I.C.E., Mr. R. Harry Stranger, Dr. Siegmund Rosenfeld, Mr. W. Lawrence Gadd, and Mr. C. S. Meik. Owing to the number of speakers it was unanimously decided to adjourn the meeting.

THE Inverness Harbour Trustees last week considered a report by Mr. R. Gordon Nicol, harbour engineer, Aberdeen, on the competitive plans and site for a steam drifter harbour. Mr. Nicol estimated that the cost of the complete scheme for 460 drifters would be 130,604*l.*, and for 230 boats the amount would be 78,544*l.* He considered the scheme of Mr. James Fraser, C.E., Inverness, was the most suitable for the port of Inverness. It was thereupon agreed that the Trustees ask

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Broadstairs ...	16/0	12/0	8/0	*Paris	45/0	27/6	20/0
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Canterbury ...	14/0	10/6	8/0	St. Leonard's ...	14/0	10/6	8/0
Deal	18/6	12/6	9/0	Sandgate ...	17/6	12/6	9/0
Dover	17/6	12/6	9/0	Sandwich ...	18/6	12/6	9/0
Flushing... ...	30/5	18/10	—	Shornciiffe ...	17/6	12/6	9/0
Folkestone ...	17/6	12/6	9/0	Tun. Wells ...	8/6	5/6	4/6
Hastings ...	14/0	10/6	8/0	Walmer	18/6	12/6	9/0
Herne Bay ...	14/0	10/0	7/0	Westgate ...	16/0	12/0	8/0
Hythe	17/6	12/6	9/0	Whitstable Tn.	14/9	10/0	7/0

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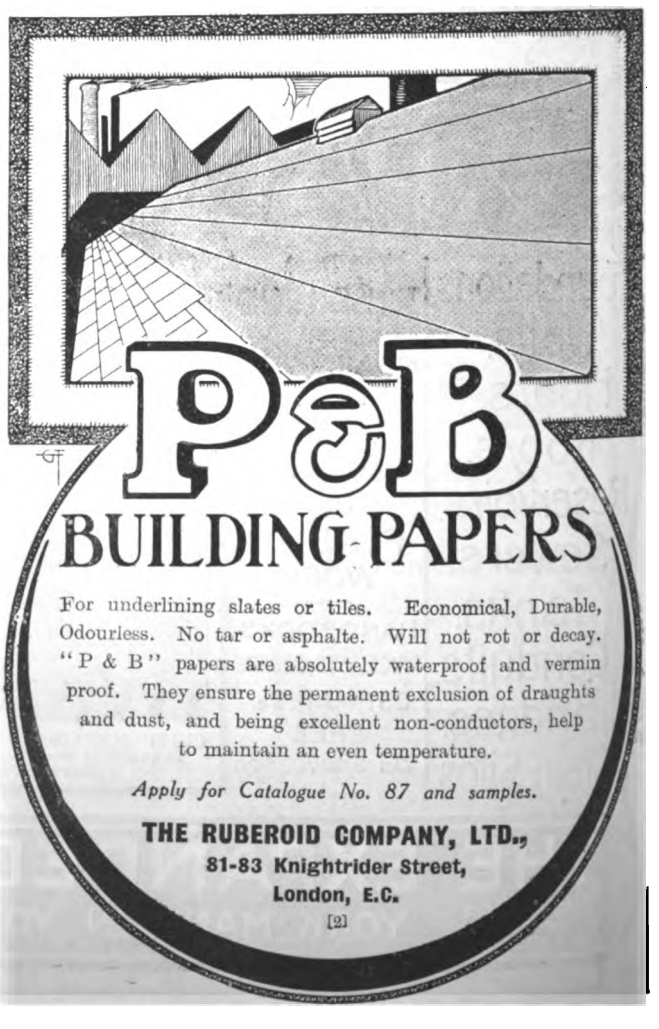
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Mr. Fraser to prepare a new scheme at a cost of 20,000*l.* for the site suggested by Mr. Nicol.

SINCE the settlement of the Rosyth contracts, Inverkeithing, as the nearest community to the future naval base, has attracted a good deal of attention from prospective builders. A number of new properties are in course of erection, while several existing subjects are being altered. At the last meeting of Inverkeithing Town Council a petition for warrant to form a new street on what is known as the Roodsfield was again submitted from Messrs. Johnston, solicitors, Kirkcaldy, on behalf of the Rosyth Buildings and Estates Company, Ltd. It having been reported that the company had accepted all the Council's conditions, warrant was granted. The architect is Mr. Williamson, Kirkcaldy. Building operations are to begin without delay.

THE Association of Building Societies at their annual conference adopted the annual report, which contained the following:—"Where land is deliberately kept out of the market to the manifest injury of the community, power should, it is thought by many, be given to the local authority to acquire such property at a fair price, quite apart from any system of taxation of land values. Further, no tax is satisfactory which is not general in its incidence. This Association knows nothing of party, but is very certain that any well-meant but ill-considered legislation which discourages thrift will prove a disaster to the country the full consequences of which it is impossible to foresee."

DR. T. F. DEWAR, the medical officer of health for Fife, in his annual report refers to the housing of the working classes. Owing to the adoption of building by-laws, he states, in all the districts of Fifeshire, and to the care scrupulously taken that all new or radically altered houses conform thereto, an improvement in the conditions of housing is gradually taking place all over the county. One regrets to notice, however, that in the houses intended for the occupation of the humbler classes bed recesses are still very frequently provided, in clear antagonism to the view now everywhere accepted in theory, that light and air in liberal allowance are primary essentials for health. Examination of plans also shows that there is still a prevalent opinion that domestic servants require less cubic space and even less light and ventilation than those whose comfort their service secures. When in years to come, observes Dr. Dewar, houses with such features come under the scrutiny of our successors in administration it will assuredly be matter for surprise that these anomalies should have been countenanced.

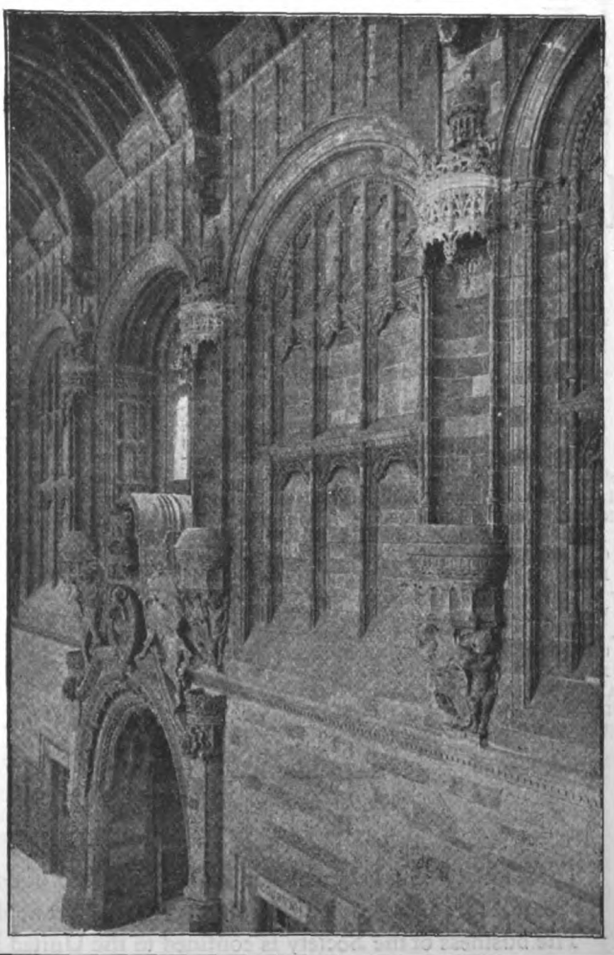
AT the annual conference of the Institute of Cleansing Superintendents in Glasgow on Tuesday an interesting paper was read by Bailie James Henderson, convener of the committee on cleansing, on "The Evolution of Cleansing in Glasgow." He first referred at some length to the condition of matters which existed in the first half of the nineteenth century. As to the present utilisation and the revenue now obtained, apart from the revenue derived from the sale of manure, a new source of income had of recent years been tapped by the saving of clinker from the cremating process and of cast-out articles found in the refuse. As regards clinker, that material, which prior to 1897 was considered valueless, was trucked to the country at a cost of 1*s.* per ton. In that year an endeavour was made to introduce it to builders for concrete work, and a start was soon effected. The revenue that year was 242*l.*, and it had gone on increasing until last year the sum received from that source was 1,711*l.* 18*s.* 5*d.* for 13,307 tons sold. After referring to the revenue from old tins, from which, he said, the princely sum of 1,982*l.* was derived in 1908, he alluded to sales of waste paper. The system of lifting paper from business premises by means of bags when inaugurated in 1900 brought in 116*l.*; last year the revenue was 618*l.* Twelve years ago, when the utilisation of waste products was seriously tackled, the sum derived from their sale was 679*l.* In 1908 the income reached 4,757*l.*, while the aggregate for the twelve years was 33,028*l.* It would thus be seen that money could be coined from rubbish if it was properly handled. As to snowstorms, the removal of snow from the streets was the most trying ordeal which a superintendent had to undergo. Nowadays a snowfall required to be speedily dealt with in large cities. Any slackness on the part of the Cleansing Department would mean disorganisation of the street traffic, and consequently much inconvenience to the citizens. With the rivers Clyde and Kelvin as tipping places, together with various tips around the outskirts, the cartage was reduced to a minimum.

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RAILWAY SERVANTS' ORPHANAGE.

IT is an unusual occurrence to be able to point to an orphanage as an object-lesson in the happy employment of colour for interior walls. But this may be safely done in the case of the London and South-Western Railway Servants' Orphanage at Woking, which is to be opened in July by His Majesty the King. The architect, Mr. W. E. Trevena, of South Farnborough, has very successfully adopted "Duresco" in its various colours for several of the larger apartments, commencing with the hall, which is in ivy-green and carmine. The dormitories are reposeful and soft, with the filling in cream Duresco, and the dado (which is specially pleasing) in the ivy-green. The large expanse of walls in the dining hall offered a fine field, and it demonstrates the beautiful velvety effect peculiar to Duresco. The work has been ably carried out by Mr. E. C. Hughes, of Wokingham, whose tender, amounting to about 20,000*l.*, was accepted for the entire building.

MESSRS. D. BALFOUR & SON, of Newcastle-upon-Tyne, have been appointed by the Doncaster Rural Council engineers to report and advise upon the best means for the sewerage and disposal of the sewage of the portion of Adwick-le-Street on the north side of the railway, and the parishes of Owston and Skellow.

THE late Mr. J. A. D. Shipley, solicitor, a former under-sheriff for Newcastle and Northumberland, left estate of the gross value of 188,000*l.* Testator bequeaths his pictures, numbering about 2,500, to Newcastle, provided that at the time of his death (which occurred on February 4), or within three years afterwards, there should be a gallery (other than the existing Corporation Art Gallery) in the city, free to the public, of sufficient extent to accommodate them, that the collection shall go to such gallery, and, should there be an art gallery capable of being extended so as to hold his pictures, he directs his trustees to raise 30,000*l.* towards the enlargement. Failing such provision in Newcastle, the pictures are to be successively offered, on like conditions, to Gateshead, the National Gallery, the Tate Galleries, the National Portrait Gallery, and the Kensington Museum.

DESTRUCTIVE FIRE AT HAMMERSMITH.

MOST of the evening papers of the 3rd inst. and the morning papers of Friday gave descriptive accounts of the great fire at Brunswick Works, Hammersmith, belonging to



Messrs. W. N. Froy & Co., builders' merchants. The extensive premises have a frontage (of which we give a photograph) on King Street—the main artery from Piccadilly,

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along Kensington, Hammersmith, Chiswick, Kew and Brentford to the West of England. The outbreak was discovered about 5 A.M. on Thursday morning by a passer-by, who noticed smoke issuing through the front entrance for the vans. He immediately rang the fire alarm and aroused the caretaker. The call was quickly responded to by a very large force of firemen, which got to work under the personal direction of Captain Hamilton and Mr. S. Gamble, who arrived from headquarters. Their work was carried out under considerable danger from the falling débris and the enormous heat. It was impossible to quench the flames which raged over the centre and main front of Messrs. W. N. Froy & Sons, Ltd., premises, a space of 250 feet by 80 feet, which contained a great deal of inflammable material such as oils, paints, colours, brushes, &c. Then the great paper show room caught fire, and about 400,000 or 500,000 rolls of wall paper became sheets of flame; so intense was the heat, heavy iron girders were twisted about like pieces of wire. It became necessary to stop all traffic along King Street, and to barricade the road and pathways.

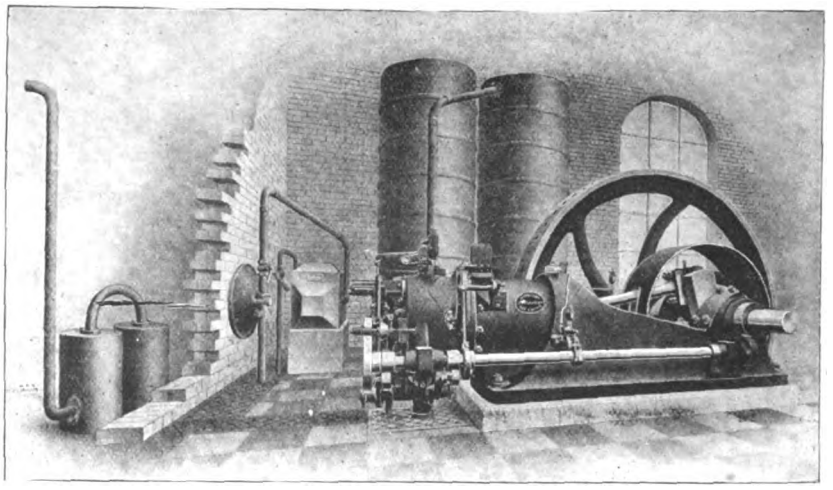
Fortunately, owing to the direction of the wind and the efforts of the fire brigade, the second and third warehouses, which extend over a site as large again as the first, were untouched. After several hours' work the fire was got under, but not before all entrances and exits were blocked with heaps of fallen timber. Mr. H. P. Froy, the managing director, however, soon devised another entrance at the back through the large stables which gave access into King Street. The same energy and ingenuity overcame other obstacles, and undismayed by the severity of the outbreak the staff carried on their business practically as though nothing had happened, and the orders coming in by letter, telephone and telegram were executed with as little delay as possible. It was fortunate that the new show rooms, which have been greatly admired, remain intact. Messrs. W. N. Froy & Sons, Ltd., hope to immediately commence rebuilding the front and centre building. Indeed, with praiseworthy alertness the firm have already in view the erection of premises even more extensive than those which have become in course of years well known throughout the country.

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THE HORNSBY-STOCKPORT GAS ENGINE AND SUCTION PLANT.

THE Stockport gas engine came on the market some thirty years ago as one of the pioneers in its class. The original company was afterwards amalgamated with Messrs. Richard Hornsby & Sons, Ltd. The engine was considerably altered and improved until it reached the high degree of excellence now common to all the Hornsby-Stockport gas engines. Our first illustration gives the general arrangement of the engine-room showing tanks, exhaust, &c., for plant working with town gas. Among the principal features of the gas engine we might mention:—

The cylinder is well supported, the cylinder jacket being cast with the frame; balanced cranks and a loose liner are on all engines; a splash guard is always provided over the cranks; a patent magneto-electric ignition, with adjustable timing is on the engines of 25 b.h.p. and above; all valves are open to inspection and easy of access; ring oiling is provided for main bearings, side-shaft bearings (except few small sizes), and for all outer bearings; there is continuous lubrication to crank-pin on all engines while the engine is working, and forced lubrication to piston (50 b.h.p. size and over); a patent sensitive governor secures gas consumption in exact proportion to work done; lastly, the engines are specially designed to work with suction gas and with low fuel consumption.



HORNSBY-STOCKPORT GAS ENGINE. General arrangement of Engine Room, showing Tanks, Exhaust, &c., for Engine working with Town Gas.

Our second illustration gives a sectional view of the Hornsby-Stockport suction gas plant. The four main parts are:—A, the generator, lined with firebrick, in which the gas is made; B, the vaporiser for producing the steam from which the gas is made; C, the scrubber for cooling and heat-

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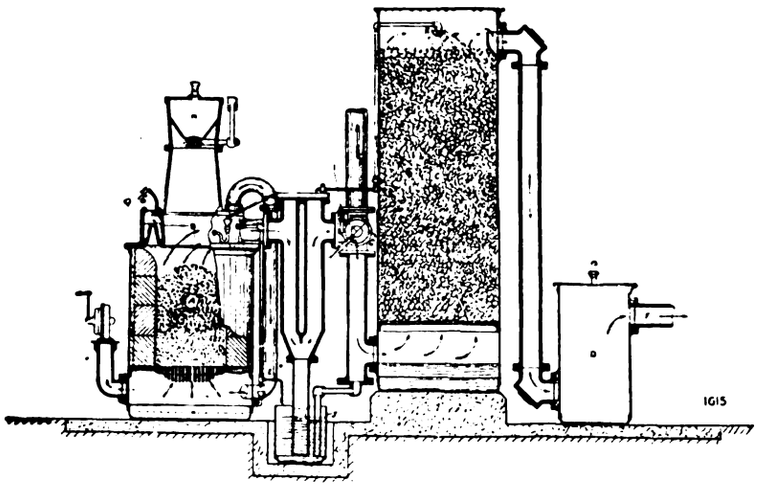
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ing the gas; and D, the reservoir box from which the engine draws its supply.

No gas is generated at pressure, so there can be no leakage or smell, and there is no gas-holder, as the gas is only made as the engine draws it. Very little attendance is required; the fuel is replenished about every four hours.



The apparatus stands in very little space, either inside or outside the engine house.

It is not necessary to fix the plant close to the engine, and two or more engines can be worked from the same plant if suitably arranged.

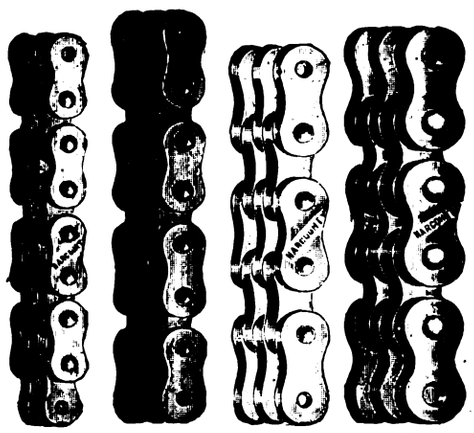
A BURMA CONCRETE BRIDGE.

AT the last meeting of the Society of Engineers a paper was read on "The Sinlumkaba (Burma) Ferro-concrete Bridge," by W. E. Haldwell, B.A., M.S.E. The author described the methods adopted in constructing a reinforced concrete arch bridge over a bridle road in a mountainous tract of country in Upper Burma. Apart from the particulars of construction contained in the paper, the descriptions gained an added interest from the fact that this, the Sinlumkaba Mill Bridge, is the first reinforced concrete bridge to be erected in Burma.

The bridge was constructed by the Burma Public Works Department, and is in one span of 40 feet, with a rise of 12 feet in the arch, the entire width of the bridge being 9 feet, and the width of the roadway inside parapets 6 feet. The level of the crown of the arch is 8 feet above the highest known flood level. The entire arching was made of cement concrete, with two layers of reinforcing bars, the bottom layer being placed 1½ inches above the intrados, and the top layer 1½ inches below the extrados of the arch. The longitudinal reinforcing bars were placed 9 inches apart, with cross bars at right angles to them, at intervals of 2 feet, both longitudinal and cross bars (which were all ½ inch thick) being wired together at their intersections with

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⅛-inch wire. The thickness of the arch at the crown was 10 inches, and at the haunches 3 feet 9 inches. Thus the distance between the two layers of reinforcement was 7 inches at the crown and 3 feet 6 inches at the haunches. The backing of the bridge was formed by parallel spandrel walls, made of coursed rubble masonry in lime mortar, 4 feet wide at the bottom and 2 feet in width at the crown level of the arch. At this level a masonry wall 1 feet 6 inches in thickness was built along either side of the arch for a height of 1 foot, thus acting as a retaining wall for the filling in over the crown, and on this wall the masonry parapet pillars of the bridge were built and connected by ⅞-inch square iron bars, which formed the railing.

NEW SOUTH WALES SCAFFOLDING AND LIFTS ACT.

THE following is the report of the Chief Inspector of Lifts and Scaffolding covering the work of the year, and indicating that considerable progress has been made in the interests of public safety:—

The number of notices received, stating intention to erect scaffolding, was 1,157. This does not indicate the actual number of scaffoldings erected, or that have come under the supervision of the inspectors, as a considerable number do not come within the statutory definition of "scaffolding," which definition comprises only such structures that are built up or fixed to a height of 8 feet from the horizontal base. But under the definition "gear" all scaffolding where located is subjected to the closest scrutiny on the part of the inspectors. On the average the two officers appointed to these duties effect fifteen to twenty inspections per day each.

An effective check upon building operations is still maintained by the regular receipt of the building notices forwarded by the Metropolitan Board of Water Supply and Sewerage and the Municipal Council of Sydney.

In the City, building operations have been particularly extensive, and a great amount of difficult work has been carried out in increasing the height of existing buildings. This latter work invariably requires gear and scaffolding of a complex character, and it is noted with satisfaction that upon this class of work no casualties to the public or employees have occurred. In connection with building operations generally, there have been recorded eighteen casualties and four fatalities, not one of which could be traceable to defective scaffolding or gear. Three of the fatalities occurred through falls from roofs, and in the remaining case the unfortunate deceased inadvertently stepped backwards down a hoisting well. The number of cranes and hoisting engines erected and used in the Metropolitan district is:—Hand cranes 100, steam cranes 22, electric cranes 4, steam hoists 36, electric hoists 8. In the Metropolitan district ninety-four new lifts were erected. Specifically they are as follows:—Electric lifts 52, hydraulic lifts 33, belt-driven lifts 9. The number of lifts in commission to date are:—Electric lifts 224, hydraulic lifts 679, belt-driven lifts 50. There occurred two fatalities and several casualties in connection with lifts, due to the careless and indiscriminate method adopted in operating these machines. No fatalities or casualties are reported in connection with the operations of the Act in the Newcastle district, and the Inspector there reports that, generally, the provisions of the Act are conformed to. The number of lifts in the district totals twenty-one, and notifications have been received covering the erection of five electric lifts. During the year new regulations were proclaimed under the "Scaffolding and Lifts Act, 1902," providing for the use of iron or steel scaffolding for bricklayers or plasterers, iron or steel fastenings for scaffolding, and approved brackets of the same materials for plasterers, tuck-pointers, &c.

An amending Bill has been drafted, the main features of which are to provide for none but certificated attendants being in charge of passenger-lifts; supervision of goods-lift attendants; the certification of persons in charge of power cranes and hoists used for any purpose, and for the direct observance of the regulations.

AT the next meeting of the United Synagogue in London a special committee will present its report on the demolition of the New Synagogue in Great St. Helen's, the site of which is said to be worth 100,000*l*. It is proposed to amalgamate the New Synagogue with the Hambro' in Union Street, Whitechapel. At a cost of 25,000*l*. the Hambro' will be rebuilt to accommodate 1,000 worshippers.

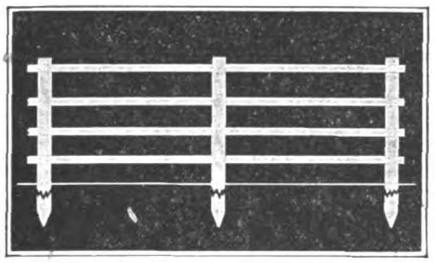
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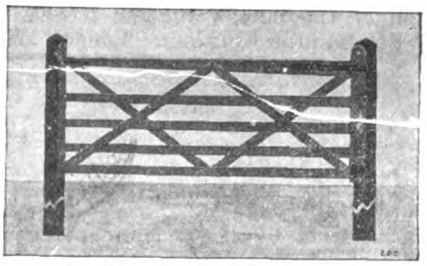
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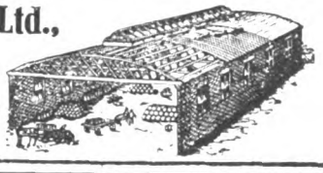
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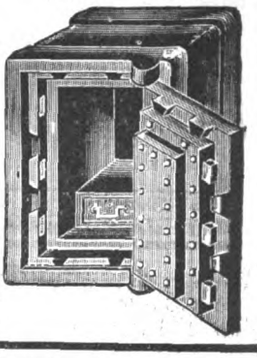
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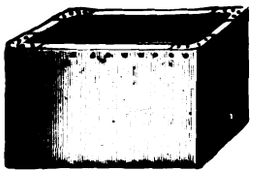
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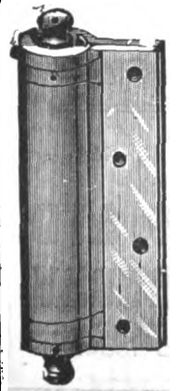
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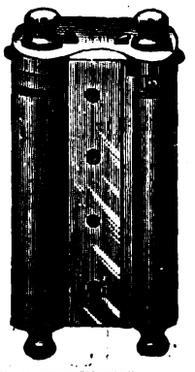


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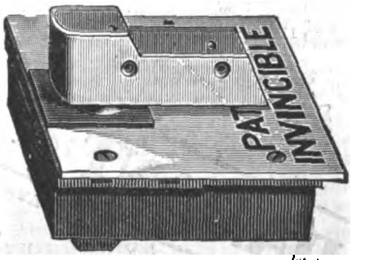


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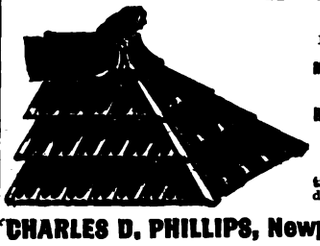
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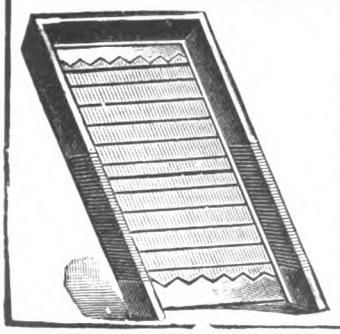
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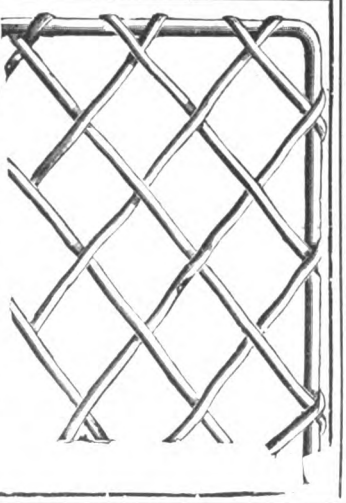
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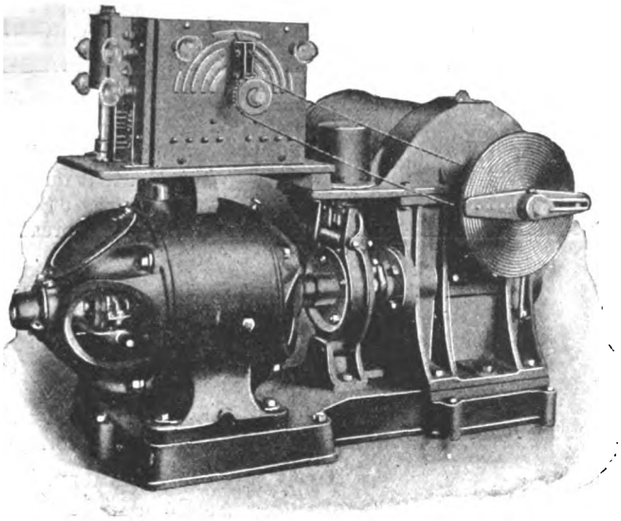
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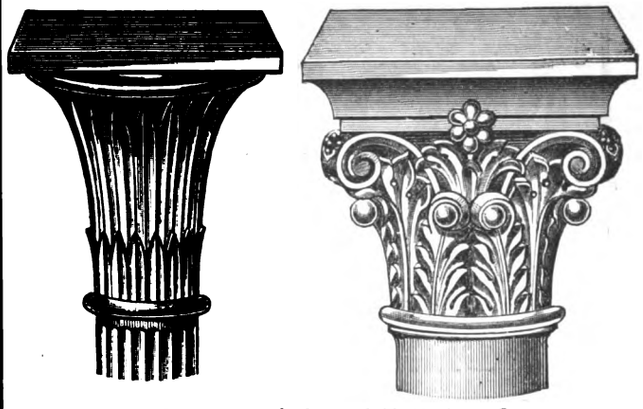
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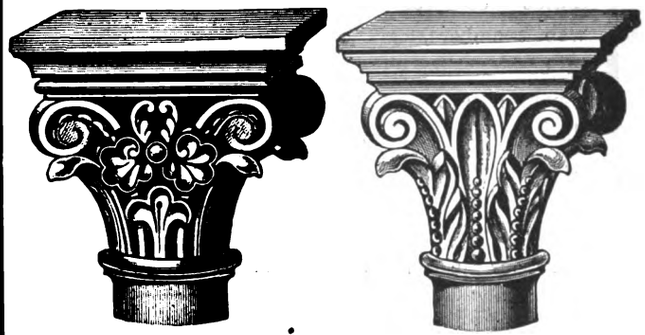
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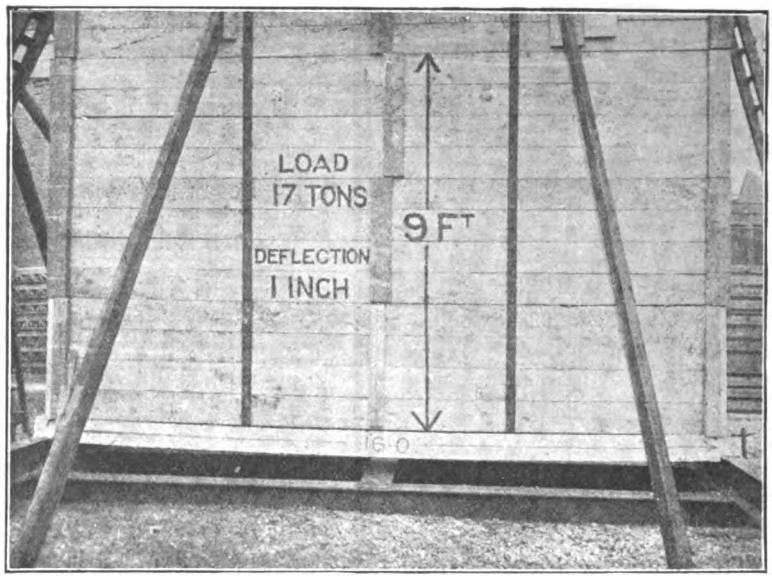
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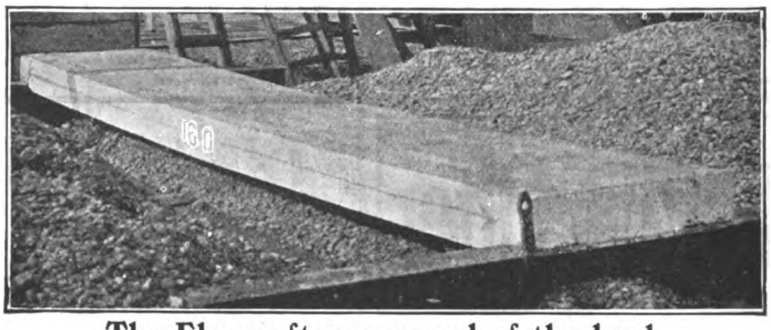
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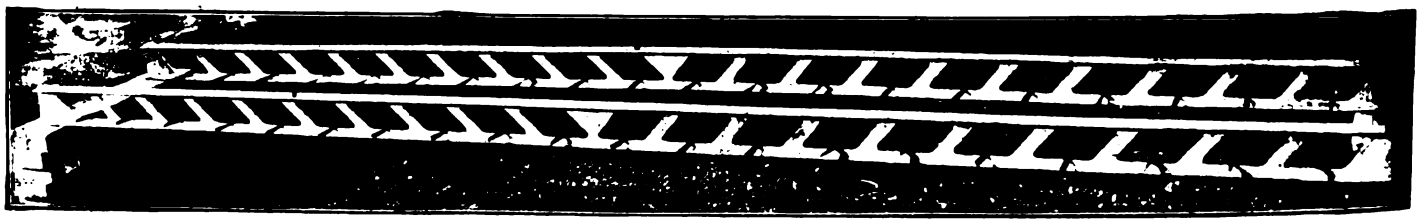
Span 15 Feet.

Load 1½ cwts. per foot.

15)63·0(4·2
60
30
30

1·5)4·2(2·8
30
120
120

Or about 2′ 9″ to 2′ 10″ Centres.



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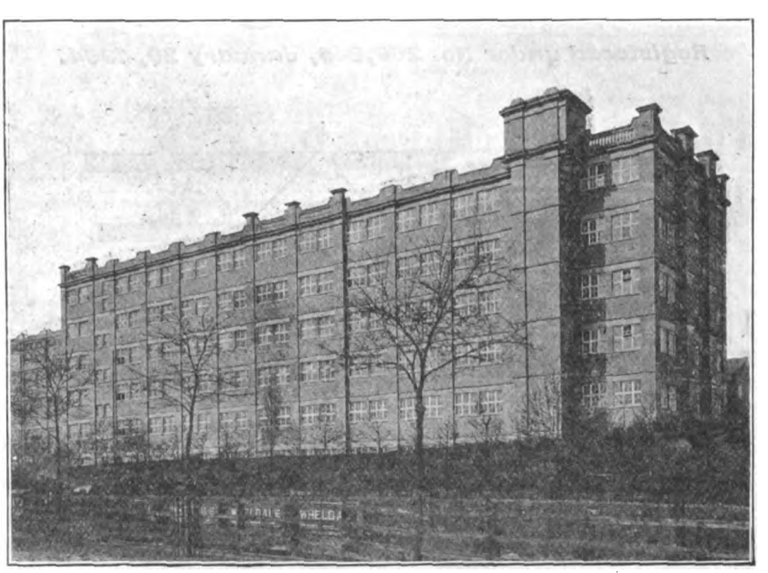
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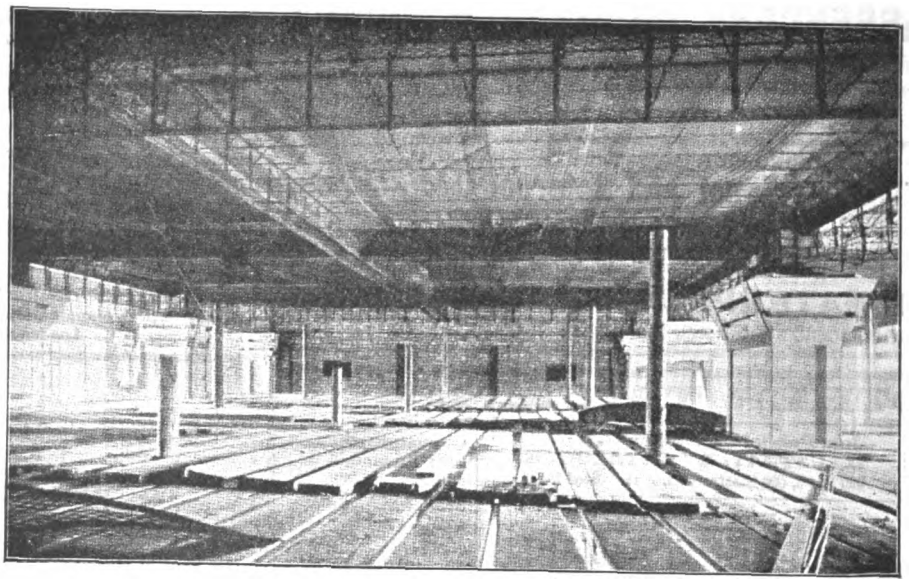
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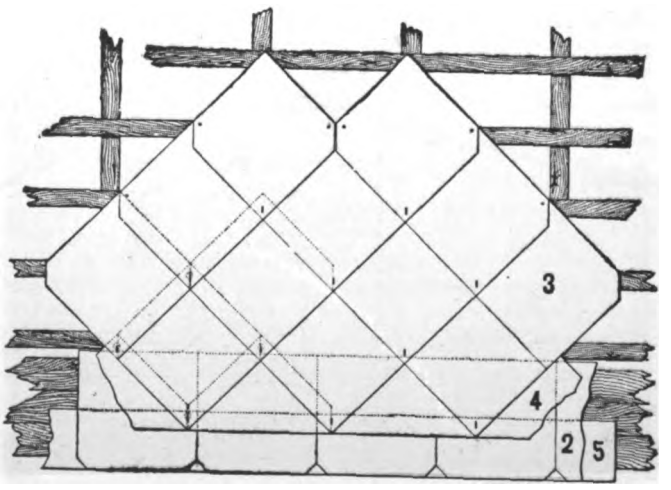
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FRIDAY, JUNE 18, 1909.

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P. A. GILBERT WOOD,

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EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

**** As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

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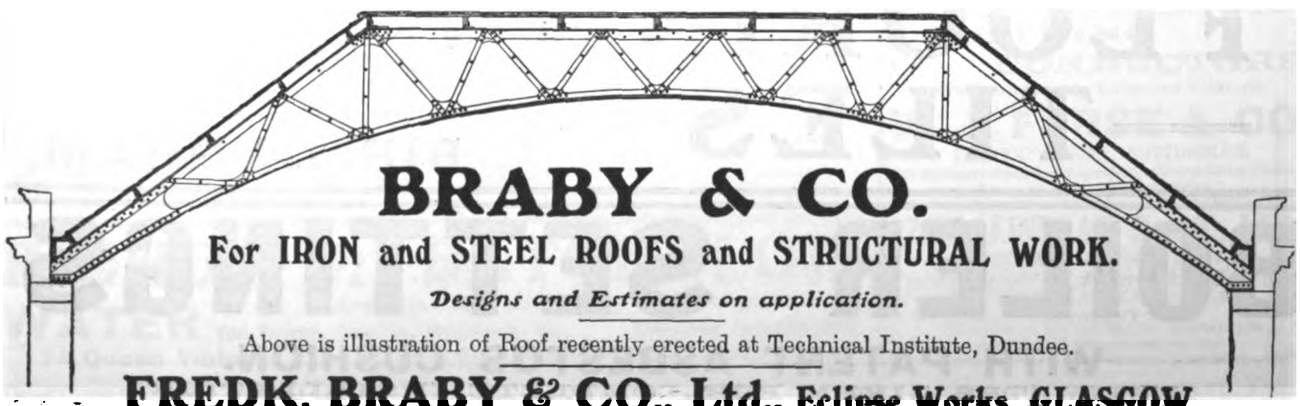
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DEPTFORD.—Sept. 1.—The Metropolitan Borough Council of Deptford invite designs for a branch library at New Cross, S.E. Premiums of 50 guineas, 25 guineas and 10 guineas will be awarded. Assessor, Mr. J. S. Gibson, V.P.R.I.B.A. Deposit 1*l.* 1*s.* Competition is limited to architects practising in the city or county of London. Mr. Vivian Orchard, Town Clerk, Town Hall, New Cross Road, S.E.

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BLACKPOOL.—June 23.—For proposed infant schools at Devonshire Road and Revoe. Deposit 1*l.* 1*s.* Mr. John S. Brodie, borough surveyor, Town Hall, Blackpool.

BRINDLEY.—June 21.—For erection of a single house and set of farm buildings at Brindley, near Acton, Cheshire. Deposit 1*l.* The Land Agent, County Estate Office, 49 Northgate Street, Chester.

BUBWITH.—For repairs, &c., to tower of Bubwith parish church. The Vicar, Bubwith Vicarage, Selby.

BURNOPFIELD.—June 19.—For the mason, slater, plasterer, painter and glazier work in connection with the erection of four houses. Mr. John J. Eltringham, architect and surveyor, Blackhill.

BURY (LANCS).—July 10.—For erection of a secondary school at Westminster Street. Deposit 1*l.* 1*s.* Mr. J. T. Halliday, A.R.I.B.A., 14 John Dalton Street, Manchester.

CALVERLEY.—June 21.—For erection of offices, &c., at Ravenscliffe Mills, Calverley, Yorks. Send names to Mr. J. Harper Bakes, M.I.A., architect and surveyor, Calverley Chambers, Victoria Square, Leeds.

DISTINGTON.—June 22.—For the various works required in erection of two cottages at Distington, Cumberland. Messrs. W. G. Scott & Co., architects and surveyors, 2 Park Lane, Workington.

DORCHESTER.—June 28.—For repairs at the following Council schools during the ensuing summer holidays:—Bothenhampton, Buckhorn Weston, Caundle Stourton, Charmouth, Gillingham, Handley, Kinson, Lytchett Matravers, Lytchett Minster, Stour Provost, Stratton, Swyre, and Yetminster. The Secretary, County Education Office, Dorchester.

DROYLSDEN (LANCS).—June 28.—For erection of buildings to contain refuse destructor and sludge-pressing plant, adjoining the sewage disposal works. Deposit 3*l.* 3*s.* Mr. Charles Hall, engineer and surveyor, Council Offices, Droylsden.

DUBLIN.—June 23.—For erection of fifty labourers' cottages, for the North Dublin Rural District Council. Mr. J. O'Neill, clerk to the Rural District Council, North Brunswick Street, Dublin.

EVESHAM.—June 19.—For erection of a Council elementary school in Chapel Street. Deposit 2*l.* 2*s.* Send names to the County Education Office, Worcester.

GLASGOW.—June 28.—For the following works of F Block (special diseases) at the Glasgow Royal Infirmary, viz.:—(1) Digger, mason, brick and steel; (2) carpenter, joiner, glazier and ironmonger; (3) plumber; (4) plasterer; (5) tile



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and marble. Deposit 1*l.* 1*s.* Mr. James Miller, A.R.S.A., architect, 15 Blythswood Square.

GOLDTHORPE.—June 24.—For the various works required in erection of twenty-eight houses, and four houses and shops, Doncaster Road, Goldthorpe, near Rotherham. Mr. W. T. Turner, architect, &c., George Chambers, Market Hill, Barnsley.

GUILDFORD.—July 3.—For erection of a receiving home for children on land adjoining the workhouse. Deposit 3*l.* 3*s.* Send names by June 21 to Mr. Edward L. Lunn, architect, 36 High Street, Guildford.

HAXEY.—June 21.—For new church and out-offices. The Rev. P. H. Powell, Epworth.

HELSBY.—June 22.—For the entire work of erection of a school for 200 children at Helsby, Cheshire. Deposit 2*l.* Send names by June 5 to Mr. Joseph Holt, A.R.I.B.A., 9 Albert Square, Manchester.

HUNGERFORD.—July 2.—For building a school for 600 scholars at Hungerford, Berks. Deposit 3*l.* 3*s.* Send names before June 22 to the Secretary to the Education Committee, The Forbury, Reading, Berks.

HYTHE.—June 28.—The Secretary of State for War invites tenders for the following work:—Erection of sixteen "b" married soldiers' quarters (cottage type) in one block at Hythe barracks, in the Eastern Command. Deposit 10*s.* Director of Barrack Construction, 80 Pall Mall, London, S.W.

ILFORD.—June 22.—For erection of extensions to the tram-car sheds, Ley Street. Deposit 2*l.* 2*s.* Mr. H. Shaw, M.I.C.E., Town Hall, Ilford.

IRELAND.—June 21.—For building sixty cottages and the fencing of the plots to be attached thereto, for the Dundalk Rural District Council. Mr. Peter Cahill, C.E., Seatown Place, Dundalk.

IRELAND.—June 30.—For the erection of National schools at Gorey, co. Wexford. Deposit 1*l.* Mr. G. L. O'Connor, M.R.I.A., architect, 426 Great Brunswick Street, Dublin.

KIRKBURTON.—June 24.—The West Riding education committee invite whole or separate tenders for Kirkburton new (mixed) school (builder, joiner, slater, plasterer, plumber, painter). Deposit 1*l.* 1*s.* The West Riding Architect, County Hall, Wakefield.

LEEDS.—June 24.—For any of the trades required in erection of the Chapeltown Council infants school. The Education Department (Architect's Section), Calverley Street, Leeds.

LEEDS.—June 24.—For the following works required for a skating rink. Contract No. 1: excavation, drainage, brickwork, and masonry; (2) carpenter and joiner; (3) plumber and glazier; (4) plasterer; (5) painter and decorator; (6) steelwork; (7) electric lighting. Deposit 10*s.* Mr. Myers-Beswick and Partners, engineers, 8 Park Square, Leeds.

LEYTON.—June 29.—For the following works, for the Urban District Council, viz.:—Cleansing, painting and repairs at four schools; improvement of gas lighting at two schools, during the summer vacation; and for hot-water heating apparatus at Sybourn Street school, in course of erection. Deposit 1*l.* Send names by June 19 to Mr. William Jacques, A.R.I.B.A., 2 Fen Court, Fenchurch Street, E.C.

LONDON.—June 22.—For external repairing, painting and sundry work at Shaftesbury Road school, and for cleansing and whitewashing the latrines and urinals at nineteen schools, as described in form of tender, for the East Ham education committee during the summer vacation. Deposit 5*l.* The Education Office, Wakefield Street, East Ham.

LONDON.—June 25.—For erection of a bandstand, composed of wood and tiles, at Boundary Street Garden, Bethnal Green, for the London County Council. The Architect's Department, 19 Charing Cross Road, W.C.

LONDON.—June 26.—For certain repairs and decorative work at the infirmary, Lower Road, Rotherhithe, S.E., for the Bermondsey Board of Guardians. Deposit 10*l.* Mr. E. Pitts Fenton, clerk, 283 Tooley Street, S.E.

LONDON.—June 29.—For erection of a new ward block in Upper Road, Plaistow, E., for the trustees of the St. Mary's Hospital for Women and Children. Deposit 10*l.* Send names by June 19 to Mr. A. Saxon Snell, F.R.I.B.A., 22 Southampton Buildings, Chancery Lane, W.C.

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LONDON.—July 5.—For the construction of two underground conveniences in Horseferry Branch Road, by Commercial Road East, Ratcliff, E., for the Stepney Borough Council. Deposit 5*l*. Mr. M. W. Jameson, A.M.I.C.E., borough engineer, Municipal Offices, Great Alie Street, Whitechapel, E.

LONDON.—July 20.—For erection of school buildings to accommodate 1,032 children, at Vicarage Lane, East Ham. Deposit 50*l*. Send names by June 29 to Mr. R. I. Curtis, architect, 11 and 12 Finsbury Square, London, E.C.

LOWESTOFT.—June 29.—For erection and completion of an additional ward pavilion and for additions to the administrative block at the sanatorium, Rotterdam Road. Deposit 2*l*. Mr. G. H. Hamby, A.M.I.C.E., borough surveyor, Town Hall, Lowestoft.

LOW MOOR.—June 25.—For repairing and beautifying the Church school. Messrs. Jas. Brown & Walter Clayton, 13 and 94 St. Paul Street, Low Moor.

LUTON.—June 21.—For alterations to the Master's apartments at the workhouse. Messrs. Gotch & Saunders, architects, 55 George Street, Luton.

LUTON.—July 6.—For erection of a public library at the junction of George Street and Williamson Street. Deposit 3*l*. 3*s*. Mr. S. F. L. Fox, A.M.I.C.E., borough engineer and surveyor, Town Hall, Luton.

MANCHESTER.—June 25.—For construction of a battery house at the Dickinson Street generating station. Deposit 2*l*. 2*s*. Mr. F. E. Hughes, secretary, Electricity Department, Town Hall, Manchester.

MANCHESTER.—June 30.—For the construction of an underground lavatory for males at the Poultry Market, Shudehill. Deposit 1*l*. 1*s*. The City Surveyor, Town Hall, Manchester.

NORWOOD GREEN.—June 25.—For erection of six houses at Norwood Green, Halifax. Messrs. Sharp & Waller, architects, 32 Bradford Road, Brighouse.

ORMSIDE.—June 25.—For erection of a block, 97 feet in length, consisting of two wards, with kitchen and nurses' room, lavatories, bath, w.c., &c., at the Joint Infectious Hospital at Ormside, near Appleby. The building will be of matchboarding on brick foundations and covered with corrugated iron. The Borough Surveyor, Appleby.

PEAKDALE.—July 8.—For erection of infants' school and additions to Peakdale Council school, near Buxton, Derbyshire. Deposit 1*l*. 1*s*. Send names to Mr. George E. Garlick, architect, Quadrant Chambers, Buxton.

PENISTONE.—June 22.—For the formation of a new cattle market. Deposit 10*s*. 6*d*. Mr. H. J. Brettoner, Penistone, near Sheffield.

PENSHAW.—June 21.—For building miners' hall at Penshaw Staithes, Durham. Mr. J. Palliser, architect, Philadelphia, Fence Houses.

SALTASH.—June 30.—For converting the space under the Guildhall, Saltash, Cornwall, into two committee rooms. The Borough Surveyor's Office.

SCOTLAND.—June 22.—The committee of the Moat House Hostel, Dumfries, invite tenders for (1) mason, joiner, plumber, and plaster works incidental to adapting Moat House, Dumfries, for the purposes of a hostel; and (2) furniture and furnishings required for the hostel. Messrs. James Barbour & Bowie, architects, Buccleuch Street, Dumfries.

SEDBERGH.—June 25.—For the whole or separate works necessary in restoring and enlarging the Farfield Mills, Sedbergh. Mr. Stephen Shaw, F.R.I.B.A., architect, Kendal.

SHARLSTON, NEAR WAKEFIELD.—June 28.—For erection of a central Sunday-school near St. Luke's Church. Deposit 1*l*. St. Luke's Lodge, Sharlston, near Wakefield.

SKIPTON.—June 23.—For the mason, joiner, plumber and glazier, painter, slater and ironfounder's work required in erection of public abattoirs in the dockyard. Deposit 1*l*. Mr. A. E. W. Aldridge, surveyor to the Council, Town Hall, Skipton.

SOUTHAMPTON.—June 21.—For constructing a police-station, &c., at Payne's Road. Deposit 2*l*. The Borough Engineer's Office.

SOUTH NORMANTON.—For erection of a public elementary school for 412 infants at South Normanton, Derbyshire. Mr. Percy B. Houlton, architect, Furnival Chambers, Chesterfield.

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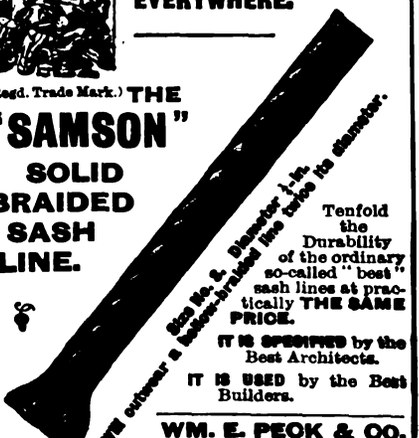
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TAUNTON.—June 22.—For head post office at Taunton. H.M. Office of Works, &c., Storey's Gate, London, S.W.

WADSWORTH.—June 22.—For erection of a public urinal near to Midgehole, in the parish of Wadsworth, Todmorden. Mr. James Suthers, surveyor and valuer, Union Offices, Todmorden.

WALES.—June 19.—For erection of a church at New Inn, for the Wesleyan Methodist trustees. Mr. D. C. Udell, architect, Commercial Street, Pontypool.

WALES.—June 21.—For erection of four houses, two shops, Chepstow Road and corner of Warwick Road, Maindee Estate, Swansea. Plans and specifications to be seen at owner's address, Rees, 11 Windsor Road.

WALES.—June 21.—For erecting platform, seating accommodation, &c., for the pavilion, for the Cardigan Semi-National Eisteddfod. Mr. D. Williams, secretary, Yngs, Cardigan.

WALES.—June 22.—For erection of a Council school to accommodate 350 children, at Greenfield, near Holywell, Flintshire. Deposit 2*l.* 2*s.* Mr. Samuel Evans, county surveyor, Mold.

WALES.—June 22.—For works at the following Council schools, for the Monmouthshire education committee, viz.:—(1) Extensions and alterations at the Llangwm Council school, near Usk; (2) re-constructing playground, New Tredegar infants' Council school; (3) construction of approaches to the Cwmsyfiog infants' Council school, near New Tredegar; (4) asphalting playground at Norton's Cross Council school, near Monmouth. Mr. John Bain, architect, County Council offices, Newport, Mon.

WALES.—June 22.—For erecting pair of semi-detached villas at The Walk, Merthyr Tydfil. Mr. T. Edmund Rees, architect and surveyor, Merthyr Tydfil.

WALES.—June 24.—For erection of a building for the Llanelly Y.M.C.A. Deposit 1*l.* 1*s.* Mr. W. Griffiths, F.S.I., architect, Llanelly.

WALES.—June 26.—For proposed alterations to premises, High Street, Penydarren. Mr. O. P. Bevan, architect and surveyor, Express Chambers, Merthyr Tydfil.

WALES.—June 26.—For the erection of a villa residence at Birch Hill, Llangollen. Mr. John W. Hughes, architect, Llangollen.

WALTHAMSTOW.—June 29.—For proposed junior mixed school to be erected on the playgrounds of the Coppermill Road school. Deposit 5*l.* Send names by June 14 to Mr. H. Prosser, M.S.A., architect to the committee, High Street, Walthamstow.

WHITLEY AND MONKSEATON (NORTHUMBERLAND).—July 5.—For the work of extending Whitley and Monkseaton North Council school. Deposit 2*l.* 2*s.* Send names by June 14 to Mr. C. Williams, secretary, Education Committee, The Moothall, Newcastle-on-Tyne.

WILLINGTON.—For coal stores, small gas generating house and tower, and boundary wallings, drainage, &c., at Willington House, Willington, near Derby. Deposit 1*l.* 1*s.* Mr. E. R. Ridgway, architect, Market Place, Long Eaton.

WINCHESTER.—June 23.—For erection of new secondary school for 160 girls. Deposit 5*l.* 5*s.* Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

WRENBURY.—June 26.—For interior alterations to Wrenbury Church, near Nantwich, comprising wood-block floor and reseating to nave and aisles, heating, ventilation, &c. Deposit 3*l.* 3*s.* Mr. C. Russell Hall, architect, Congleton.

YORKS.—June 21.—The West Riding education committee invite whole or separate tenders for the following works:—Clayton Provided School—new heating boiler; Royston Provided School—alterations (builder, joiner, plumber, plasterer). Deposit 1*l.* each. The West Riding Architect, County Hall, Wakefield.

A NATIONAL Town-planning Congress has been arranged by the National Housing Reform Council to take place at Port Sunlight, Woodlands colliery village, Doncaster, and Earswick village (Rowntree's), York, on August 4, 5 and 6. The sittings of the Congress will take place at Port Sunlight, and papers will be read by Mr. T. C. Horsfall, Professor Patrick Geddes, Professor S. D. Adshead (Professor of Town-planning and Civic Design at Liverpool University), and the foreign delegates.

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For erection and fitting up of St. Philip's Church, Bolton, Lancs. Mr. E. H. LINGEN BARKER, architect.

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For the making of a new road at Langley Moor, Durham, between Herbert Street and Brandon Lane. Mr. GEO. G. DONKIN, surveyor, Langley Moor.

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For erection of a new isolation hospital at Dob's Hill, near Buckley. Messrs. JOHN H. DAVIES & SONS, architects, Chester.

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147 STRAND, LONDON, W.C. (FIRST FLOOR.)

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COVENTRY—*continued.*

Lord	1,830	0	0
Higgs	1,827	0	0
Jones & Bacon	1,802	15	0
Smith	1,798	0	0
Orr Bros.	1,794	5	2
Kelley & Son	1,792	6	6
GOODE, Homesdale Road, Coventry (*accepted*)	1,750	0	0
Beardsmore & West	1,717	0	0
Gathercole	1,662	0	0

For the erection of a new out-patients' department at the Coventry and Warwickshire Hospital. Messrs. A. HESSELL TILTMAN and H. W. CHATTAWAY, joint architects.

Willcock & Co.	£3,325	0	0
Kelley & Son	3,269	4	11
Green	3,252	0	0
Parnell & Son	3,239	15	0
Lord	3,191	19	3
Levins	3,142	0	0
Bosworth & Lowe	3,103	2	9
Beardsmore & West	3,085	10	0
Pattinson & Sons	3,039	0	0
Hickman	3,025	2	8
MOSS & SONS, Loughborough (*accepted*)	3,013	7	4
Higgs	3,004	4	8
Gathercole	2,964	2	7

HEREFORD.

For building St. Nicholas Rectory. Messrs. NICHOLSON & HARTREE, architects, Hereford.

Bowers & Co.	£1,505	8	0
Cooke	1,482	10	0
Beavan & Hodges	1,479	10	0
Powell	1,359	0	0
Lewis & Co.	1,348	5	0
Wilks	1,271	15	0
PREECE, Hereford (*accepted*)	1,216	0	0

HULL.

For alterations and additions at the East Hull Liberal Club premises, Holderness Road. Mr. GEO. THORPE, architect, Lowgate.

Hill & Stephenson	£663	11	7
Darneley & Son	662	0	0
Simpson & Son	650	0	0
Fenwick	643	0	0
Richardson	624	0	0
Scorrer	613	13	5
Boyes & Oliver	610	0	0
Morrell & Sons	590	16	6
Levitt	587	0	0
Hunt	582	19	0
Singleton	581	15	6
Harper	573	16	0
Southern	565	15	0
Boyce	553	12	3
Cundall	551	7	0
BERRIDGE, Hull (*accepted*)	532	0	0

LONDON.

For alterations to the Police Section House at Kennington Lane, S.E. Mr. J. DIXON BUTLER, F.R.I.B.A., surveyor to the Metropolitan Police, New Scotland Yard, S.W.

Mowlem & Co.	£2,200	0	0
Minter	2,051	0	0
Lorden & Son	1,975	0	0
Holloway Bros.	1,975	0	0
F. & H. F. Higgs	1,960	0	0
Appleby & Son	1,909	0	0
Ansell	1,900	0	0
Smith & Son	1,895	0	0
Rice & Son	1,851	0	0
Eyre	1,850	0	0
Higgs & Hill	1,774	0	0
Prestige & Co.	1,711	0	0



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LONDON—*continued.*

For erection of school at Lauriston Road, Hackney, for the London County Council.

Price	£9,009	0	0
McLaughlin & Harvey	8,816	15	10
Johnson & Co.	8,814	0	0
Harris	8,708	0	0
Dabbs & Son	8,649	0	0
McCormick & Sons	8,587	0	0
Perry & Co.	8,485	0	0
Roberts & Co.	8,471	0	0
Leng	8,372	0	0
F. & T. Thorne	8,366	0	0
Lawrance & Sons	8,287	0	0
Shurmur & Sons	8,217	0	0
Galbraith Bros., 46 Camberwell Green (*recommended*)	8,140	16	0

For the erection on the Fairclough Street site (St. George-in-the East) of an elementary school for the accommodation of 968 children.

Parker & Sons	£19,582	0	0
F. & H. F. Higgs	18,691	0	0
Davies	18,651	7	6
Smith & Son	17,969	0	0
Garrett & Son	17,571	0	0
Wall	17,487	2	8
Kirk & Randall	17,480	0	0
Holloway	17,450	0	0
Carmichael	17,263	0	0
Appleby & Sons	17,187	0	0
Leng	17,006	0	0
Perry & Co.	16,824	0	0
J. & C. Bowyer	16,796	0	0
Lovatt	16,757	10	0
J. & M. Patrick	16,730	0	0
Thomas & Edge	16,596	0	0
F. & T. Thorne	16,543	0	0
Wallis & Sons	16,332	0	0
Marsland & Sons	16,198	0	0
Lawrance & Sons	16,030	0	0
Holliday & Greenwood, Brixton (*recommended*)	15,991	15	9
Architect's estimate (Education)	17,095	0	0

LONDON—*continued.*

For setting back the fences and forecourt walls at Nos. 707 to 713, and 731 to 757 (odd numbers), Wandsworth Road.

Crooks & Co.	£280	0	0
Lapthorne & Co.	274	0	0
Withers	250	0	0
TRIGGS, Clapham (*accepted*)	135	0	0

For providing a teachers' room for each department of the Elizabeth Street School (Woolwich).

F. & E. Davey	£737	0	0
Wiles & Sons	655	0	0
Griggs & Son	627	10	0
Kazak	625	0	0
Kent	620	0	0
Gorham	596	0	0
Vigor & Co.	595	0	0
Groves	595	0	0
Mills	592	0	0
Holloway	583	0	0
Friday & Ling	574	0	0
Harris	570	0	0
Thomas & Edge, Woolwich (*recommended*)	552	0	0
Architect's estimate (Education)	537	0	0

MAIDSTONE.

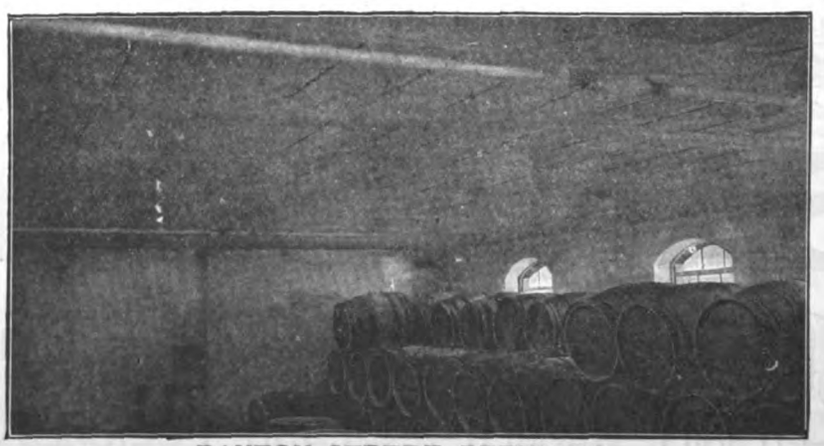
For the building of London and County Bank in High Street. Mr. W. CAMPBELL JONES, architect, Bedford Row, London.

Skinner	£17,264	0	0
Hunt	14,945	0	0
Higgs & Hill	14,714	0	0
Rider & Son	14,600	0	0
Grover & Son	14,312	0	0
Munday & Sons	14,040	0	0
Martin & Co.	14,035	0	0
Perry & Co.	13,987	0	0
Barden & Head	13,788	0	0
Minter	13,472	0	0
Seager	13,344	0	0
Dove Bros.	13,236	0	0
Nash	13,111	0	0
WALLIS & SONS, Maidstone (*accepted*)	13,109	0	0

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LONG ASHTON (SOMERSET).

For additions to sewage disposal and sewerage works. Mr. A. P. I. COTTERELL, M.I.C.E., engineer, Bristol.

Brebner & Co.	£357	10	0
Cooper & Co.	330	0	0
Coles & Son	287	2	0
COWLIN & SON, Bristol (*accepted*)	280	0	0

MOULTON.

For alterations, &c., to the local schools. Mr. HARRIS, architect.

Sharman	£768	0	0
Higgs	698	10	0
H. Green	609	0	0
Hawtin	589	0	0
E. Green	584	0	0
MARTIN (*accepted*)	558	0	0

NEW MALDEN.

For the following works:—Contract No. 1: For making-up and maintaining a part of Burlington Road, from St. James's Church to the Beverley Brook (exclusive of footway paving). Contract No. 2: For paving with artificial stone slabs the footways of a part of Burlington Road. Mr. REGINALD H. JEFFES, A.M.I.C.E., engineer and surveyor.

Contract No. 1 (roadway).

E. & E. ILES, Wimbledon (*accepted*)	£846	13	1
Engineer and surveyor's estimate	882	2	8

Contract No. 2 (artificial stone paving).

ATLAS STONE CO., Cambridge (*accepted*)	154	10	3
Engineer and surveyor's estimate	170	12	6

NORTHAMPTON.

For the erection of a county sanatorium.

POWELL, Northampton (*accepted*)	£4,357	0	0

ILLUSTRATIONS.

LIVING ARCHITECTS.—NO. 8. MR. J. G. S. GIBSON, V.P.R.I.B.A.

NO. 9. MR. E. GUY DAWBER, V.P.R.I.B.A.

STOCKPORT TOWN HALL.—THE GREAT HALL.

INTERIOR OF HOLYROOD ABBEY CHAPEL.

HOLYROOD ABBEY.—A THEORY OF ITS METHOD OF DESIGN.

THE PARTHENON.—A THEORY OF ITS METHOD OF DESIGN.

TIREE (SCOTLAND).

For reinforced concrete steamboat pier (Hennebique system), also for breakwater and slip to be constructed in Gott Bay, Tiree, for the Harbour Trustees. Mr. G. W. BRENAN, M.I.C.E., engineer, Oban.

Whole works.

Cochrane & Son (without road)	£19,109	8	8
Neal	18,989	5	0
Playfair & Toole (without road)	18,020	14	5
Yorkshire Hennebique Co. (without road)	14,277	3	1
Adam & Co.	11,594	4	3
Kinnear, Moodie & Co., Glasgow (*recommended*)	11,000	0	0
Brebner	9,715	12	0

Breakwater and slip only.

Munro	7,791	5	7
Topping (with road)	7,090	8	7
Adam & Co.	6,300	15	0
E. & D. Stewart	3,904	18	7

Reinforced concrete work only.

Thorburn & Son	5,889	4	1
Yorkshire Hennebique Co.	5,750	12	8

Road and fencing only.

MacKechnie	326	0	0
MacArthur	301	15	0
MacDougall	291	12	6
MacDonald	253	15	0

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SHERBORNE (DORSET).

For additions to the Sherborne Ladies' College. Messrs. JOHN HARDING & SON, architects, Salisbury.

Wort & Way	£6,042	0	0
Parnell & Son	5,875	14	0
Harris Bros.	5,605	0	0
Guppy & Son	5,190	0	0
GILLINGHAM, Sherborne (*accepted*)	5,167	0	0

WALES.

For erection of a church to seat 545 persons at Caerau, near Maesteg. Mr. GEORGE E. HALLIDAY, F.R.I.B.A., architect, Cardiff.

W. H. Evans	£4,468	17	7
D. W. Evans	4,395	3	0
Evans & Jones	4,290	13	8
Prothero	4,279	10	0
Rees	4,159	0	0
Symonds & Sons	4,050	0	0
Stephens, Bastow & Co.	3,994	0	0
Cox & Bardo	3,975	16	5
W. & J. R. WATSON, Edinburgh (*accepted*)	3,876	0	0

For erecting a church at Canton, Cardiff. Mr. G. E. HALLIDAY, F.R.I.B.A., 19 Castle Street, Cardiff.

Bosworth & Co.	£4,463	15	0
Cox & Bardo	4,365	17	3
Stevens, Bastow & Co.	4,263	0	0
Blacker Bros.	4,095	0	0
Turner & Sons	4,070	0	0
Beames	3,926	5	0
SYMONDS & SONS, Cardiff (*accepted*)	3,771	0	0
Haines	3,672	0	0

For pulling down old buildings and erecting a small post-office and telephone exchange at Brynmawr. Mr. W. H. DASHWOOD CAPLE, F.R.I.B.A., architect, Cardiff.

Williams	£788	5	6
Thomas & Sons	770	0	0
Ebbw Vale Building Co.	713	1	2
JENKINS, Brynmawr (*accepted*)	597	0	0

WALES—*continued.*

For erection of forty or more houses at Bargoed (at per house), for the Graig Building Club, Bargoed. Mr. H. GABE JONES, architect and surveyor, Hengoed.

Davies	£228	0	0
Davis	208	10	0
Colborne	207	6	0
Casslett	201	10	0
Vodden & Lee	201	0	0
ARTHUR, Bargoed (*accepted*)	199	7	0
Barnett	175	10	0

WIGGENHALL ST. GERMANS.

For additions to cottage and general repairs at Fitton Hall. Messrs. WALKER & WALKER, architects, Wisbech and Terrington.

Ashby	£262	15	0
Tash & Langley	249	10	0
Lawson & Co.	230	0	0
Lewis	226	6	0
Means	226	0	0
Medwell	225	0	0
Holman	208	0	0
Johnson & Son	175	5	0
EGGLETON, King's Lynn (*accepted*)	168	0	0

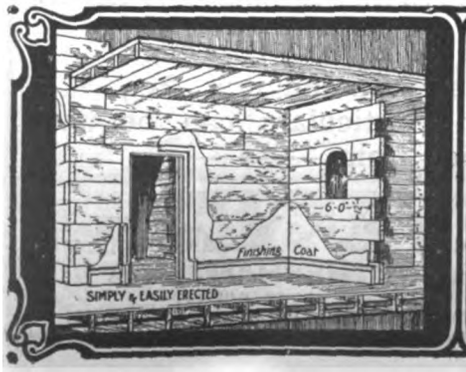
THE Croydon Town Council are about to construct a low-level reservoir and waterworks, at an estimated cost of 90,000*l.*, on a site at Russell Hill.

MESSRS. R. WAYGOOD & CO., LTD., held their ninth ordinary general meeting on Wednesday last, Mr. Henry C. Walker, the chairman of the company, presiding, and in spite of the depression in the building trade, they were enabled to declare the same dividend as last year.

THE asylum visiting committee of the Middlesbrough Corporation had before them at their last meeting alternative proposals for the erection of six additional workmen's cottages in Marton Road, at a cost of 275*l.*, 280*l.* and 300*l.* per house respectively. No decision was arrived at by the committee.

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TRADE NOTES.

THE Phœnix Assurance Company is now prepared to undertake the duties of trustee and executor.

A MON'LITHCRETE floor is in course of construction at Messrs. Champion & Slee's vinegar works. Mr. Kennard is the architect.

A NEW bank is in course of erection at Manningtree for Messrs. Barclay, from the design of Mr. John Corder. The floors are to be fireproof on the Fawcett system.

WE regret to announce that Mr. Alfred Liebert, for a great many years manager to the Calmon Asbestos Slate Company, died last week, after a short illness. He was held in high esteem by all who had dealings with him.

SIR HENRY SCOTT has just given orders to Messrs. John Smith & Sons, of Derby, to make a new chiming clock with three large dials for the parish church at Blackwell, near Alfreton.

MESSRS. BROOKES, LTD., the proprietors of the Hard York Non-slip Stone, announce that owing to the increase in their business they have been compelled to move to more commodious London offices and showrooms at Caxton House, Westminster, S.W., where they will exhibit samples of their Silex and Non-slip stones, granites and glazed bricks.

THE Sussex Portland Cement Company, Ltd., of Newhaven, have issued a block calendar for July 1909 till the end of June 1910, a month to each page. The sketch accompanying it shows the Auld Brig o' Ayr, this being one of the restoration works where the "Newhaven" brand of Portland cement is being exclusively used.

MESSRS. E. H. SHORLAND & BROTHER, of Manchester, are supplying their patent Manchester stoves to the Infectious Diseases Hospital, Lincoln, and the Clifton Asylum, York. Their patent exhaust roof and special inlet ventilators are being supplied for the extensions to the technical schools, Warrington, the Infectious Diseases Hospital, Lincoln, and the new Council schools, High Clarence.

A NEW smoke preventer is about to be placed on the market by the Furnace Appliances Company, of 9 Bedford Row, W.C., who state that very complete trials have been carried out during the past twelve months which have shown that any class of fuel may be smokelessly and economically consumed with their apparatus. They have also acquired the business of the British Fuel Economiser and Smoke Preventer, together with their works, offices, &c., and will commence operations on July 1.

MESSRS. ARTHUR L. GIBSON & Co., of 19, 20 and 21 Tower Street, Upper St. Martin's Lane, London, W.C., advise us that their new factory, Radnor Works, Strawberry Vale, Twickenham, is now in running order, and in future all orders received for their Kinnear patent steel rolling shutters will be filled from that address. Their offices and warehouse will remain for the present at the old address, in Upper St. Martin's Lane, London, W.C.

VISITORS to the Royal Agricultural Show, Gloucester, would be well advised to make a call at Messrs. Merryweather & Sons' Stand (No. 121), where they have a large exhibit of fire appliances and water-supply apparatus, suitable for country houses, farms and estates. Motor and horse-drawn fire engines are on view, as well as the useful little "Valiant" steam pump. This is a most handy machine, and, in addition to fire protection, is very useful for irrigation and general pumping purposes, while it can also be arranged for driving light machinery.

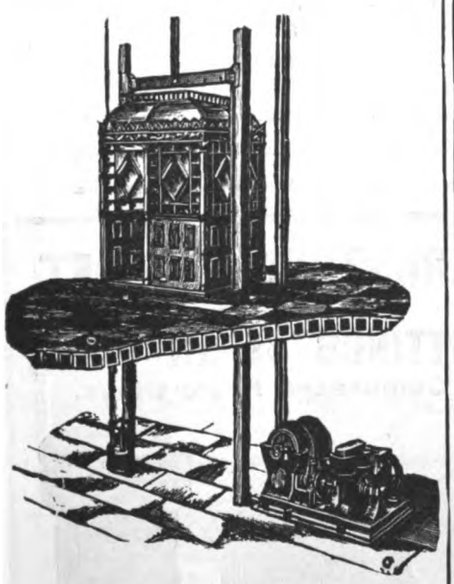
THE Strood Rural Council have approved a modified sewerage scheme for Halling which is estimated to cost 9,925*l*. Application is to be made for the necessary loan.

MR. JOHN T. WOODWARD, architect and surveyor, is removing his offices on Midsummer day to Garrick House, 27 Southampton Street, Strand, W.C.

THE Wirksworth Urban Council have agreed to engage Mr. Radford, engineer, of Nottingham, to report on the cost of a covered storage reservoir to hold 5,000,000 gallons, or less if water can be found to be available by gravitation.

THE Manchester waterworks committee last week opened the tenders for the laying of the first section of the third pipe from Thirlmere to the city. The section is from a point about two miles south of Ambleside to one about three miles south-east of Carnforth, and consists of about fourteen miles of 44-inch cast-iron pipes. The section passes under two lines of railway.

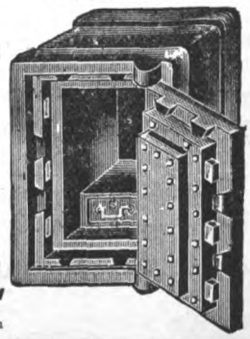
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VARIETIES.

THE Worsley District Council decided on Monday to apply to the Local Government Board for permission to borrow 9,250*l.* for the erection of a technical school in Walkden Road, Walkden.

THE Plymouth Borough Council have adopted a scheme for the provision of stable and cart-shed accommodation at Prince Rock for the house refuse removal depôt at an estimated cost of 4,700*l.*

A CHURCH is to be erected in the working-class parish of St. Philip, Litherland, in the diocese of Liverpool. An anonymous donation of 10,000*l.* was recently given for the building of a memorial church in some populous and needy parish in the diocese.

THE Council of the London Chamber of Commerce at their meeting on the 10th inst. elected Mr. Henry Adams, M.Inst.C.E., F.S.I., &c. (Henry Adams & Son, 60 Queen Victoria Street, E.C.), a member of the arbitration committee of the Chamber in addition to the engineering committee, of which he has been a member for some years.

THE Guildford Board of Guardians have decided on the erection of a home for nurses at the workhouse, in accordance with plans approved by the Local Government Board, at a cost not exceeding 2,650*l.*, which will be borrowed for a period of not more than thirty years.

THE water committee of the Aberdeen Town Council, on the question of obtaining a new water supply for the city, has decided to apply to Parliament for powers to bring a supply from the River Avon, this being the scheme that has been under consideration for several years. The estimated cost is put at 835,000*l.*, but that sum will probably be exceeded.

IN the King's Bench Division on Tuesday, Charles Groves, engineer, of Clapham, sued Messrs. Dove Bros., contractors, Islington, for damages for personal injuries caused by the alleged negligence of the defendants. It was stated that the plaintiff, in July last year, had his legs broken and his hip injured through the collapse of a scaffolding erected by the defendants on the stage of Drury Lane Theatre. Defendants denied negligence, but the jury returned a verdict for plaintiff for 500*l.*

THE Corporation of Newcastle-on-Tyne have this week opened a number of houses intended for the poorest class. The dwellings consist of two blocks, containing altogether seventy-two dwellings, each consisting of an apartment 15 feet by 12½ feet, with bed in alcove and screened-off scullery. The buildings are on Corporation land, and the tenements are to be let at 3*s.* 6*d.* per week.

THE Stanmore estates of the late Mr. Frederick Gordon, which include Bentley Priory, Stanmore Park, and the Manor House and Woodlands estates at Stanmore, Middlesex, were sold by auction in London on Monday. They extend over 800 acres, and produce some 10,000*l.* per annum. A bid of 50*l.* in excess of the reserve was immediately made, and at the price of 275,050*l.* the estate was declared sold.

THE vicar and churchwardens of Harrow parish church have received authority from the Consistory Court to erect an addition to the vestry from plans prepared by Sir A. Webb, R.A., on consecrated ground at the north side of the parish church. The Court direct that between the floor of the vestry and the foundation on which it rested a concrete pavement should be laid, so that any unknown graves which might be beneath would be undisturbed.

MR. GILBERT BAYES is executing the memorial to Coquelin *aîné*, which English actors and actresses are to present to the Comédie-Française. It is to consist of a bronze shrine, Greek in form, over a female gilt figure emblematical of "Fame" holding a wreath of laurel in her hand. On the wall of the shrine are inscribed the names of the principal characters represented by Coquelin. The height of the shrine is 3 feet 6 inches.

THE Hartlepool Corporation have decided upon an important scheme for the improvement of the area at the corner of Corporation Road and Warren Street. The leases of the property in this area lapsed in December last, and, as soon as the land passed into the possession of the Corporation, the improvement committee took the matter in hand, with the result that a scheme has been approved by the Council for the transformation of the area. The land has been divided into nineteen sites, and these are now being offered by the Corporation for dwelling-houses for a lease of seventy-five years, the lessees to erect self-contained houses of not less value than 200*l.* each.

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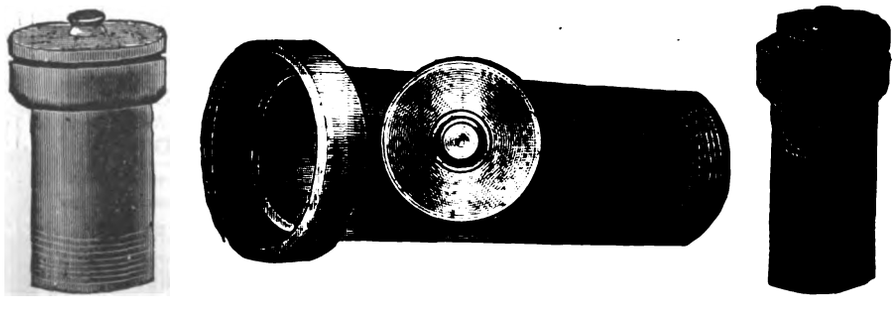
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THE Dublin Corporation decided this week:—(*a*) That the paving committee be directed to take steps to ensure that in future no name which is un-Irish or anti-Irish in expression or sentiment shall be given to any new street, road, avenue, terrace, or other place taken in charge by the Corporation; (*b*) that the name-plates in future erected on any such new streets or other places shall bear names in the Irish language; (*c*) that the committee be directed to, if possible, complete the erection of bi-lingual name-plates on all streets, roads, avenues, &c., now in charge of the Corporation during the next five years; this paragraph not to refer to obsolete or unnecessary names on any terrace, row, or villa forming part of a road, street, or avenue, in which the numbers run consecutively, and the numbers on the houses of such terraces, &c., are what might be described as "street numbers."

THE Stafford Town Council have accepted the resignation of Mr. W. Blackshaw, the borough engineer. The following recommendations have been adopted:—(*a*) That on the appointment of a new borough engineer and surveyor the services of Mr. Blackshaw be retained in the capacity of consulting engineer and surveyor in connection with the various departments now under his supervision, that he be paid for such services a fee of 150*l.* per annum, and that this arrangement be reconsidered at the expiration of two years; (*b*) that a borough engineer and surveyor be appointed to succeed Mr. Blackshaw, the salary to be 275*l.* per annum, rising to 400*l.* by annual increments of 25*l.*; (*c*) that the committee be authorised to publish forthwith the necessary advertisement, examine the applications received, and select therefrom no fewer than three for submission to the Council at the meeting to be held on July 30 next.

IN the Court of Appeal, before Lords Justices Vaughan Williams, Moulton and Buckley, an application was made on Monday to fix a day for continuing the hearing of an appeal by the plaintiffs in the case of William Kennedy, Ltd., *v.* the Mayor and Corporation of Barrow-in-Furness, against an order of Mr. Justice Bucknill staying the action on the ground that the dispute ought to be referred to arbitration. The plaintiffs, who are a firm of Glasgow contractors, claim 31,264*l.* under a contract for the construction in connection with the defendants' waterworks of a dam and intake. The defendants' engineer had refused to give certificate of completion, alleging defects in the dam, and the plaintiffs contended that as he was the arbitrator mentioned in the contract he was not a fit person to adjudicate in the matter. The appeal was partly heard last March before Lords Justices Vaughan Williams and Kennedy, but was adjourned for the Barrow town clerk and the engineer to make affidavits, and it had since stood over owing to the absence of Lord Justice Vaughan Williams. It was now arranged that the appeal should be reargued before the Court as at present constituted on Monday next.

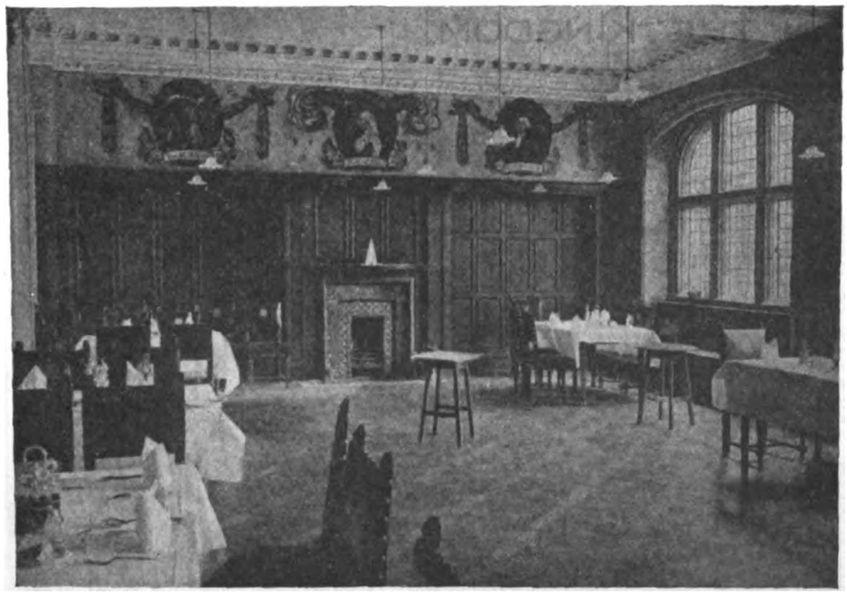
THE SMOKE NUISANCE AND THE LONDON COUNTY COUNCIL.

THE public control committee of the London County Council reported in February that they had had under consideration for a considerable time past the question of smoke nuisance in London and the means which may be adopted to remedy the evil. In their opening remarks they say that without any direct statutory control or responsibility in dealing with smoke nuisance from trade premises, the Council has some indirect control by virtue of its power of acting in default of sanitary authorities under the Public Health (London) Act, 1891. In the special cases of steam locomotives on railways, and locomotives on roads, the Council is able to take direct action, and has secured a very considerable reduction of nuisance from these sources.

Experience has shown that the principal enactments dealing with smoke are inadequate, and that important amendments are needed to furnish means for dealing effectively with the nuisance. All sources of smoke nuisance in London, except locomotives and domestic chimneys, are subject to the operation of Sections 23 and 24 of the Public Health (London) Act, 1891, but Sections 23 and 24 (*a*) are so crippled by qualifying words that it is difficult to obtain convictions under them. The only provision of real value—namely, Section 24 (*b*)—deals with black smoke alone, and this is the only portion of the smoke sections of the Act which is enforced by the majority of the Metropolitan Borough Councils.

The limitation of this effective section to black smoke is unfortunate, as very frequently smoke of other colour than

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black is emitted in such volumes as to cause very serious nuisance, and yet, under the existing law, it is practically impossible to penalise the offenders. The extension of Section 24 (*b*) to cover any serious emission of smoke, irrespective of colour, would be most useful, and similar powers are to be found in the Public Health (Scotland) Act, 1897. A further reason in support of this proposal is the fact that in the year 1907 unsuccessful and costly proceedings were instituted by the Chelsea Metropolitan Borough Council against the Underground Electric Railways Company of London, Limited, and after a long trial, at which much expert and technical evidence was tendered, the case was dismissed, with 300 guineas costs against the Borough Council. The magistrate found that it had not been proved to his satisfaction that the smoke, the subject of the summons, was "black" smoke. It appears to us, says the committee, that a similar difficulty may possibly hereafter arise on this point, in which case the only section of the Act of 1891 which has been of real value will prove to be as unreliable as the other smoke provisions of the Act. The result of the proceedings also leads us to think that Metropolitan Borough Councils may desire the assistance of the Council in cases of special difficulty, and those which may possibly involve exceptional expenditure in connection with their conduct. Although the Council has power to act in default of a Borough Council, it is not in a position to assist in the manner indicated, and we think that this state of affairs should be remedied.

It has been found that some of the electric lighting corporations contend that they are exempt from penalties for smoke nuisance, as they allege that the nuisance arises in connection with the discharge of statutory obligations, and these corporations when applying to Parliament for new powers have endeavoured to obtain relief from the existing law relating to such nuisance. We see no reason why exemption should be granted to the corporations in question, as there is abundant evidence to show that their businesses can be conducted without causing nuisance from smoke, and we accordingly submit a proposal dealing with the matter.

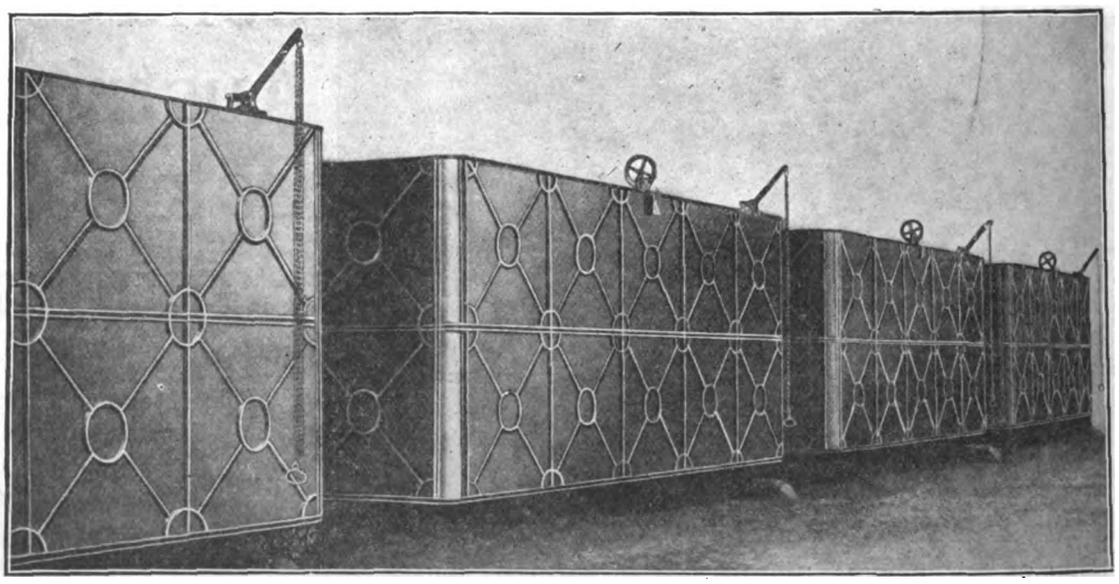
It is also extremely desirable that Government property, which is now exempt from the provisions of the Public Health (London) Act, 1891, relating to smoke, should be brought under their operation, as both the Council and the Woolwich Metropolitan Borough Council have frequently had cause to complain of the serious smoke nuisance from the chimneys of the Royal Arsenal at Woolwich. In this connection we may remind the Council that the following resolution was passed at a conference of the Metropolitan Borough Councils, held on July 7, 1904, on the administration of the Public Health (London) Act, 1891:—"That, in the opinion of this conference, it is desirable that the provisions of the Public Health (London) Act, 1891, as to nuisances arising from the emission of smoke, should be applied to property in the possession of the Crown."

Much nuisance has arisen from premises belonging to Borough Councils, and only recently we had under consideration a serious nuisance from the electricity works of the Stepney Metropolitan Borough Council in Osborne Street, Stepney. Although technically within the statue, the nuisance is practically unpunishable and one in which the Council is without power to act in default. Having regard to the principle underlying the Public Health (London) Act, 1891, it seems reasonable to suppose that if the point had been considered when the measure was before Parliament the Council would have been given power to act in such cases. We think that it will be to the advantage of London if the Council is in a position to take proceedings in cases of this description, and, of course, action would be taken only when all other means of securing an abatement of a nuisance had failed.

Considerable nuisance from smoke arises from trade premises outside London, which nuisance is dealt with under the Public Health Act, 1875. For practical purposes the effect of the law is the same outside and inside London. When such smoke drifts into London and becomes a nuisance, proceedings can be taken by the authority whose district is affected, in pursuance of Section 14 of the Public Health (London) Act, 1891. In practice this limits the taking of action to those Borough Councils on the borders of London, as other Borough Councils find difficulty in proving that their districts are affected. All London, however, suffers more or less from a smoke nuisance of this description, and we therefore consider that the Council should also be in a position to take proceedings if such a course is found to be necessary.

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nuisance, we held on March 12, 1909, a conference with repeesentatives of the City Corporation and the Metropolitan Borough Councils, at which proposals Nos. (i.) to (iv.), submitted below, were very fully discussed and approved, with the exception of No. (iv.), which, if it becomes law, will empower the Council to take proceedings in respect of smoke nuisance created by sanitary authorities. We, however, place very great importance upon the proposal in question, and we think the Council will be well advised to proceed with it.

Serious smoke nuisance also arises from private houses. It is estimated that one-half of the smoke in London comes from this source, and at the present time does not come within the law. The smoke from each individual chimney may be slight, but when it is remembered that in winter probably one million domestic chimneys in London pour forth smoke daily into the atmosphere it is evident that the total volume of smoke must be very great. As indicating the great amount of smoke discharged from domestic chimneys it has been noticed that some of the densest London fogs have arisen on days when the great bulk of business premises have been closed, and a bank of smoke in London has been seen to rise to a height of at least 3,000 feet or 4,000 feet, and to be carried by the wind in a sunlight-obscuring trail to a distance of fifty miles.

Dr. W. M. Shaw, of the Meteorological Office, states that he finds from comparison of records that, owing to its smoke, London loses half of its sunshine in winter, and one-sixth in summer, and there can be no doubt that domestic grates contribute largely towards this evil. Many people advocate the abolition of the open fire in favour of the closed stove system in use on the Continent, but while undoubtedly the general adoption of such a system of heating would result in a purer external atmosphere, this would be secured at the sacrifice of much of the fresh air inside living rooms for which open fires, by providing a good deal of ventilation, are largely responsible. It is therefore unlikely that English people will abandon the open fire. Although, owing to the very nature of its construction, it seems impossible to combine in the open grate the essentials of smokeless combustion unless anthracite coal or coke be exclusively used, careful experiment and inquiry have shown that there are several open fire grates on the market which secure excellent combustion of coal and largely reduce the amount of smoke.

Much reduction of smoke nuisance from private houses may be expected through the growing use of gas and electricity for the purposes of heating and cooking, as it has been found that nearly half a million gas cooking-stoves are now in use in London, and their use is steadily increasing. It has been suggested that the amount of smoke could also be considerably reduced by adopting systems of central heating, but we are of opinion that to diminish domestic smoke materially it is necessary to educate public opinion on the subject, and a step in this direction is the instruction which is given to children in elementary schools in the principles of combustion, so as to make them grasp the fact that smoke is not inevitable, but often results from the wasteful use of fuel.

We do not propose at the present time to suggest any action to deal with nuisance from this source, but it may be found necessary at some future time, unless public opinion brings about some radical improvement, to give serious attention to this grave problem.

Considerable inquiry, however, would be necessary before ameliorating measures could be proposed, and we think that the opportunity should now be taken of placing the Council in a position to expend money for the purpose.

As required by standing order No. 163, we have to state that we are advised by the solicitor that the Council has power to promote legislation in the direction above indicated, provided that the provisions of the Borough Funds Act, 1872, as applied by the County Councils (Bills in Parliament) Act, 1903, are complied with, and we recommend:—

(*a*) That, as regards nuisance from smoke in the County of London, application be made to Parliament in the session of 1910 to give effect to the following proposals:—

(i.) That Section 24 (*b*) of the Public Health (London) Act, 1891, which provides that "any chimney (not being the chimney of a private dwelling-house) sending forth black smoke in such quantities as to be a nuisance" shall be a nuisance liable to be dealt with summarily under the Act, should be amended by the deletion of the word "black."

(ii.) That the word "chimney" in Section 24 (*b*) of the Public Health (London) Act, 1891, should be deemed to include:—(*a*) Openings through which smoke is emitted from



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buildings or places in which processes of manufacture are carried on, and the chimneys of any building or place where furnaces are used in operations carried on under statutory powers; (*b*) the chimneys of any Government workshop or factory.

(iii.) That in special cases of nuisance arising under Sections 23 and 24 of the Public Health (London) Act, 1891, the proceedings in respect of any nuisance may, at the request of and by agreement with the sanitary authority, be taken by the Council in such special cases.

(iv.) That the power of the Council to take proceedings in respect of nuisance created by sanitary authorities under Section 22 of the Public Health (London) Act, 1891, should be extended to apply to smoke nuisance from electricity or other industrial works, or from premises used for the treatment or disposal of refuse, or for disinfecting purposes, or from baths or wash-houses or other buildings or wharves owned, leased, or occupied by sanitary authorities in which furnaces are used.

(v.) That the power of sanitary authorities under Section 14 of the Public Health (London) Act, 1891, to take proceedings in respect of nuisance arising outside their respective areas should be extended to the Council as regards smoke nuisance arising outside the County of London.

(vi.) That the Council should be empowered to expend such money as it may think expedient, not exceeding 500*l*. a year, for the advancement of measures for the abatement of smoke nuisance.

(*b*) That the costs and expenses of promoting the legislation referred to in the foregoing resolution (*a*) be defrayed out of the county fund.

The finance committee have prepared the following report on the above recommendations:—

The public control committee are recommending the Council to apply in the session of 1910 for an amendment of the law relating to nuisance from smoke, and for power to enable the Council to expend sums not exceeding 500*l*. a year for the advancement of measures for the abatement of the smoke nuisance. No estimate is put forward in respect of the cost involved in administering the powers to be sought, which include the extension of the Council's power for the Council to act in default of the local authority, and power for the Council to act directly in certain special cases of nuisance. At present the expenses of the Council in acting in default of the sanitary authority are recoverable from the latter. Under the proposals of the public control committee the administrative expenses of this Council would be chiefly in connection with proceedings against sanitary authorities, and in respect of nuisances arising from sources outside the county.

We see no objection, from a financial point of view, to the proposals of the public control committee so far as they relate to the strengthening of the powers of the Borough Councils in this matter. We view with apprehension, however, any proposal which might involve the Council in increased expenditure of an unascertained amount in connection with the administration of any powers which may be conferred upon the Council as the result of the legislation now proposed, and we are not prepared, in the absence of any estimate as to the expenditure to which the Council may be put, to endorse the proposals of the public control committee, so far as they relate to such additional powers.

THE Doncaster Rural District Council have instructed Messrs. D. Balfour & Son, of London and Newcastle-on-Tyne, to report upon the best means of sewering, and also disposing of the sewage of a portion of Adwick-le-Street, and also for the parishes of Owston and Skellow in their district, which is urgently required owing to important colliery developments in that neighbourhood.

THE Darfield Urban District Council have received the sanction of the Local Government Board to the carrying out of a scheme of sewage disposal prepared by Messrs. D. Balfour & Son, civil engineers, London and Newcastle-on-Tyne, for the town of Darfield, near Barnsley. The work consists in the construction of screening and detritus tanks, from which the sewage will flow into a storage tank and be pumped by oil engines and centrifugal pumps to a receiving tank, from which it will gravitate to the liquefying tanks. The tank effluent will flow to a dosing chamber, from which it will be distributed on to primary and secondary percolating filters, and after flowing through humus chambers will be discharged into the River Dearne.

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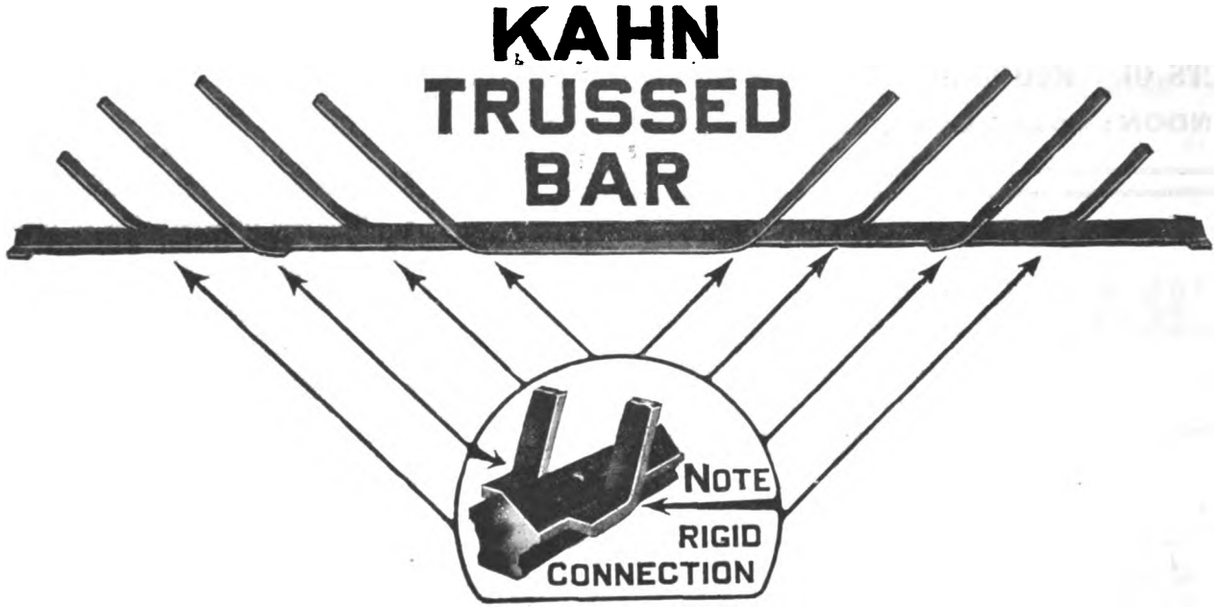
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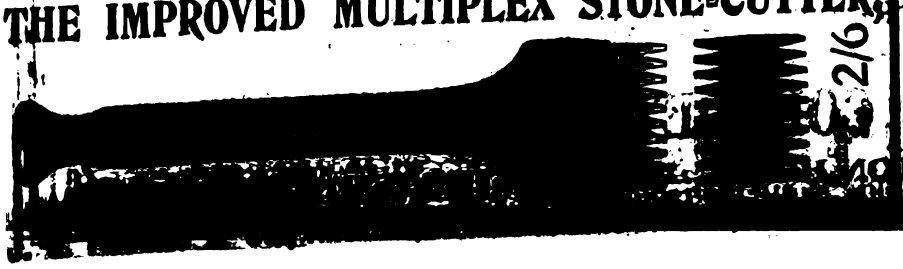
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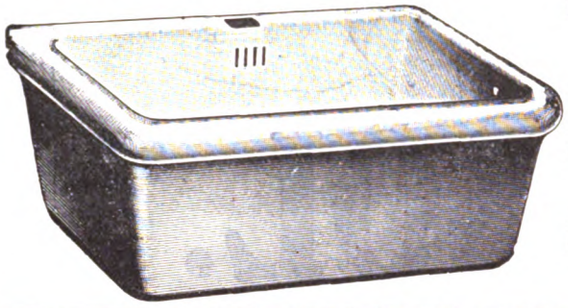
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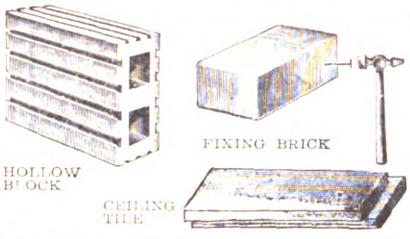
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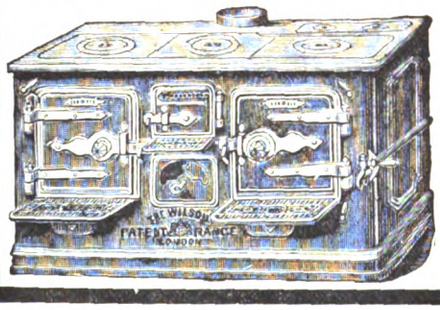
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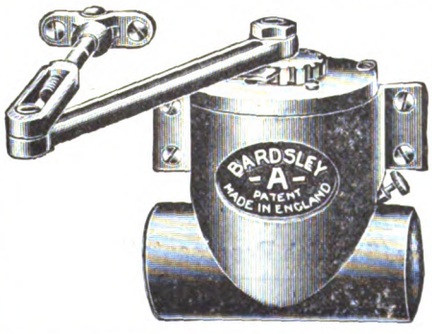
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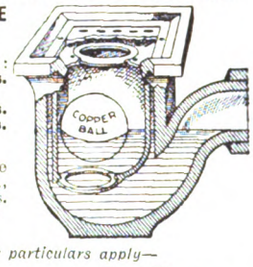
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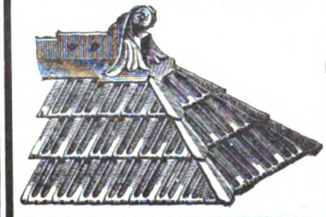


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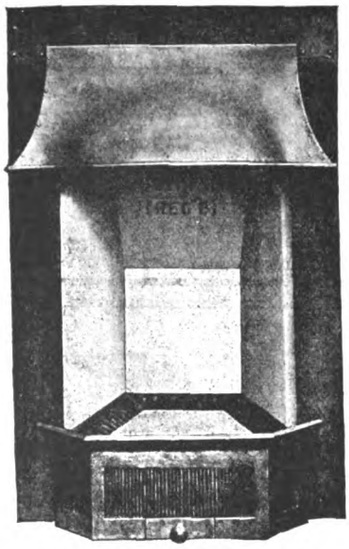
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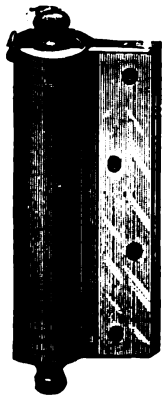
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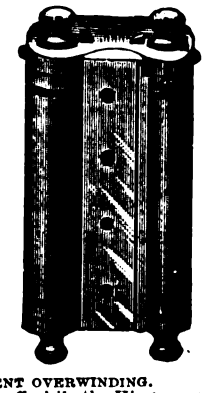
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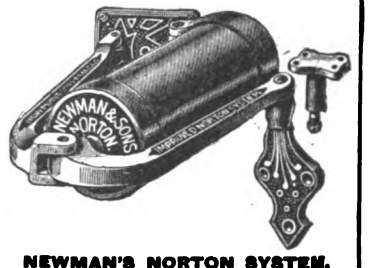
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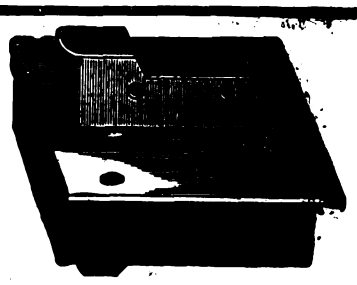
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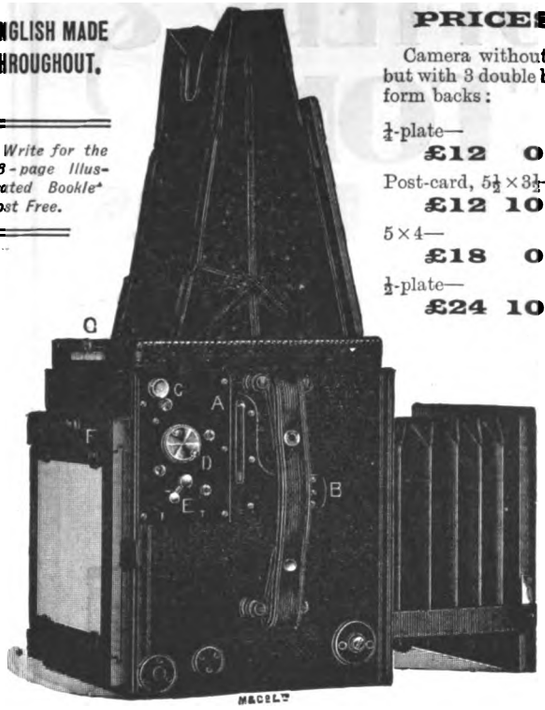
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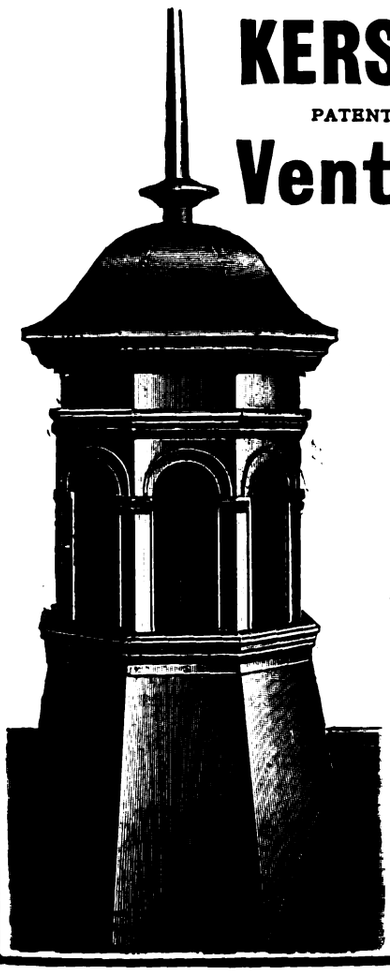
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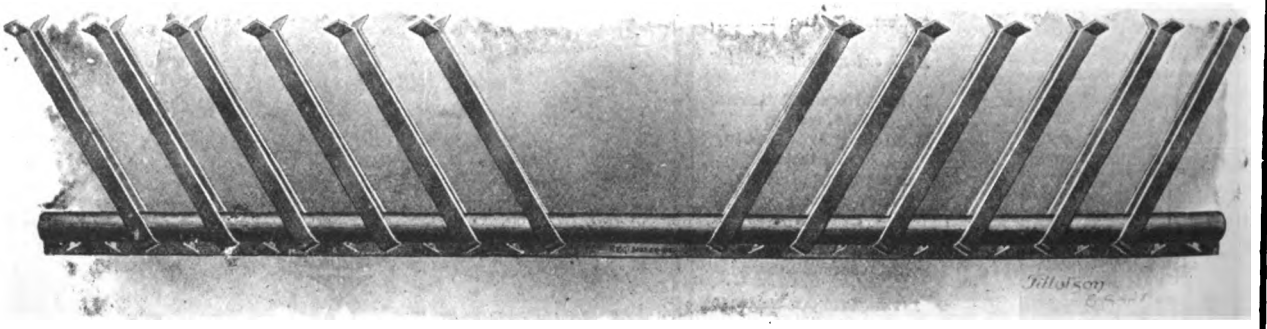


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P. A. GILBERT WOOD,

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EDITORIAL NOTICES.

In view of the many difficulties which are certain to arise in connection with the law, practice rules and procedure under the Workmen's Compensation Act, we have added to our staff A VERY EMINENT BARRISTER, who has made the subject a special study, and will be glad to answer in the columns of this paper any questions relating to the complicated matters arising from the provisions of this difficult Act. Our LEGAL ADVISER will further answer any legal question that may be of interest to our readers. All letters must be addressed "LEGAL ADVISER," Office of "The Architect," Imperial Buildings, Ludgate Circus, London, E.C.

The Editor will be glad to receive from Architects in London and the Provinces results of Competitions and Tenders and other particulars of Works in progress in which they may be interested.

No communication can be inserted unless authenticated by the name and address of the writer—not in every case for publication, but as a guarantee of good faith.

Correspondents are requested to make their communications as brief as possible. The space we can devote to Correspondence will not usually permit our inserting lengthy communications.

The authors of signed articles and papers read in public must necessarily be held responsible for their contents.

TENDERS, ETC.

*** *As great disappointment is frequently expressed at the non-appearance of Contracts Open, Tenders, &c., it is particularly requested that information of this description be forwarded to the Office, Imperial Buildings, Ludgate Circus, London, E.C., not later than 2 P.M. on Thursdays.*

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assessor. Premiums of 100*l.*, 75*l.*, and 50*l.* Deposit 1*l.* 1*s.* Apply to Mr. J. Fred Hawkins, county surveyor, Bank Chambers, Cross Street, Reading.

STOKE-UPON-TRENT.—July 9.—For additions to the town hall, including hall to seat 3,000 people, and police court. Premiums of 100*l.* and 50*l.* for designs placed second and third. Mr. J. B. Ashwell, town clerk, Town Hall, Stoke-upon-Trent.

WALSOKEN.—June 30.—The Norfolk education committee invite plans, specifications and estimates for a new school. Apply to the Secretary, County Education Offices, Shire Hall, Norwich.

WHITBY.—July 30.—The North Riding of Yorkshire County Council education committee invite designs for a secondary school. Mr. Paul Waterhouse, assessor. Apply to the Secretary, Education Offices, County Hall, Northallerton.

WOOD GREEN.—July 9.—For the erection of public baths at a cost of 8,000*l.* Premiums of 50, 25 and 15 guineas. Mr. A. Hessell Tiltman, F.R.I.B.A., assessor. Architects should send particulars of baths recently designed by them to Mr. W. P. Harding, clerk, Town Hall, Wood Green. See advertisement.

CONTRACTS OPEN.

ASHLEY.—July 12. For erection of an additional classroom for fifty children and a cloakroom at Ashley Council school, Hants. Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

BARNET.—June 30.—For erection and completion of a County Council school. Deposit 2*l.* 2*s.* Mr. Urban A. Smith, county surveyor, Hatfield.

BARROW-IN-FURNESS.—July 7.—For erection of conveniences in the public park. Borough engineer's office.

BATLEY.—July 5.—For the erection and completion of conveniences at the Carlinghow Council schools. Mr. Oscar J. Kirby, borough engineer, Town Hall, Batley.

BICESTER.—July 12.—For the construction of the new cattle market as follows:—Contract No. 1—Buildings, roads, drainage and concreting. Contract No. 2—Constructional ironwork for cattle, sheep and pig pens. Deposit 3*l.* 3*s.* each. Mr. Richard Parker, surveyor, Market Hill, Bicester, Oxon.

BIRKENHEAD.—July 19.—For the construction of a dwarf brick wall, with counterforts and stone coping, to the Bebington Road and Albany Road frontages of Victoria Park. Deposit 10*s.* Mr. Chas. Brownridge, M.I.C.E., borough engineer and surveyor, Town Hall, Birkenhead.

BIRMINGHAM.—June 29.—For supply and erection of platform roof covering at Moor Street Station, for the Great Western Railway Company. The New Works Engineer, Paddington Station, London.

BLACKBURN.—July 5.—For erection of the higher elementary school and swimming bath on Blakey Moor. Deposit 1*l.* 1*s.* Messrs. Briggs & Wolstenholme and Messrs. Stones and Stones, joint architects, Richmond Terrace, Blackburn.

BOYLESTONE.—July 1.—For erection of three cottages, cowsheds, &c., on the County Council Small Holdings at Boylestone, Derby. Deposit 2*l.* 2*s.* Mr. Maurice Hunter, surveyor, All Saints' Chambers, Derby.

BRADFORD.—For erecting extensive alterations and additions to St. Stephen National schools, Bowling Old Lane. Mr. T. L. Dixon (late Brayshaw & Dixon), architect and surveyor, Bowling Old Lane, Bradford, and Halifax Road, Buttershaw.

BRIGHTON.—July 6.—For erection of a residence at the workhouse, Elm Grove, for the assistant medical officer. Messrs. Hawker & Clover, architects for the Guardians, 8 North Street, Brighton.

BURY.—July 10.—For the erection of a secondary school in Westminster Street. Deposit 2*l.* Mr. J. T. Halliday, A.R.I.B.A., 14 John Dalton Street, Manchester.

CHAPEL-EN-LE-FRITH.—For erection of Primitive Methodist schools. Messrs. Bryden & Walton, architects and surveyors, Buxton.

CHOPWELL.—June 30.—For erection of five shops. Mr. D. M. Spence, architect and surveyor, Shotley Bridge.

COTHERSTONE.—June 28.—For additions and alterations to St. Cuthbert's Grove, Cotherstone, Darlington. Mr. Wm. Kidd, Red Lion Hotel, Cotherstone.

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CRICKLADE AND SWINDON.—July 12.—For internal and external renovations to Cricklade, Old Swindon and New Swindon police stations, Wilts. Mr. J. George Powell, county architect and surveyor, County Offices, Trowbridge.

CROYDON.—June 29.—For the following works for the Croydon Town Council, viz.:—(*a*) Builders' work necessary in the erection of engine and boiler houses, two cottages, &c., at the Waddon Well (Contract No. 5); (*b*) smith and iron-founders' work necessary in the erection of a steel roof, &c., in the pumping station at the Waddon Well (Contract No. 6). Deposit 1*l.* 1*s.* Mr. George F. Carter, M.I.C.E., borough engineer, Town Hall, Croydon.

CUDWORTH.—July 2.—For the conversion of offices (builder, plumber), at Cudworth, Snydale Road provided school. The West Riding Architect, County Hall, Wakefield.

DARTMOUTH.—June 30.—For erection of a pair of cottages at Above Town. Mr. W. Percy Marr, A.R.I.B.A., architect and surveyor, Dartmouth.

DEWSBURY.—June 29.—For the various works required in enlarging a weaving shed in three contracts:—(1) Mason; (2) joiner, ironfounder, plumber and painter; (3) slater. Messrs. Kirk, Sons & Ridgway, F.R.I.B.A., architects and surveyors, Market Place, Dewsbury.

DORCHESTER.—June 28.—For repairs at the following Council schools during the ensuing summer holidays:—Bothenhampton, Buckhorn Weston, Caundle Stourton, Charmouth, Gillingham, Handley, Kinson, Lytchett Matravers, Lytchett Minster, Stour Provost, Stratton, Swyre, and Yetminster. The Secretary, County Education Office, Dorchester.

DROYLSDEN (LANCS).—June 28.—For erection of buildings to contain refuse destructor and sludge-pressing plant, adjoining the sewage disposal works. Deposit 3*l.* 3*s.* Mr. Charles Hall, engineer and surveyor, Council Offices, Droylsden.

FALMOUTH.—July 5.—For erection of a pair of semi-detached villas, near Gyllyngvase Beach. Mr. H. E. Tresidder, P.A.S.I., A.I.S.E., architect, 23 Church Street, Falmouth.

FEATHERSTONE.—July 8.—For the following works:—Featherstone new school (builder, joiner, slater, plasterer, plumber, painter). Deposit 1*l.* each. The West Riding Architect, County Hall, Wakefield.

FENTON (STAFFS.).—The Fenton education committee invite tenders for (1) the heating apparatus; (2) furniture, for infants' school in course of erection in Manor Street; (3) construction of a panic exit, iron staircase and sundry work in connection therewith at the boys' department of the Market Street schools; (4) renovation of the temporary class-rooms at Heron Cross schools; (5) painting at (*a*) Queen Street schools, mixed department; (*b*) St. Mary's schools, Havelock Street; (*c*) the new cookery school, Market Street. Mr. S. B. Ashworth, architect, Old Bank Chambers, Stoke-upon-Trent.

GATESHEAD.—June 26.—For the several trades required in erection of a parish hall for Christ Church. Send names to Messrs. Hicks & Charlewood, architects, 67 Westgate Road, Newcastle-on-Tyne.

GLASGOW.—June 28.—For the following works of F Block (special diseases) at the Glasgow Royal Infirmary, viz.:—(1) Digger, mason, brick and steel; (2) carpenter, joiner, glazier and ironmonger; (3) plumber; (4) plasterer; (5) tile and marble. Deposit 1*l.* 1*s.* Mr. James Miller, A.R.S.A., architect, 15 Blythswood Square.

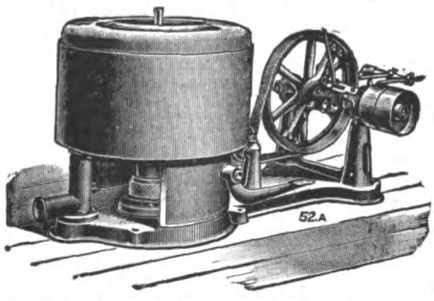
GRANTHAM.—July 14.—For erection of a girls' secondary school. Deposit 1*l.* 1*s.* Mr. H. H. Dunn, A.R.I.B.A., Silver Street, Lincoln.

GUILDFORD.—July 12.—For the construction of the superstructural buildings (upon foundations already completed) over the refuse-destructor plant and machinery at Bellfields, Stoke. Deposit 2*l.* 2*s.* Mr. C. G. Mason, A.M.I.C.E., borough engineer and surveyor, Tuns Gate, Guildford.

HALIFAX.—June 30.—For additions to house at Salterhebble. Messrs. Clement Williams & Sons, architects, &c., Post Office Buildings, Commercial Street, Halifax.

HULL.—July 9.—For steel roof work required in an extension of the Madely Street baths, for the Corporation. The work consists of eight elliptical principals of about 74 feet span, together with purlins, lanterns, &c., the total weight being approximately forty tons. Plan 2*s.* 6*d.* Deposit 1*l.* Mr. A. E. White, M.I.C.E., city engineer, Town Hall, Hull.

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HYTHE.—June 28.—The Secretary of State for War invites tenders for the following work:—Erection of sixteen "b" married soldiers' quarters (cottage type) in one block at Hythe barracks, in the Eastern Command. Deposit 10*s*. Director of Barrack Construction, 80 Pall Mall, London, S.W.

IRELAND.—June 30.—For the erection of National schools at Gorey, co. Wexford. Deposit 1*l*. Mr. G. L. O'Connor, M.R.I.A., architect, 426 Great Brunswick Street, Dublin.

IRELAND.—July 1.—For the erection of Foresters' Hall, Arklow. Mr. M. Waldron, 58 Main Street, Arklow.

IRELAND.—July 5.—For building a dwelling-house at Ballyherridan, near Armagh. Mr. Sampson Jervois, M.R.I.A.I., architect, Armagh.

IRELAND.—July 14.—For repairs, &c., to the surgeon's house, Longford Infirmary. Mr. S. Wilson, registrar, Medical Hall, Longford.

KNOTTINGLEY (YORKS.).—July 1.—For erection of a school at Knottingley. Deposit of 1*l*. must be paid direct to the West Riding Treasurer, County Hall, Wakefield. Messrs. Tennant & Collins, architects, Pontefract.

LEEDS.—July 1.—For erection of a block of buildings in Hope Street. Mr. C. S. Nelson, architect, Sun Buildings, 15 Park Row, Leeds.

LITTLEHAMPTON.—July 1.—For building and completing a shelter hall on the Green. Mr. H. Howard, M.S.A., surveyor, Town Offices.

LONDON.—June 26.—For certain repairs and decorative work at the infirmary, Lower Road, Rotherhithe, S.E., for the Bermondsey Board of Guardians. Deposit 10*l*. Mr. E. Pitts Fenton, clerk, 283 Tooley Street, S.E.

LONDON.—July 5.—For the construction of two underground conveniences in Horseferry Branch Road, by Commercial Road East, Ratcliff, E., for the Stepney Borough Council. Deposit 5*l*. Mr. M. W. Jameson, A.M.I.C.E., borough engineer, Municipal Offices, Great Alie Street, Whitechapel, E.

LONDON.—July 12.—The Tottenham education committee invite tenders for summer repairs to various schools in their district. Separate tenders are invited for repairs to playgrounds. Deposit 1*l*. 1*s*. Mr. W. H. Prescott, A.M.I.C.A., surveyor to the committee, Council Offices, Tottenham.

LONDON.—July 20.—For erection of school buildings to accommodate 1,032 children, at Vicarage Lane, East Ham. Deposit 50*l*. Send names by June 29 to Mr. R. I. Curtis, architect, 11 and 12 Finsbury Square, London, E.C.

LOWESTOFT.—June 29.—For erection and completion of an additional ward pavilion and for additions to the administrative block at the sanatorium, Rotterdam Road. Deposit 2*l*. Mr. G. H. Hamby, A.M.I.C.E., borough surveyor, Town Hall, Lowestoft.

MANCHESTER.—June 30.—For the construction of an underground lavatory for males at the Poultry Market, Shudehill. Deposit 1*l*. 1*s*. The City Surveyor, Town Hall, Manchester.

MANCHESTER.—July 12.—For erection of the Moseley Road Municipal school, Fallowfield. Deposit 2*l*. 2*s*. The Education Offices, Deansgate, Manchester.

MARYPORT (CUMBERLAND).—June 30.—For the various works in connection with the building of fifteen workmen's cottages, viz.:—Two at Crofton, four at Brayton, one at Mealsgate, four at Aspatria, three at Bullgill and one at Dearham Bridge, for the Maryport and Carlisle Railway Company. Separate tenders for the cottages at each place. The Engineer of the Company, Maryport Station, Cumberland.

NEWBIGGIN-BY-SEA.—July 13.—For extending the Newbiggin-by-the-Sea Council school, Northumberland. Deposit 1*l*. 1*s*. Send names to Mr. C. Williams, secretary to the education committee, the Moot Hall, Newcastle-on-Tyne.

PEAKDALE.—July 8.—For erection of infants' school and additions to Peakdale Council school, near Buxton, Derbyshire. Deposit 1*l*. 1*s*. Send names to Mr. George E. Garlick, architect, Quadrant Chambers, Buxton.

PENSNETT.—For erection and completion of a Council school for 250 children, and a cookery room, at Pensnett, near Dudley. Deposit 1*l*. 1*s*. Apply to Mr. Graham Bal-

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four, director of education, County Education Offices, Stafford.

REDRUTH.—July 1.—For renovations and alterations of the workhouse. Mr. Sampson Hill, architect, Redruth.

ST. ALBANS.—July 15.—The visiting committee of the Middlesex County Asylum, Napsbury, St. Albans, Herts, invite names of contractors willing to tender for alterations and additions to accommodate 582 additional patients at the asylum. Offers to undertake a portion of the work only will not be entertained. A selection will be made, and the selected firms will then be invited to tender. Mr. Rowland Plumbe, F.R.I.B.A., architect, 13 Fitzroy Square, London, W.

SALTASH.—June 30.—For converting the space under the Guildhall, Saltash, Cornwall, into two committee rooms. The Borough Surveyor's Office.

SCOTLAND.—For alterations at Alan Ker school, for the Greenock (Burgh) School Board. Deposit 10*s*. Mr. A. F. Niven, clerk, Municipal Buildings, Greenock.

SCOTLAND.—June 28.—For the mason, carpenter, slater and plaster works of alterations and improvements upon the dwelling-house and farmsteading at Invernoughty. Mr. Charles Christie, factor, the Estate Office, Strathdon.

SCOTLAND.—July 5.—For building workmen's hall, institute and free library at Cwmbach, Aberdare. Mr. Thomas Roderick, architect, Ashbrook House, Clifton Street, Aberdare.

SHARLSTON, NEAR WAKEFIELD.—June 28.—For erection of a central Sunday-school near St. Luke's Church. Deposit 1*l*. St. Luke's Lodge, Sharlston, near Wakefield.

SHOOTER'S HILL.—July 16.—For the construction of a water tower and other subservient works. Deposit 10*l*. with the Accountant, Metropolitan Water Board Offices, Savoy Court, Strand, W.C.

SKIPTON.—June 28.—For the mason, joiner, plumber, plasterer, slater and steel work required in erection of additions to the Science and Art Schools. Mr. James Hartley, architect, Skipton.

SOUTHAMPTON.—July 3.—For alterations and additions to "F" warehouse, Town Quay. Deposit 1*l*. Mr. E. Cooper Poole, A.M.I.C.E., engineer, Town Quay, Southampton.

SOUTHEND-ON-SEA.—June 30.—For alterations and additions to the boys' and girls' departments of the Southchurch Hall Council school. Messrs. Burles & Harris, architects, Clarence Street, Southend-on-Sea.

STAINLAND.—June 30.—For new floors at Bowling Green school, Stainland, West Riding. Mr. J. H. Thorpe, divisional clerk, Town Hall Buildings, Elland.

STOKE-ON-TRENT.—June 26.—For erection of skating rink in Wharf Street. Deposit 2*l*. 2*s*. Send names to Mr. J. Beardmore, architect, Stoke-on-Trent.

TIVERTON.—July 7.—For erection and completion of new school building for the Governors of the Middle Schools and School of Art. Deposit 2*l*. 2*s*. Mr. E. S. Perkin, director, School of Art, Fore Street, Tiverton.

TODMORDEN.—June 30.—For the mason, bricklayer, joiner, plumber, glazier, painter, ironfounder and steelwork required in the erection and completion of a motor-'bus garage at Millwood. Send names to Mr. J. A. Heap, borough engineer and surveyor.

WALES.—For the removal of old iron lavatories in various Council schools at Merthyr Tydfil, and the provision of new glazed stoneware lavatories with modern fittings complete. The Deputy Surveyor.

WALES.—June 28.—For the re-erection of tower at the public baths, Penarth. Mr. H. Snell, architect, 13 Hickman Road, Penarth.

WALES.—June 30.—For erection of a new church at Ammanford to seat 600. Send names to Mr. W. D. Jenkins, F.S.I., A.R.I.B.A., architect, Llandilo.

WALES.—June 30.—For erection of thirty houses for the Park View Building Club, Blackwood, Mon. Mr. Alan H. Davies, M.S.A., architect and surveyor, Dock Street, Newport, Mon.

WALES.—June 30.—For erection of two shops at New Road, Skewen. Mr. Richard Thomas, Miner's Arms, Skewen.

WALES.—July 3.—For erection of thirty or more workmen's cottages off Glyn Terrace, Tredegar, Mon., for the Glyn Building Club. Mr. A. F. Webb, architect and surveyor, High Street, Blackwood, or Tredegar.

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WALES.—July 5.—For building ten houses at Aberdare for the Monk Street Building Club. Mr. Thomas Roderick, architect, Clifton Street, Aberdare.

WALES.—July 5.—For erection of two semi-detached houses in Turkey Road, Llantwit Major. Messrs. W. M. Lewis & L. N. Morgan, architects, Pontypridd, Tonypandy and Cardiff.

WALES.—July 7.—For erection of a vestry, with conveniences and boundary walls at Ystrad Mynach, for the Welsh Methodist Connexion. Mr. T. Edmund Rees, architect and surveyor, Merthyr Tydfil.

WALES.—July 7.—For the erection and completion of the following works at the Swansea Union workhouse:—(1) Operating block, together with bridge connecting same to male block, &c.; (2) extension to female imbecile block. Deposit 2*l.* 2*s.* Mr. Charles T. Ruthen, architect, Bank Chambers, Swansea.

WALES.—July 10.—For erection of two pairs of semi-detached villas at The Walk, Merthyr Tydfil. Mr. T. Edmund Rees, architect and surveyor, Merthyr Tydfil.

WATERLOO (LANCS.).—June 28.—For shelters, picket fencing and entrance gates at Crosby Road Recreation Ground, Seaforth. Mr. F. Spencer Yates, A.M.I.C.E., surveyor to the Council, Town Hall, Waterloo, Lancs.

WEMBLEY.—June 30.—For extension of the public offices, Harrow Road, including the erection of a fire station. Deposit 2*l.* 2*s.* Mr. Cecil R. W. Chapman, surveyor, Public Offices, Wembley.

WHALEY BRIDGE.—July 10.—For erection of joint Council schools at Whaley Bridge, Derbyshire, to accommodate 336 children (mixed and infants), with cookery and manual instruction rooms. Deposit 1*l.* 1*s.* Mr. George H. Widdows, A.R.I.B.A., architect to the committee, County Education Office, St. Mary's Gate, Derby.

WHITEHAVEN.—June 29.—For alterations and additions to the old infirmary at the workhouse. Deposit 5*s.* Mr. George Boyd, C.E., 33 Queen Street, Whitehaven.

WRENBURY.—June 26.—For interior alterations to Wrenbury Church, near Nantwich, comprising wood-block floor and reseating to nave and aisles, heating, ventilation, &c. Deposit 3*l.* 3*s.* Mr. C. Russell Hall, architect, Congleton.

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SHARP (*accepted*)	193 7 0

BYFLEET.

For the erection of the first portion of new church.

TARRANT (*accepted*)	£6,758 0 0

GRIMSBY.

For erection of villa residence in Weelsby Road. Mr. G. H. MUMBY, architect, Grimsby.

Pumfrey	£940 0 0
Gill	897 0 0
Vicars	885 0 0
Thompson & Son	862 0 0
Johnson	860 0 0
Hewins & Goodhand	847 0 0
PARKER & SON, Boston and Grimsby (*accepted*)	810 0 0

For erection of villa residence in Weelsby Road. Mr. G. H. MUMBY, architect, Grimsby.

Pumfrey	£1,030 0 0
Gill	975 0 0
Vicars	925 0 0
Thompson & Son	901 0 0
Johnson	895 0 0
Hewins & Goodhand	886 17 6
PARKER & SON, Boston and Grimsby (*accepted*)	880 0 0

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THE BATH STONE FIRMS LTD
MONK'S PARK TRADE MARK
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COBRIDGE (STAFFS.).

For additions to manufactory, for Messrs. H. & R. Johnson. Messrs. R. SCRIVENER & SONS, architects, &c., Hanley.

Chatfield	£1,286	0	0
Godwin	1,159	0	0
Grant & Sons	1,115	0	0
Cooke	1,100	0	0
Cornes & Son	1,095	0	0
Grant	1,078	0	0
Colley & Lindop	1,058	0	0
Bennett Bros.	1,000	0	0
WARDLE, Longport (*accepted*)	990	0	0
Smith	980	0	0

GOSPORT.

For erection of a Baptist church in Stoke Road. Messrs. JOHN WILLS & SONS, architects, Derby.

Privett	£2,567	0	0
Davis	2,547	0	0
Jones & Sons	2,479	0	0
Lear & Son	2,397	0	0
Evans	2,381	0	0
Light & Sons	2,375	0	0
Croad	2,294	0	0
Dash	2,255	0	0
HUNT, Gosport (*accepted*)	2,215	10	0
Architects' estimate	2,230	0	0

HASTINGS.

For building a public convenience in Fairlight Road, St. Helen's, Hastings, and other works. Mr. P. H. PALMER, M.I.C.E., borough engineer, Hastings.

BARTER, Hastings (*accepted*)	£239	0	0

HOUGHTON-LE-SPRING.

For enlarging the tanks at the William Henry Pit Sewage Works.

Harrison	£199	0	0
White	195	0	0
Hudson & Sons	192	3	0
Greaves	182	10	6
Westgarth	179	12	1
Brown	177	0	0
Robinson	170	0	0

HUDDERSFIELD.

For re-erection of a mill at Bay Hall. Messrs. STOCKS & SYKES, architects, Huddersfield.

Accepted tenders.

Law, Stead & Sons, mason	£1,245	0	0
Cooke, concreter, fireproof flooring, &c.	1,073	8	3
Ratcliffe, joiner	473	10	6
Brooke & Co., ironfounder	292	0	0
Marsden & Sons, plumber	192	10	0
Pickles Bros., slater	188	10	0
Moxon & Sons, painter	114	7	7
Jowitt, plasterer	73	10	0

KIRKHAM.

For erection of an elementary school and cookery and manual building at Kirkham, Lancs, to accommodate 200 scholars.

COTTAM, Preston (*accepted*)	£3,718	0	0

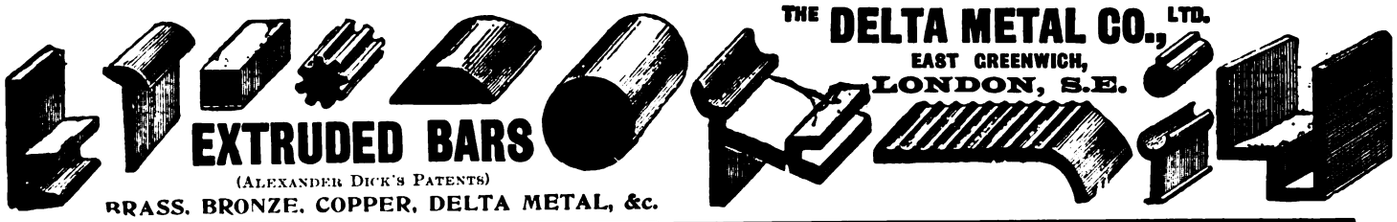
LONDON.

For electric lighting at the London County Council Secondary school, Putney.

Foster-Curtis & Co.	£876	14	9
Whitehead Bros.	848	9	0
Caspards, Ltd.	824	10	0
Macdonald	796	10	0
Taylor & Co.	789	0	0
Harland, Bowden & Co.	771	0	0
Harper Electric Company	762	9	0
Newton & Co.,	750	0	0
Balchin, Schulz & Co.	740	0	0
Mecredy, Eaton & Davidson	740	0	0
Tilley Bros.	722	12	0
Weston & Sons	720	0	0
Larkins & Co.	719	14	0
Bridger & Co.	694	9	0
Pinching & Walton (*recommended*)	665	3	0
Love & Sons	655	0	0

For the making-up and paving of Rectory Lane, Tooting. Mr. P. DODD, borough engineer.

WALL (*accepted*)	£3,643	0	0
Borough engineer's estimate	4,149	8	7



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LONDON—*continued.*

For electric lighting at the Oliver Goldsmith school, Peckham, for the London County Council education committee.

Grant & Blake, Clapham Junction (*recommended*)	£142 0 0

For erection of a manual training centre for forty boys on the Park Walk site, Chelsea, for the London County Council.

Lapthorne & Co.	£1,265 0 0
Roberts & Co.	1,264 0 0
J. & W. Drake	1,238 7 6
Bendon, Ltd.	1,219 3 3
Peattie	1,162 0 10
Lole & Co.	1,159 11 10
Lathey Bros.	1,157 0 0
Triggs	1,063 0 0
Soole & Son, Richmond (*recommended*)	1,052 14 10
Architect's (Education) estimate	1,136 0 0

For school at Torriano Avenue, St. Pancras, N.W., for the London County Council.

Spencer, Santo & Co.	£14,758 0 0
Leslie & Co.	14,056 0 0
Patman & Fotheringham	13,671 0 0
Johnson & Co.	13,465 0 0
Smith & Sons	13,442 0 0
McLaughlin & Harvey	13,192 4 7
McCormick & Sons	13,063 0 0
L. H. & R. Roberts	13,020 0 0
Godson & Sons	12,987 0 0
Treasure & Son	12,951 0 0
Kearley	12,893 0 0
Chessum & Sons (*recommended*)	12,648 5 3
Lawrance & Sons	12,530 0 0
Architect's (Education) estimate	13,154 0 0

For the following work for the Wandsworth Borough Council:—Making-up and paving of Waldron Road, Springfield. Mr. P. DODD, borough engineer.

HARRINGTON & Co. (*accepted*)	£1,390 0 0
Borough engineer's estimate	1,534 9 0

LONDON—*continued.*

For providing and fixing a hot-water heating apparatus at a school on the Dingle Lane site, Poplar.

Wontner-Smith, Gray & Co.	£699 10 0
Turner & Co.	660 0 0
Boyd & Sons	656 0 0
Kinnell & Co.	644 0 0
Stevens & Sons	637 0 0
Yetton & Co.	630 0 0
Palowkar & Sons	608 0 0
J. & F. May	608 0 0
Korting Bros.	582 0 0
Cash & Co.	554 0 0
G. & E. Bradley (*recommended*)	553 0 0
Architect's estimate (education)	570 0 0

For electric lighting and bells in a secondary school on the West Hill site, Wandsworth.

Foster-Curtis & Co.	£876 14 9
Whitehead Bros.	848 9 0
Casperds	824 10 0
MacDonald	796 10 0
Taylor & Co.	789 0 0
Harland, Bowden & Co.	771 0 0
Harper Electric Co.	762 9 0
Newton & Co.	750 0 0
Mecredy, Eaton & Davidson	740 0 0
Schulz & Co.	740 0 0
Tilley Bros.	722 12 0
Weston & Sons	720 0 0
Larkins & Co.	719 14 0
Bridger & Co.	694 9 0
Pinching & Walton (*recommended*)	665 3 0
Love & Sons	655 0 0
Chief engineer's estimate	725 0 0

For paving Eatonville Road, Balham. Mr. P. DODD, borough engineer.

Harber & Co. (*recommended*)	£799 1 7
Borough engineer's estimate	856 15 11

For the making-up and paving of Bridgford Street, Springfield. Mr. P. DODD, borough engineer.

Wall (*recommended*)	£373 5 0
Borough engineer's estimate	443 8 7



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LONDON—*continued.*

For the supply of deal blocks for use in the L.C.C. tramways department. (1) 100,000 3-inch by 9-inch by 4½-inch, for depôts north of the Thames; (2) 50,000 3-inch by 9-inch by 4½-inch for depôts south of the Thames; and (3) 50,000 3-inch by 9-inch by 4-inch to depôts south of the Thames.

1 *and* 2. *Price per thousand.*

	Delivered by barge at			Delivered by van at				
	Metropolis Wharf.	Deptford Wharf.	Battersea Wharf.	Metropolis Wharf.	Parkhurst Road.	Deptford Wharf.	Oval Depôt.	Battersea Wharf.
Sir William Burnett & Co.	£6 12 6	£6 12 6	£6 12 6	£6 12 6	£6 12 6	£6 12 6	£6 12 6	£6 12 6
Burt, Boulton & Haywood	6 11 9	6 7 9	6 7 9	6 11 9	6 11 9	6 10 9	6 10 9	6 12 9
Improved Wood Pavement Co.	6 11 6	6 8 6	6 8 6	6 13 9	6 13 9	6 9 9	6 13 9	6 13 9
Acme Flooring and Paving Co.	6 9 9	6 9 9	6 9 9	6 11 9	6 11 9	6 11 9	6 11 9	6 11 9
Howard Bros. & Co., Commercial Wharf (*recommended*)	6 7 2	6 6 4	6 6 4	6 10 5	6 11 3	6 10 5	6 11 3	6 11 3

3. *Price per thousand.*

	Delivered by barge at		Delivered by van at		
	Deptford Wharf.	Battersea Wharf.	Deptford Wharf.	Battersea Wharf.	Oval Depôt.
Sir William Burnett & Co.	£5 19 9	£5 19 9	£5 19 9	£5 19 9	£5 19 9
Acme Flooring and Paving Co.	5 17 6	5 17 6	5 19 6	5 19 6	5 19 6
Improved Wood Pavement Co.	5 15 0	5 15 0	5 16 0	5 19 3	5 19 3
Burt, Boulton & Haywood	5 13 9	5 13 9	5 16 3	5 18 0	5 16 3
Howard Bros. & Co., Commercial Wharf (*recommended*)	5 12 9	5 12 9	5 16 4	5 17 1	5 17 1

For cleaning and painting work at L.C.C. schools.

Contracts to be sealed.

Battersea Park Road, Battersea.
Triggs £330 0 0

New Park Road, Clapham.
Rice & Son 289 0 0

The Deptford Park, Deptford.
F. & T. Thorne 397 0 0

Baltic Street, Finsbury.
Mason & Co. 252 0 0

New King's Road, Fulham.
Triggs 399 0 0

Old Woolwich Road, Greenwich.
Groves 410 0 0

Queen's Road, Hackney.
Woollaston Bros. 350 0 0

Scawfell Street, Haggerston.
Press, Robinson & Co. 388 0 0

Drury Lane Day Industrial School, Holborn.
Hornett 312 10 0

Blackstock Road, Islington.
Stevens & Sons 437 0 0

Pakeman Street, Islington.
Mather 340 0 0

Yerbury Road, Islington.
Langsford 457 0 0

Kennington Road, Kennington.
Ford 334 0 0

The Springfield, Kennington.
Triggs 441 0 0

Brownhill Road, Lewisham.
Kazak 390 0 0

Haseltine Road, Lewisham.
Groves 428 0 0

Crampton Street, Newington.
Glendinning 488 10 0

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LONDON—*continued.*

Salters Hill, Norwood.

Brown & Son	407	0	0

School of Marine Engineering and Navigation, Poplar.

Vigor & Co.	395	0	0

Silwood Street, Rotherhithe.

Leng	430	0	0

Hearnville Road, Wandsworth.

Rice & Son	373	0	0

Oak Lodge (deaf), Wandsworth.

Triggs	262	0	0

Buckingham Gate, Westminster.

Staines & Co.	300	0	0

St. Dunstan's Road, Fulham.

Johnson	£941	0	0
Roberts & Co.	860	0	0
Bendon	853	0	0
Brown & Sons	851	15	0
Richards & Co.	839	0	0
Lole & Co.	834	0	0
J. & W. Drake	827	0	0
W. R. & A. Hide	825	0	0
McArthur & Co.	809	10	0
A. & F. Polden (*recommended*)	608	0	0

Colls Road, Peckham.

Glendinning	£809	0	0
Line	645	0	0
Holliday & Greenwood	635	0	0
Goad	623	0	0
Rice & Son	606	3	2
King	519	0	0
Bragg & Sons	517	0	0
Read	515	0	0
Parker & Sons	515	0	0
Maxwell Bros. (*recommended*)	505	0	0

Mina Road, Walworth.

Appleby & Sons	£877	0	0
Turnbull & Son	860	0	0
Goad	847	0	0
Garrett & Son	702	0	0
Fenn	688	0	0
Parker & Sons	666	0	0
Maxwell Bros. (*recommended*)	636	0	0

LONDON—*continued.*

Goodrich Road, Dulwich.

Read	£684	0	0
Bragg & Sons	675	16	0
Orpin	664	0	0
Mitchell & Son	654	8	0
Parker & Sons	652	0	0
Line	645	0	0
Leney & Sons	637	0	0
Young	621	0	0
Garrett & Son (*recommended*)	554	0	0
Brown & Son	519	0	0

MARLOW (BUCKS.).

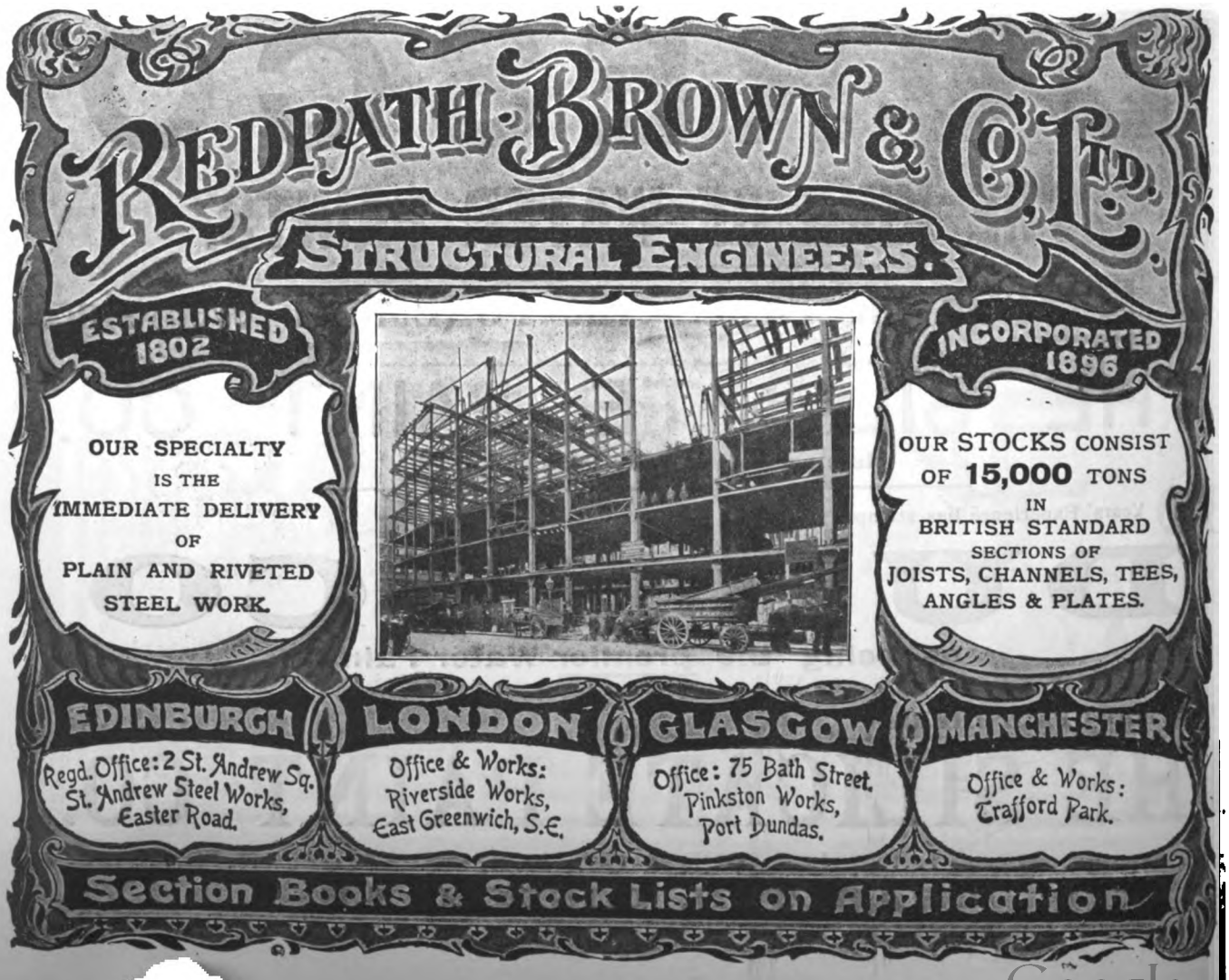
For bacterial contact filters, pump well, engine house, outfall to river, &c., at Marlow, for Messrs. Thomas, Wethered & Sons, Ltd. Mr. W. FAIRLEY, engineer, 69 Victoria Street, Westminster, S.W.

Moran & Son	£2,378	0	0
E. & E. Iles	2,148	0	0
Kavanagh & Co.	2,111	13	4
Dean & Perkins	1,988	12	1
Pedrette	1,893	14	1
Griffiths	1,855	6	5
Catley	1,850	0	0
Dixon	1,817	12	10
WATSON, Ascot (*accepted*)	1,756	0	0

PORTSMOUTH.

For erection of a nurses' home at the Royal Portsmouth, Portsea, and Gosport Hospital. Mr. C. W. BEVIS, F.R.I.B.A., architect, Southsea.

Jones & Son	£7,890	0	0
Davis	7,765	0	0
Coltherup & Woods	7,750	0	0
Light & Son	7,587	0	0
Croad	7,300	0	0
Wakeham Bros.	7,275	0	0
Crockerell	7,231	0	0
E. & H. Sprigings	7,225	0	0
SALTER, Portsmouth (*accepted*)	6,997	0	0



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ILLUSTRATIONS.

"THE ANNUNCIATION."—CARTOON FOR TEMPERA PAINTING IN MATSON CHURCH, GLOUCESTER.

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HOUSE AT EDGBASTON, BIRMINGHAM.

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OXFORD COLLEGE SERIES, HERTFORD.—QUAD.

SOLIHULL.

For erection of aged and chronic wards, &c., for the Guardians of the Solihull Union. Messrs. W. H. WARD, architects, Paradise Street, Birmingham.

Bloxham	£7.281	0	0
Horton	7.277	0	0
Dorse	6.995	0	0
Barnsley & Sons	6.989	0	0
Garfield	6.984	0	0
W. & J. Webb	6,981	0	0
Robinson	6,970	0	0
Fenwick	6,950	0	0
Rowbotham	6,940	0	0
Whitehouse & Sons	6,921	0	0
Smith & Co.	6,910	0	0
Webb & Son	6,900	0	0
Sapcote & Sons	6,855	0	0
Grove & Sons	6,797	0	0
Smith	6,735	0	0
Gibbs	6,573	0	0
Pattinson & Sons	6,469	0	0
Bragg Bros.	6,448	0	0
T. & W. Thompson	6,300	0	0
DALLOW & SONS, Black Heath (*accepted*)	6,240	0	0

SOLIHULL.

For steam, hot and cold water supplies, and steam heating apparatus, for the Guardians of the Poor of the Solihull Union, Warwickshire. Messrs. W. H. WARD, architects, Paradise Street, Birmingham.

Rosser & Russell	£415	0	0
Hope & Sons	375	0	0
Reynolds & Co.	365	0	0
Southall	365	0	0
Stott & Co.	347	2	6
Moorwood, Sons & Co.	319	0	0
Parker, Winder & Achurch	300	0	0
The Griffin Ironworks Co.	299	2	6
Haden & Sons	293	0	0
Taylor	280	0	0
THE BRIGHTSIDE FOUNDRY CO., Birmingham (*accepted*)	272	0	0

SITTINGBOURNE.

For the erection of a new elementary school at Sittingbourne for the Kent education committee. Mr. W. H. ROBINSON, M.S.A., Caxton House, S.W.

Sanderson	£9,787	2	9
Edwards	5,582	0	0
Morse & Co.	5,195	0	0
Patrick	5,001	0	0
Higgs	4,995	0	0
Drowley & Co.	4,910	0	0
Dixon	4,882	0	0
Godden & Son	4,818	0	0
Hayward & Paramore	4,771	0	0
Thomas & Edge	4,762	0	0
West Bros.	4,755	0	0
Gates & Sons	4,750	0	0
Spencer, Santo & Co.	4,738	0	0
Wallis & Sons	4,721	0	0
Ingleton	4,697	0	0
Skinner	4,687	0	0
Fuller & Sons	4,675	0	0
Amos & Foad	4,669	0	0
Tidy	4,649	0	0
Denne & Son	4,640	0	0

"HESTIA" GRATES WITH BLOWER
Register, Interior, or Mantel Register.

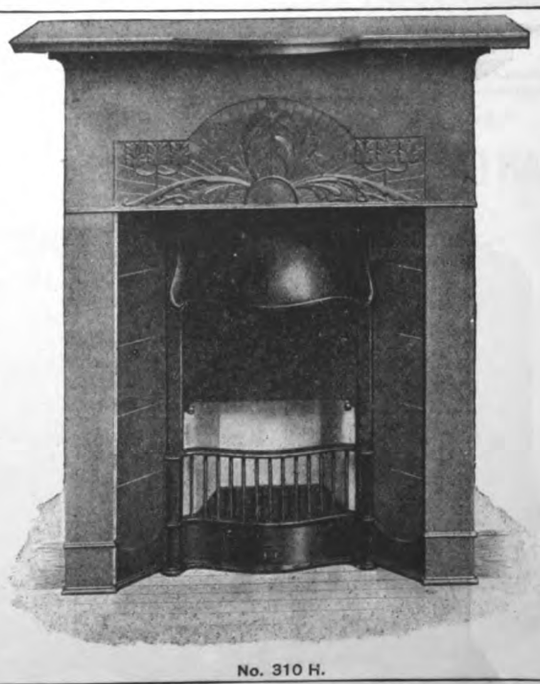
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Blower, Swing Canopy and Damper combined.
SIMPLE in CONSTRUCTION and ACTION (no part can get out of order).
BLOWER is hidden behind canopy when not in use, and when wanted is EASILY LOWERED and REPLACED (no fastening required).
BLOWER quickens or revives a fire.
DAMPER and CANOPY save fuel and completely control combustion.
ARTISTIC, CONVENIENT, INEXPENSIVE.

The "Hestia" Grates hold the Certificate of the Incorporated Institute of Hygiene.

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Telegrams: "CAMELON, FALKIRK."
Makers of Stoves and Ranges; Baths (Porcelain, Vitreous and Metallic Enamelled); Pipes and Fittings for Rain Water, Soil, Hot Water and Gas; Furnace Pans, &c., &c.

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SITTINGBOURNE—*continued.*

Monk	4,601	10	0
Pethick Bros.	4,588	0	0
Wise	4,577	0	0
Barker & Son	4,499	0	0
Jones & Andrews	4,475	0	0
Ballard & Co.	4,464	0	0
Bishop & Sons	4,371	0	0
Davison	4,347	0	0
Seager	4,336	0	0
W. & L. BOWES, Milton (*accepted*)	4,312	10	0

SURBITON.

For erection and completion of extensions to the electricity works in Ewell Road, for the Urban District Council. Mr. JOHN ARMITAGE, architect, Sanctuary House, Westminster.

Hawkins & Co.	£2,115	0	0
Casse	1,937	0	0
Kavanagh & Co.	1,758	0	0
Coles	1,750	0	0
Thompson & Sons	1,630	0	0
Turtle & Appleton	1,580	0	0
Minter	1,576	0	0
Holliday & Greenwood	1,569	0	0
Patman & Co.	1,550	0	0
Carmichael	1,549	0	0
Kearley	1,513	0	0
Limpus & Son	1,500	0	0
Jarman & Co.	1,499	0	0
Deacon & Son	1,498	0	0
Turner	1,496	0	0
Cæsar Bros.	1,478	0	0
Gibson & Son	1,395	0	0
Nightingale	1,369	0	0
F. & G. Foster	1,358	0	0
Spencer, Santo & Co.	1,350	0	0
Fryer & Co.	1,299	0	0
PASTERFIELD & ENGLISH, Streatham (*provisionally accepted*)	1,266	0	0

WALES.

For erection at Briton Ferry of fifty-one houses for the working classes, for the Urban District Council. Mr. H. ALEX. CLARKE, architect and surveyor, Briton Ferry.

W. Davies	£12,026	0	0
Jones & Thomas	11,785	0	0
W. P. & E. Williams	11,285	0	0
Davies & Co.	11,239	0	0
Gower	10,510	0	0
Evans	10,340	0	0
WATERS, Briton Ferry (*accepted*)	9,555	0	0
Architect's estimate	9,745	0	0

For erection of fifty or more cottages at Ebbw Vale, for the Mount Pleasant "Model Cottage" Building Club. Mr. W. HARRIS, architect and surveyor, Bank Chambers, Bargoed.

Gradwell & Co., 140*l.*, 145*l.* 4*s.* and 156*l.*
Edwards, 135*l.*, 137*l.* and 147*l.*
Davies & Co., 125*l.*, 135*l.* and 150*l.*
Rowland & Davies, 124*l.* 10*s.*, 133*l.* and 147*l.*
Davis, 116*l.*, 126*l.* 2*s.* 6*d.* and 137*l.* 5*s.* 6*d.*
WATKINS, Ebbw Vale, 115*l.* 15*s.*, 124*l.* 10*s.* and 137*l.* (*accepted*).

For erection of schools at Tallis Town, Ebbw Vale, Mon. Mr. H. WATERS, architect, Ebbw Vale.

COLBORNE, Swindon (*accepted*)	£14,200	0	0

For erection of a workman's institute and gymnasium at Wattstown, Rhondda Fach.

Williams	£3,900	0	0
Isaac	2,992	0	0
EVANS BROS., Cathays, Cardiff (*accepted*)	2,747	0	0
D. Richards	2,600	0	0
A. Richards	2,194	0	0

WALLASEY.

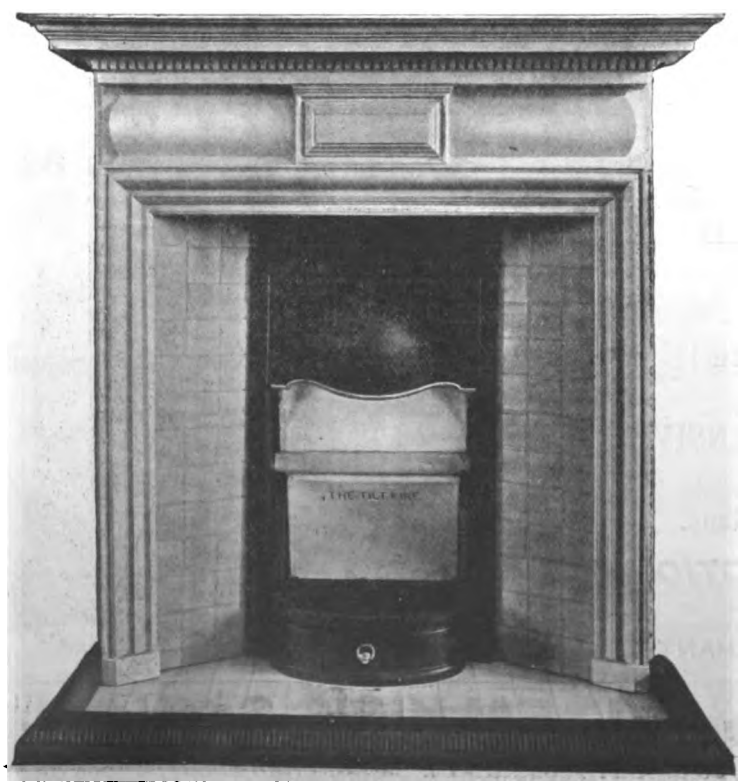
For the erection of a secondary school for the Cheshire County Council.

HUXLEY, Malpas (*accepted*)	£15,430	0	0

MR. JOHN T. WOODARD, architect and surveyor, is removing his offices on Midsummer Day to Garrick House, 27 Southampton Street, Strand, W.C.

THE "TILT" FIRE

¶ With the "TILT" FIRE you cannot fail to get a Bright Fire in a Few Minutes.



¶ This fire aroused considerable interest at the great Building Exhibition, and when seen will be appreciated.

¶ The tilting arrangement is so simple that there is nothing to get out of order. No other hearth fire has such advantages. Many hundreds already sold.

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TRADE NOTES.

MR. R. T. BECKETT, architect, is moving his office from Liverpool to 7 Abbey Buildings, Chester, on June 28.

MACKAY'S patent direct-acting ventilators, supplied by Messrs. Cousland & Mackay, Glasgow, the sole makers, have been used for the ventilation of the New Bridge Street U.F. Church, Alexandria, erected from the plans of Messrs. H. & D. Barclay, architects, Glasgow.

AMONG the clocks recently erected by Messrs. Wm. Potts & Sons, of Leeds and Newcastle, or recently ordered, are an illuminated turret clock and pier clock with bells, at Bournemouth, a clock with three dials at Castle Rock Church, Londonderry, and a new clock at the parish church, Kirkby Malzeard, near Ripon.

MESSRS. GEORGE MILLS & CO., LTD., engineers, Radcliffe (proprietors of the "Titan" Sprinkler), have received the following letter from the *Manchester Guardian*, Ltd.:—"You will be interested to hear that a fire occurred here on the 14th inst., simultaneously with the explosion in Deansgate, and that the sprinklers which you installed for us last year acted promptly, not only keeping the fire down in a rather dangerous spot just under the roof, but giving the alarm on the gong. The fact that the fire occurred in the highest part of the building makes the test as complete as we could well desire, and we need hardly say that we have every reason to be pleased that we installed them."

J. G. CHILDS & CO., LTD., electric and hydraulic engineers, Willesden Green, N.W., are exhibiting at the Royal Agricultural Show, Gloucester, this week. The principal feature is a 24-feet diameter plant, which consists of their special turbine upon a steel tower 60 feet high, with vertical shaft driving a Morris Hawkins variable speed generator placed vertically at fifty volts, and charging a twenty-eight cell Pritchett & Gold battery, having a discharge capacity of 450 ampere hours. They are lighting the show cottage of the Country Gentlemen's Association, 200 yards distant, and supplying current for working an electric grill there by means of the wind turbine. Another point of interest is that the storage battery is divided into two parts; fifty volts can be used for working the cooking apparatus and other machines exhibited, and 25 volts for the lighting. The plant also supplies energy for many of the other exhibits.

VARIETIES.

THE National Art Collections Fund have removed their offices to Queen Anne's Chambers, Broadway, Westminster, S.W.

THE Royal Oak Hotel, at Bowness, in the Lake District, is shortly to be enlarged and altered from the plans of Mr. J. Hutton, architect, of Kendal.

MR. W. S. MAXWELL, of Gainsborough, has been appointed surveyor of the Horncastle North District. The salary is 140*l.* a year, and there were eighty-five applicants.

THE Branksome Tower Hotel, Bournemouth, is to be considerably enlarged. The plans, which have been prepared by Mr. H. E. Hawker, architect, Bournemouth, provide for thirty-two new rooms, and the alterations and extensions have received the necessary magisterial sanction.

GLASGOW libraries committee recommend that, in place of Arbroath stone stairs, as included in the estimate for the new Mitchell Library in North Street, stairs formed of reinforced concrete be substituted, the treads and risers to be covered with marble, at an estimated extra cost of about 250*l.*

MR. A. W. SMITH, F.R.I.B.A., Maidstone, has prepared plans and estimates for the erection of a hospital for the Maidstone Rural Council at a cost of 6,400*l.*, exclusive of site. The matter has been deferred for further consideration.

MR. H. H. COUZENS, A.M.I.E.E., has been appointed chief electrical engineer for the borough by the West Ham Town Council. Mr. Couzens is at present deputy electrical engineer at Bristol. The salary is 500*l.* per annum, rising to 700*l.* by annual increments of 50*l.*

THE Chelmsford education committee reported last week that Mr. W. H. Pertwee, the architect for the proposed school in Hill Road, which site had been abandoned, was prepared to accept 75*l.* for preparing those plans in view of being appointed architect for the schools in Trinity Road. The bill was for 100*l.* It was agreed to settle the account at once.

THE Birmingham Board of Guardians have agreed to the erection of a new laundry at the workhouse in accordance with plans prepared by Mr. W. H. Ward, at an estimated cost of 5,200*l.*, including machinery. The report of the

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We have, under the circumstances, strongly advised our client to have another "Sine Qua Non" fixed, and so save the other half.
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infirmary management committee recommending the adoption of plans for a matron's house at an estimated cost of 600*l.* was also agreed to.

A COMMITTEE has been formed to promote a national memorial to Gainsborough in his native town of Sudbury. The original scheme was limited to the county of Suffolk, but a meeting held at the House of Commons determined to make a general appeal for funds. A committee was formed, with the Marquess of Bristol as chairman, and has held two meetings. The committee ascertained that a statue by one of the best artists would cost 2,000*l.*, half of which has been promised.

MESSRS. EDWIN FOX & BOUSFIELD will offer at auction on Wednesday next at the Mart, Tokenhouse Yard, the freehold residential property "Bowden House," Harrow-on-the-Hill, with grounds extending to nearly thirty acres. The land has a frontage of about 1,600 feet to the London main road, and along the west side is a grass lane which will probably become a leading thoroughfare. The estate presents, therefore, large building prospects.

THE Liverpool Green Room Amateur Dramatic Society, Mr. B. A. Malandrinos, president, are considering the advisability of erecting a centrally situated hall in Liverpool, suitable for concerts, recitals, lectures, and stage plays, and capable of accommodating about 700 people. It is believed such a building could be provided at a cost of 14,000*l.* inclusive of site.

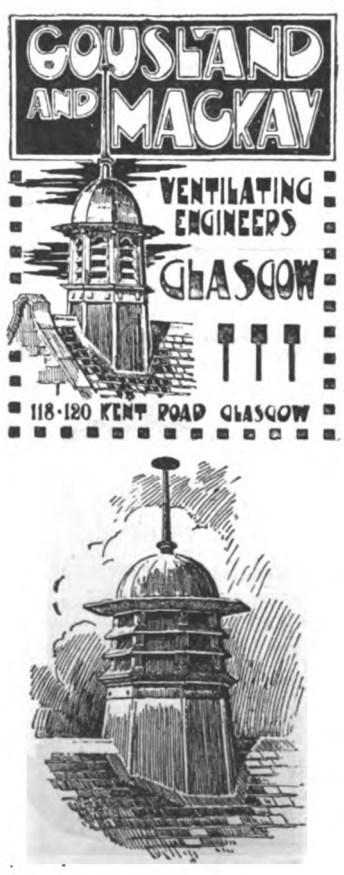
THE sanitary and plans committee of the Middlesbrough Corporation held last week a special meeting to consider a report recommending the adoption of the water carriage system. It was pointed out in the joint report by the Borough Engineer, Medical Officer, and Sanitary Inspector that under the Public Health Amendment Act, 1907, the Corporation could now demand water-closets in every new building. They recommended this to be done, also the gradual abolition of the existing pan-closets and privy middens, of which there were about 17,000 in Middlesbrough. The cost of conversion would be about 95,000*l.* The committee agreed that the Corporation adopt the Act, also that no building plans be passed in future which do not provide water-closets.

AT the last meeting of the Wexford County Council a letter was read from the Local Government Board stating that of the twenty-three candidates whose names were submitted for the position of County Surveyor, eleven were qualified for appointment. Of the twelve others, five withdrew their application or did not attend the examination, five failed, and two were ineligible. There were only four candidates before the Council—viz., William Fitzgerald Barry, Co. Surveyor, Monaghan; Robert B. Chillingworth, 21 Charlemont Place, Dublin; Stafford Gaffney, 46 Northumberland Place, Dublin; and Ignatius O'Sullivan, Highland Railway, Inverness, Scotland. Mr. S. Gaffney was ultimately elected.

MR. NATHAN SOLOMON JOSEPH, F.R.I.B.A., 18 Porchester Terrace, Bayswater, W., died on the 11th inst., at the age of seventy-five. He became a member of the Institute forty-six years ago, and had considerable practice, especially in the construction of dwellings for the working classes. He was architect to the Guinness Trust and the Four per Cent. Industrial Dwellings Company, and was also employed for similar work by the London County Council and other public bodies. Mr. Joseph retired six years ago.

IT was reported on Tuesday at the meeting of the Middlesbrough ferry committee that the contract with Sir William Arrol & Co., of Glasgow, for the construction of the transporter bridge at Middlesbrough had been completed, and the firm were about to proceed with the work. The committee decided to advertise for quotations for the testing of the steel to be used for the bridge. The steel is to be made in the Glasgow district, and the testing will be at the manufacturers' works.

THE Blackrock Urban Council (Ireland) have received a letter from the Local Government Board stating that they had received the report of their chief engineering inspector, Mr. Cowan, on the inquiry held into the application of the Council for sanction to a loan of 14,500*l.*, for the purpose of erecting working-class lodging-houses. The plans submitted for the buildings could, it is remarked, be materially improved, as indicated by the Inspector at the inquiry, and the Council would do well to obtain the advice of an architect who has had special experience of such work. The proposal to erect sixteen houses to be let at 8*s.* a week seems to the





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Board questionable, as the rent appears excessive for houses to be erected under the Acts in Ireland, and it is doubtful if such rents could be secured. An architect is to be appointed.

THE Shrewsbury Town Council have adopted the recommendation of the improvement committee for the erection of new stables and depôt at Renshill for the accommodation of the horses of the Corporation, for office stores, carpenter and blacksmith's shop and other conveniences, at a cost of about 8,000*l*. It was pointed out that the scheme, owing to the position of the new stables and yard, would effect a saving of at least 200*l*. per annum in time and labour. The report was also adopted of the sanitary committee, who advised the erection of a public slaughter-house at Renshill at a cost of 8,080*l*., including the cost of land and existing private slaughter-houses in that vicinity.

AT the Mansion House, Mr. Alderman Howse some weeks ago dismissed a summons brought by J. Lyons & Co., Ltd., against the Corporation, under the Public Health Act, for failing to remove rubbish from a restaurant in the Poultry. The firm appealed in the High Court. The case raised the question whether the refuse of an eating-house or restaurant was "house" or "trade" refuse. The Lord Chief Justice said they were convinced that the refuse in question was house refuse. Therefore the appeal would be allowed. He hoped that the question would be further argued before the Court of Appeal, and, if necessary, before the House of Lords, because it was of considerable difficulty and importance.

AT a recent meeting of the Swadlincote Urban Council a letter was read from Mr. Carnegie, the donor of the public library, in reply to a letter from the Council asking him to make up a deficit of 317*l*. 10*s*. on the building scheme. Mr. Carnegie's reply to the request was that if the Council had been a little more economical in laying out the funds, the application would not have been necessary. It was absurd, the letter proceeded, that planning, supervision, and expenses of the competition for and preparation of designs should come to 13 per cent. of a total expenditure of 4,000*l*.; and, in view of the fact that Mr. Carnegie had sent 202*l*. in June of last year to meet the deficit, he failed to see how they could reasonably ask for the present deficit to be made up. A member said the architect led the committee to believe that, whatever accounts he passed, Mr. Carnegie would pay. No action was decided upon.

THE Belle Steamers announce that the starting time of the Nore steamer from Fresh Wharf, London Bridge, has been altered on Sundays from 1.30 P.M. to 2.30 P.M. This will enable people residing in the suburbs to reach the metropolis in time to catch the steamer. The boat will call en route at Greenwich at three o'clock, North Woolwich at 3.30, and proceed to Gravesend and round the Nore lightship and back to the same piers. Commencing July 5 trips will be run on Mondays, Thursdays and Saturdays to the Nore, leaving an hour earlier than the above times, and will call at Southend and Sheerness. Special steamers will leave Fresh Wharf at 10 A.M. to view the fleet in the Thames on July 19, 20, 21 and 22. Full details can be obtained on application to Belle House, Fish Street Hill, E.C.

THE Special Commission of the executive officers of the British Fire Prevention Committee, which visited Berlin and Hamburg, have returned to London. The commission comprised Mr. Edwin O. Sachs, F.R.S.Ed. (chairman), Mr. Ellis Marsland (honorary secretary), Messrs. Percy Collins, J.P., and J. Herbert Dyer (members of the Executive), Mr. Horace Folker (honorary auditor), and Major Maitland Coffin, F.R.C.P. (honorary medical officer). The questions examined by the commission on the journey related chiefly to the construction of large drapery stores, warehouses, theatres, schools, and hospitals. The commission also viewed a number of petroleum stores, scenes of fires, and they had an opportunity of inspecting a number of new fire stations, and of witnessing demonstrations with modern fire appliances. On their journey outwards they visited Hanover, and some of the members of the commission also visited Kiel. At Berlin the occasion of the visit was taken by the Chief Officer of the Royal Police Fire Brigade to arrange a special display of the working of his brigade. The arrangements for the journey having been carefully prepared in advance, and the authorities having put all possible facilities at the disposal of the commission, a very large number of useful data was obtained, and it is intended, as on previous occasions, to publish the data together with illustrations in a report to be issued by the British Fire Prevention Committee.

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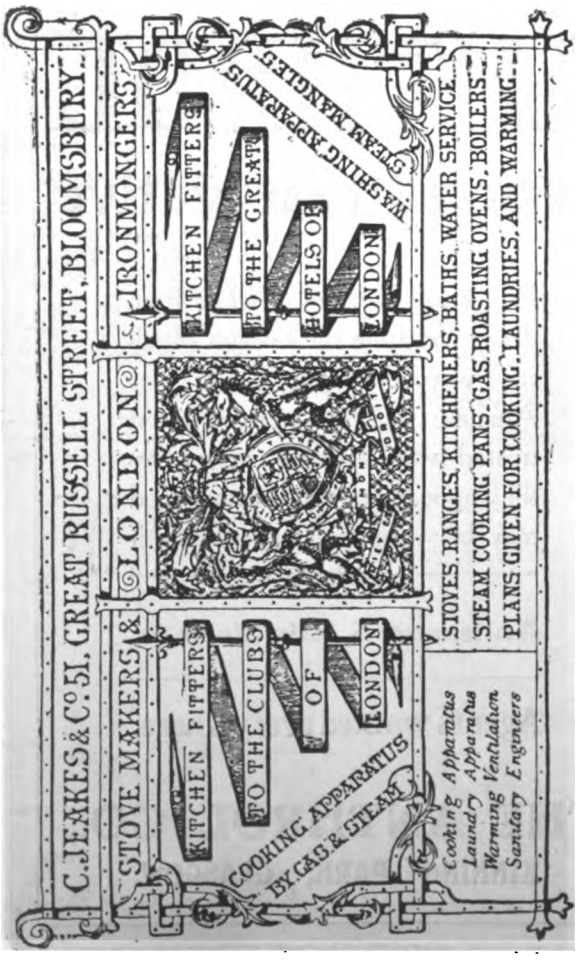
NEW CATALOGUES.

THE British Vacuum Cleaner Company seem to have installed their appliances in all the principal hotels, theatres, and shops, not to mention in Buckingham Palace, the Houses of Parliament and the Law Courts. As a general rule the plant, consisting of filter, pump and electric motor, is worked from the basement. The iron pipes in connection with the vacuum pump are carried up in the lift shafts and provided with connections on every floor. Flexible tubes are connected up to these points, the tubes being of sufficient length to reach every room on any particular floor. But the company have now thought of the multitudes of householders who do not require a plant on such a scale, but who prefer to be independent of house cleaning by contract. They have perfected a portable vacuum which runs on three broad rubber wheels, and can be connected with any electric light fixture, and only requires one person to work it.

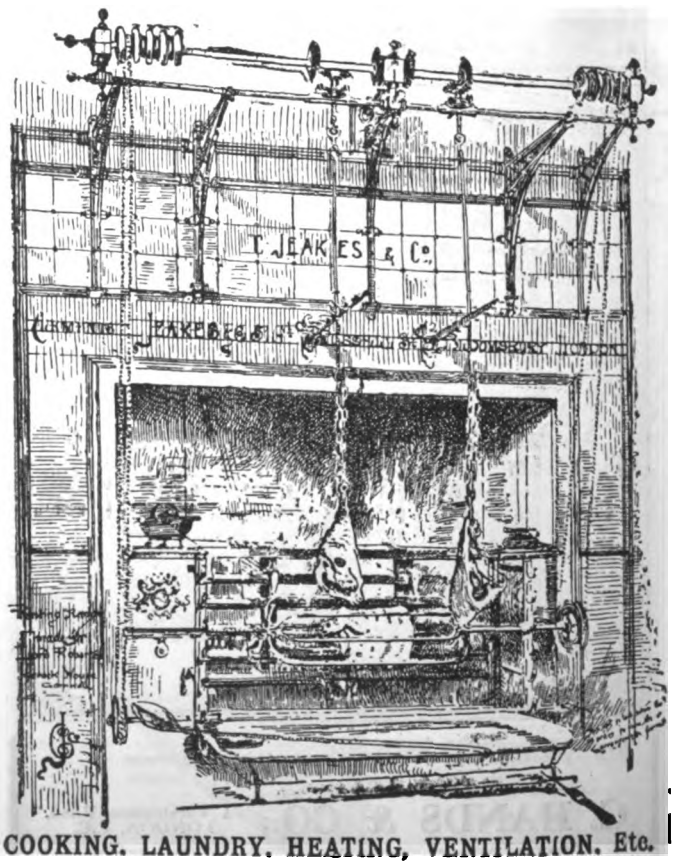
The 1909 catalogue of Messrs. Norton & Gregory, Ltd., Castle Lane, Westminster, S.W., and Glasgow, clearly shows how completely the firm meets the widely differing requirements of technical offices. Section I. deals with surveying instruments, and includes improvements which are shown for the first time, such as solid uprights for theodolites. Section II. devotes sixty pages to drawing instruments and appliances of the best quality, from pins to roller-bearing cabinets. The third and last section gives the accessories which form so important a part of office work whether it be the pencil, the indiarubber, the drawing paper, and even the office chairs. It also gives explanatory notes upon the firm's own drawing and tracing offices and plant for lithography and photo-lithography, camera work, modelling, typewriting and other aids to relieve principals from much worry and trouble. Messrs. Norton & Gregory make it their business to provide for, if not to anticipate, the special needs of their clients, and their efforts continue to enjoy an ever-increasing appreciation.

The United Kingdom Fireproofing Company, Ltd., have produced a catalogue that is striking in many respects, most particularly for its directness. The compiler apparently set himself to say all that he has to say in the fewest possible words. A brief introduction is followed by illustrations and short descriptions of the seven systems employed by the company. This is cunningly arranged, for they are set out in the centre of separate sheets with wide margins on both sides and top and bottom. The consequent impression of spaciousness is in marked contrast to that conveyed by the generality of catalogues issued by similar companies, which are calculated to daunt any but the most courageous. Six out of their seven floors are hollow; in these reinforced concrete beams are introduced at intervals, between which are placed concrete tubes, or terra-cotta lintels, or terra-cotta tubes, or (when very deep girders are employed) separate ceiling plates and cover plates. For these hollow floors no centering is required, which is a highly important feature. The weight of the U.K. floor is about half that of a solid concrete floor, thereby reducing the quantity of steelwork. There is no loss in strength, for in the first public test a floor 24 feet by 12 feet and 12 inches in thickness, consisting of hollow concrete tubes, supported on ferro concrete beams without any steel joists, withstood a load exceeding 161,000 lb., this being equal to 560 lb. a square foot, or 6.6 times the load for which it was intended. Other subsequent tests have proved no less satisfactory. The centre of the tubes may be utilised for pipes, &c., as was done in the chemical laboratory at Cambridge where they served for air ducts to the radiators, for cable trenches, &c. The catalogue gives photographs of various works, and mentions which particular system was employed and any particular points of interest. It concludes with reproductions of some working drawings of a few of their contracts, including a storage tank, swimming bath, cattle market, and water tower.

The Reiss patent system of natural ventilation has been brought to this country and manufactured in Birmingham by Mr. W. S. Vellinghausen, who purchased the British patent rights. The Reiss ventilator consists of a rectangular underframe or base, and one or two hood-shaped lifting frames overlapping each other. These iron frames, which are connected by a system of lifting levers or expanding trellis work, open uniformly on both sides, and lift very high, forming, in conjunction with the base, a shaft into which the foul air, &c., enters. It is claimed that by this means (whichever way the wind is) a constant movement of the air in the inside of the apparatus is produced since the outer air carrying off the inner air brings about an absorbing effect. The Krupp Works at Essen have over 400 of these ventilators.

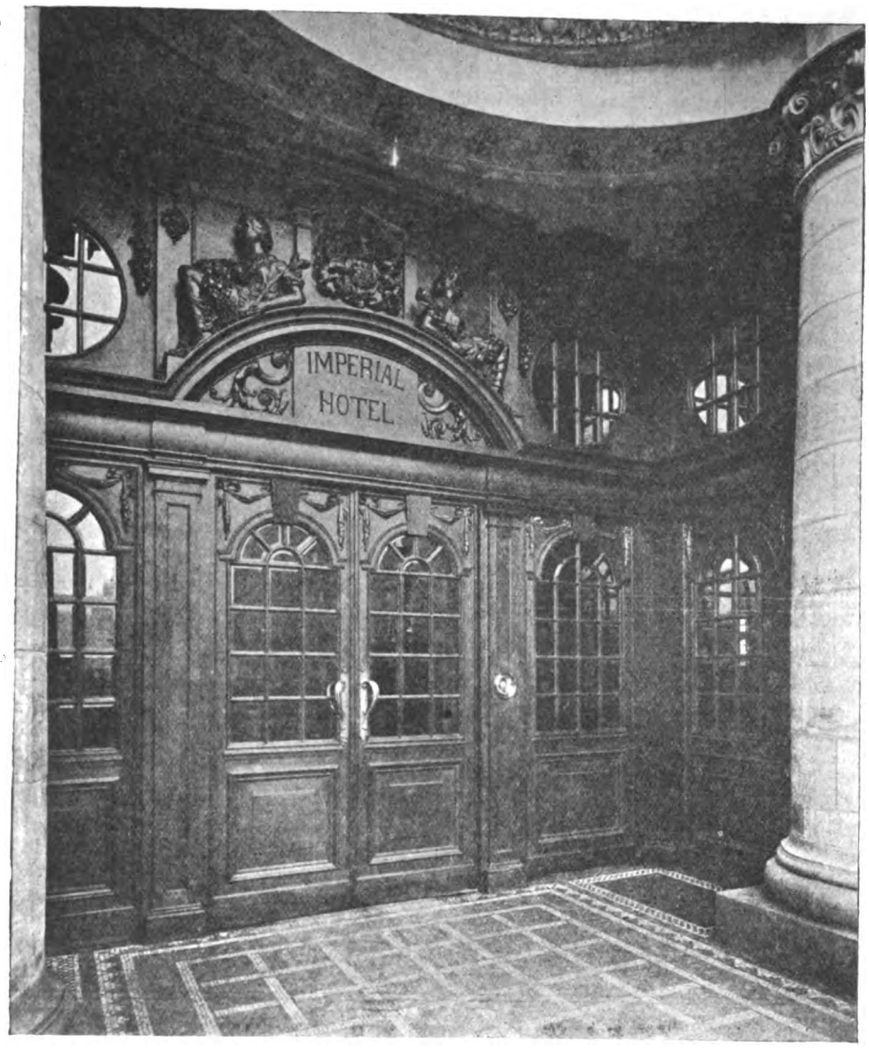


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ENTRANCE DOORS AND SCREEN. Executed by HOFLER, LTD.
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Two or three years ago, in the course of a paper read before the Royal Institute of British Architects, mention was made of the difficulty carvers continually meet with in connection with architects' indications of carving, which are often rough sketches by a junior. The architect himself merely marks on his drawing the word "carving." Unfortunately the carver feels compelled to follow out the rough outline given, whether it be bad or good. That carvers can produce excellent work, and that their work is deserving of every encouragement and assistance, is shown in the illustrated list just issued by Messrs. Hofler, Ltd., and especially in the photographs of some of the ecclesiastical work carried out by them. The firm undertake to reproduce details and designs furnished by their clients, carefully, and with the utmost fidelity. We illustrate as a specimen of their work the entrance doors of the Imperial Hotel, Russell Square. The first half of the list shows some of the designs for Austrian oak panelling and chimney pieces. Messrs. Hofler emphasize the fact that all their panelling is properly framed up out of solid 1 inch Austrian oak, and that no veneered or 3-ply panels are used. Moreover, the panelling is specially constructed to plan, so as to fit the position it is intended to occupy, without extra charge. The prices vary considerably in accordance with the difficulty of the carving. The oak chimney pieces offer a wide selection of pleasing designs.

Some excellent advice is given by Messrs. Revy, Phillips & Co., Ltd., in the introduction to sectional catalogue C1, Cooking Apparatus. It is stated for instance that a well-made apparatus of average weight will easily last four or five

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times as long as a cheap article; the aim of the company is not to submit articles at low prices, but appliances of thoroughly reliable design and quality at a reasonable figure. Stress is laid on the importance of fixing and setting being entrusted to none but an experienced contractor, or left to the company to do. It is also important to note the warning that many stoves and ranges have been ruined by being fired too severely at first. The catalogue illustrates the appliances that are now manufactured to aid the chef, such as central kitcheners, roasting ovens, carving tables, steam chests, grills, and toasters. In addition it shows numerous aids to cooking on a small as well as a large scale. Messrs. Revy, Phillips & Co., Ltd., are, it should be added, general, electrical and heating engineers; their cooking apparatus being only one department.

Messrs. R. Waygood & Co., Ltd., were the first British manufacturers to produce lifts worked by electric current. Their latest catalogue shows to what a diversity of uses they are now put. At Lisbon the company have installed a double-cage electric lift at the Santa Justa tramway station, for carrying passengers from the town to the level of the tramway at the top. The lift is constructed to raise a load of 4,500 lb. in each cage, and the height of travel is 105 feet. The cages are about 10 feet square by 7 feet 10 inches high, and the lift is capable of raising the full load at a speed of 280 feet per minute. The lifts are fitted in an ornamental iron structure, and were manufactured in the Falmouth Road works, and erected by Messrs. Waygood's men on the site. Quite different are two passenger lifts fitted for the Bournemouth Corporation to carry passengers from the cliff level to the new Marine Drive. The Ramsgate cliff lift, which was opened in July last year, makes a perpendicular ascent in a brick shaft. A special lift is made for motor-cars, with large platforms and gears of extra strength. But it is for passenger, goods and service lifts that Messrs. R. Waygood & Co., Ltd., are universally known. The company have installed them in Buckingham Palace, St. James's Palace, the new War Office, Gaiety Restaurant, numerous liners, and other places where personal comfort is a first consideration.

"Standard Steel Construction," compiled by Messrs. Hall & Pickles, iron and steel merchants, Manchester, is something more than a trade catalogue. The purpose of this well-bound and well-printed book is thus described:—"As a decided want exists of a section book which deals not only with the properties of individual sections, but shows at a glance their values in different combinations, and without loss of time enables a selection to be made of the combination best suited to the case in point, we have compiled these tables." The section book is divided into three parts giving the property tables, beam tables, and strut tables of sections. The volume concludes with a table of beam loading factors. Two plates are given; the first is for determining at a glance the shearing force in tons that a given web will safely sustain without the use of stiffeners; the second is a linen chart which shows the economical values of different types of stanchions. "Standard Steel Construction" has now reached its third edition. It may confidently be anticipated that the demands of architects, engineers and contractors, for whom it is compiled, will quickly render necessary the publication of further editions.

"To and Fro Route Directory" is a new monthly that, unlike most new periodicals, meets requirements that have never been met before. It shows "how to go from anywhere to anywhere in London," the area embraced being roughly from the Isle of Dogs to Hammersmith, and from Hampstead Heath to Deptford. It is a wonderful publication and a marvel of painstaking labour carried out on a clearly defined system. There are no doubt some small inaccuracies, as was inevitable in the initial issue, but the compilers invite corrections, and will no doubt make each successive monthly issue more and more accurate. The first part is the street directory (seemingly every street in the area comprised is given); Part 2 is a location directory, giving the leading shops, theatres, museums, businesses, baths, &c. There must be some difficulty in selection, for there are sixteen architects, thirty-two builders and ten contractors. Part 3 is the route directory, in which the directions show the quickest route from point to point, mentioning, if necessary, the train, tube, tram, 'bus and motor-'bus. It is published by Messrs. Simpkin & Marshall at 6*d*.

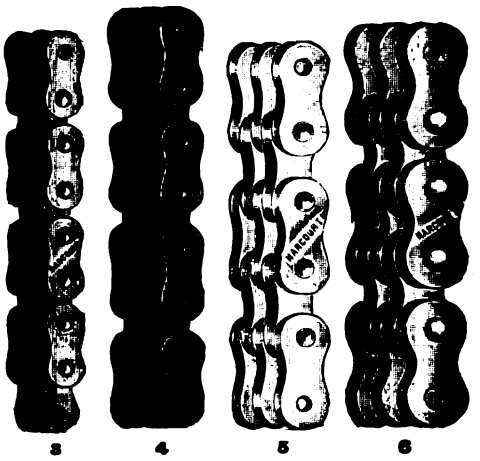
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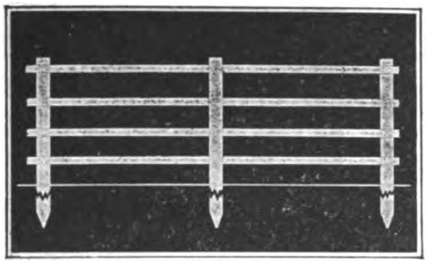
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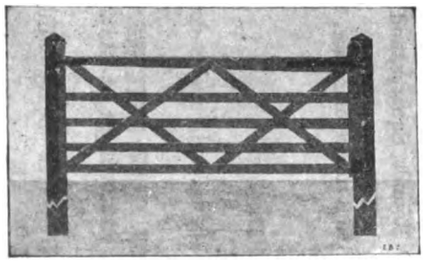
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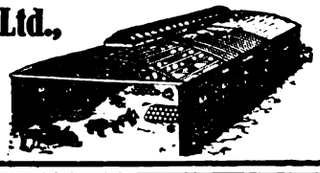
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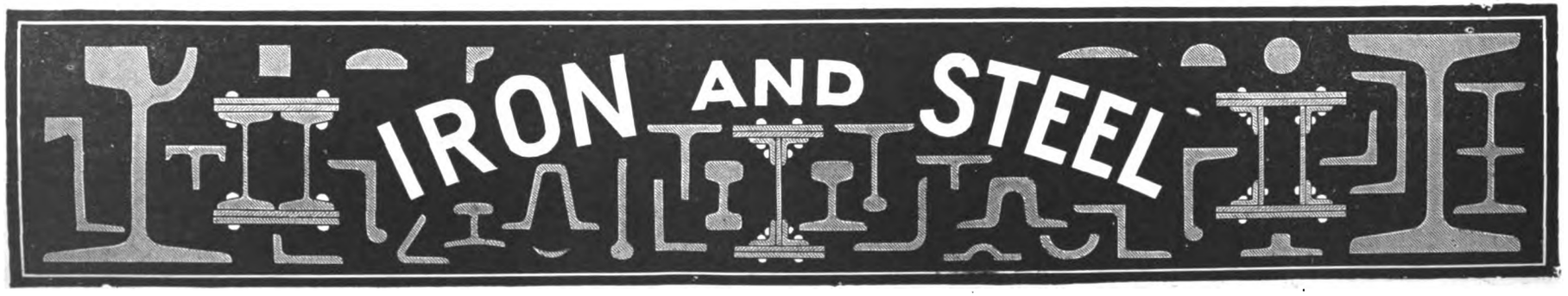
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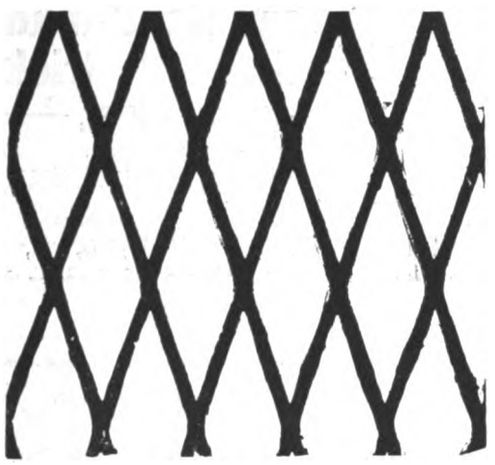


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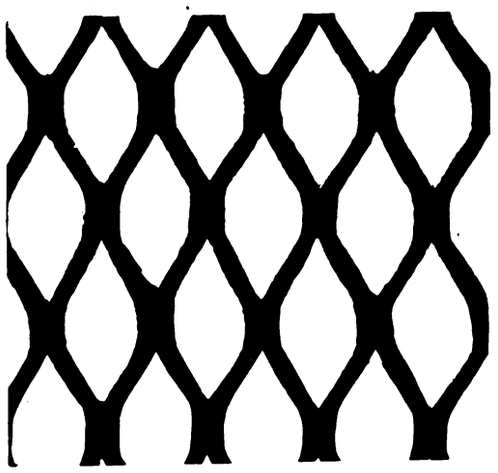
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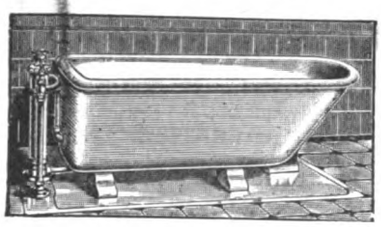
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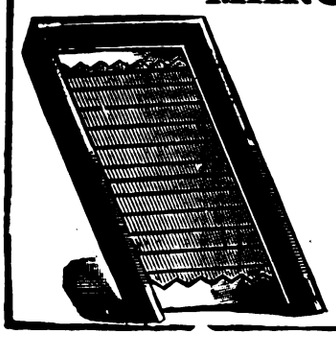
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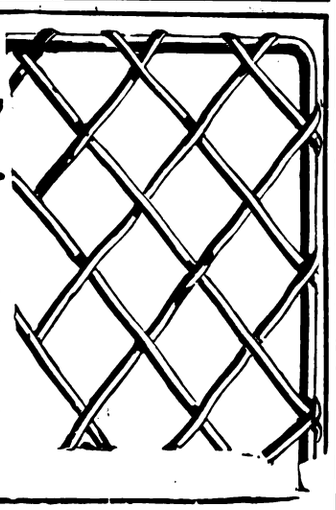
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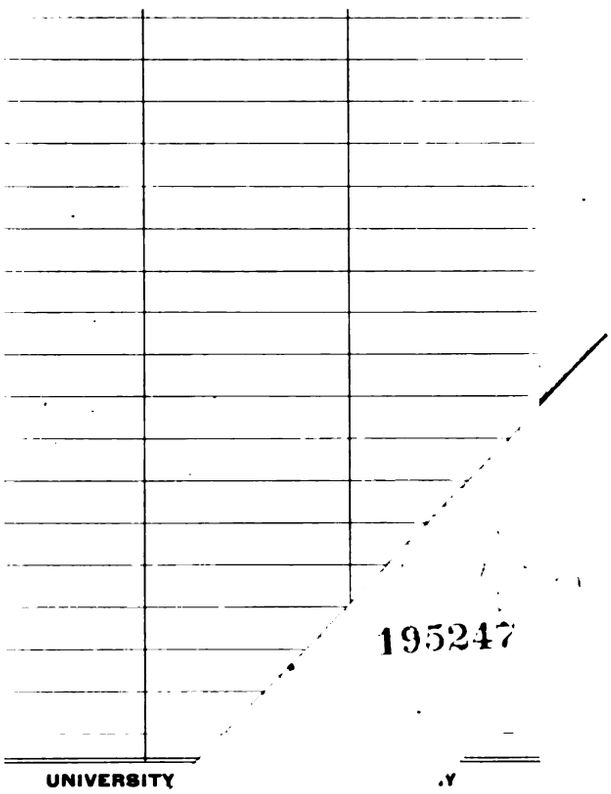
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